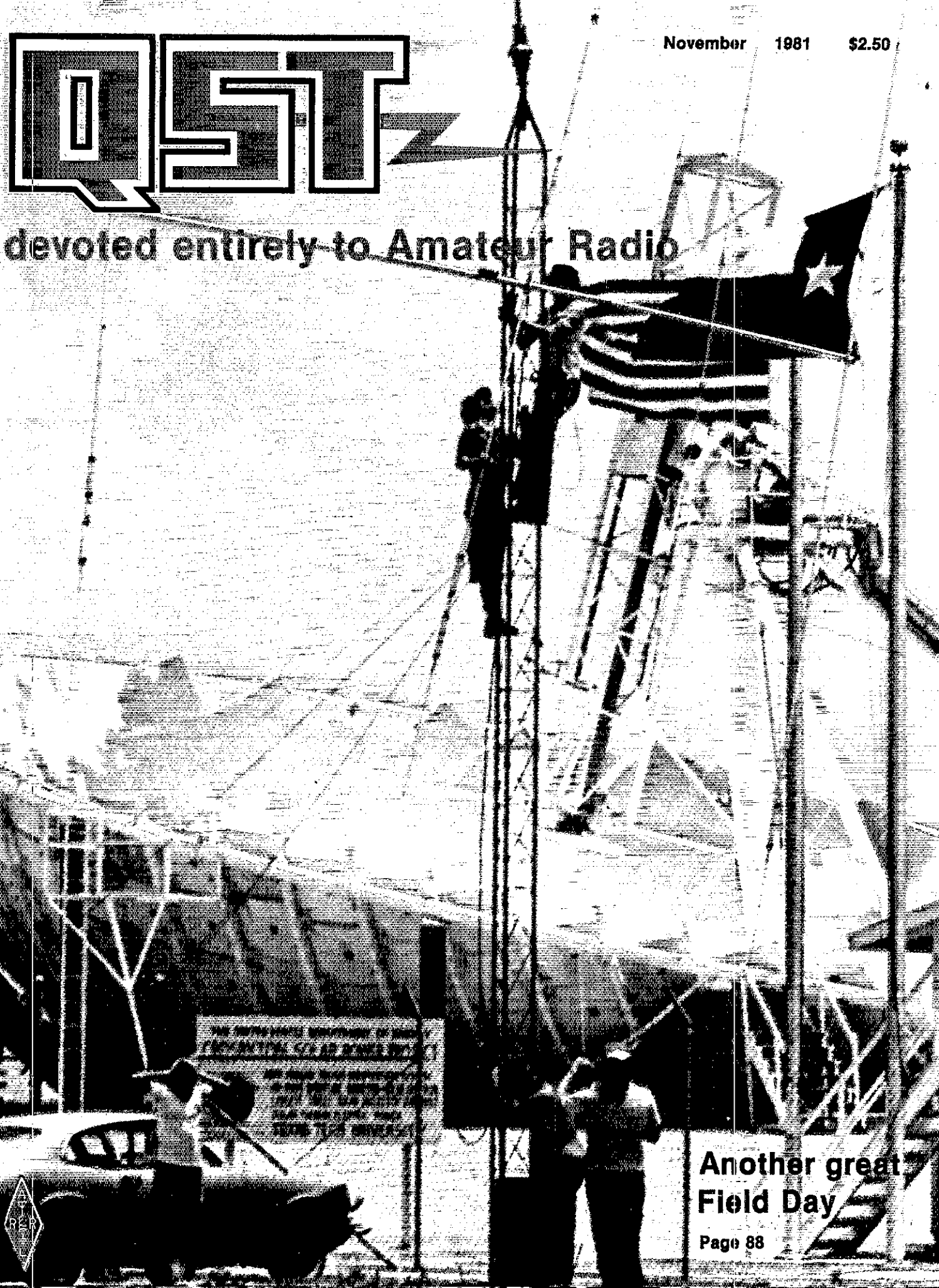
QST

November 1981 $2.50

devoted entirely to Amateur Radio



Another great Field Day

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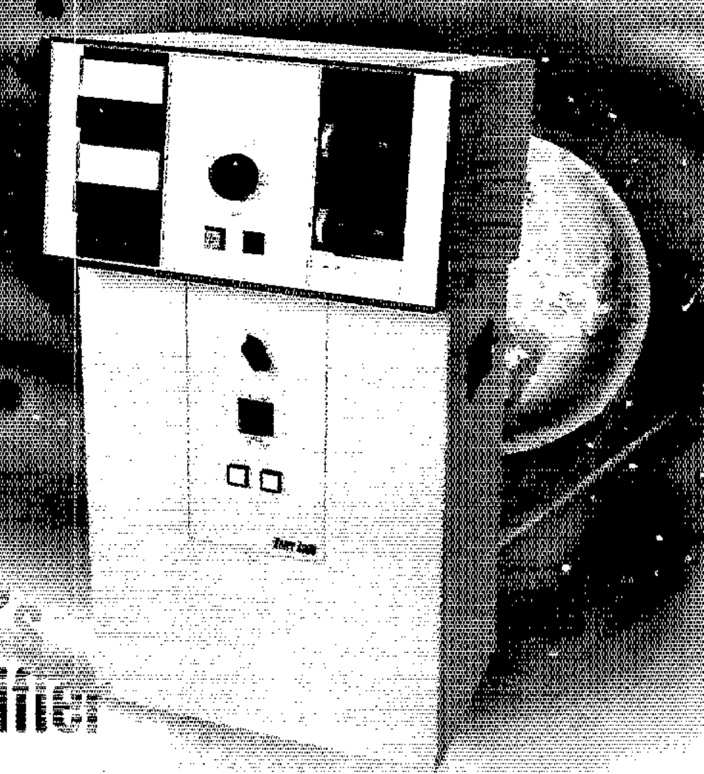

2K *Classic*

A new edition of the world's most famous linear amplifier

The 2K Classic represents the culmination of fifteen years experience in developing, manufacturing and improving the 2K series. It remains as always a "workhorse", engineered and built to loaf along at full legal power for days or weeks without rest. A look inside shows why! No expense has been spared to make the 2K a truly "Classic" Amateur amplifier. Heavy duty, top quality components along with its rugged construction assures you of trouble free operation. The 2K Classic offers engineering and features second to none. It will put your signal on the air with greater strength and clarity than you ever dreamed possible. The 2K Classic operates on all amateur bands, 80 through 15 meters (export models include 10 meters).

Features:

- Two rugged Eimac 3-500Z grounded grid triodes
- Pi-L plate circuit with silver plated tank coil
- Resonant cathode pi input circuit
- Maximum legal input on all modes

The **1KD-5** ...Another fine member of the famous Henry Radio family of superior amplifiers. And we're still convinced that it's the world's finest linear in its class. The 1KD-5 was designed for the amateur who wants the quality and dependability of the 2KD-5 and 2K-4, who may prefer the smaller size, lighter weight and lower price and who will settle for a little less power. But make no mistake, the 1KD-5 is no slouch. Its 1200 watt PEP input (700 watt PEP nominal output) along with its superb operating characteristics will still punch out clean powerful signals...signals you'll be proud of. Compare its specifications, its features and its fine components and we're sure you will agree that the 1KD-5 is a superb value at only $695.

The **2KD-5** We have been suggesting that you look inside any amplifier before you buy it. We hope that you will. If you "lift the lid" on a 2KD-5 you will see only the highest quality, heavy duty components and careful workmanship...attributes that promise a long life of continous operation in any mode at full legal power. The 2KD-5 is a 2000 watt PEP input (1200 watt PEP nominal output) RF linear amplifier, covering the 80, 40, 20, and 15 meter amateur bands. It operates with two Eimac 3-500Z glass envelope triodes and a Pi-L plate circuit with a rotary silver plated tank coil. Price $945.

And don't forget the rest of the Henry family of amateur amplifiers...the Tempo 2002 high power VHF amplifier and the broad line of top quality solid state amplifiers. Henry Radio also offers the 3K-A and 4K-Ultra superb high power H.F. amplifiers and a broad line of commercial FCC type accepted amplifiers for two way FM communications covering the range to 500 MHz.

Announcing!

A brand new "super" linear...the 3K Classic! Designed for the most critical Amateur Radio operator...the individual who wants and appreciates owning the finest.

53 YEARS OF SERVICE

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Henry Radio

Prices subject to change without notice

CT2100

HAL Puts MORE Behind The Buttons

45-1200 Baud RTTY
1-100 WPM Morse
Code

2 Page
Display

72 or 36
Character
Lines

Status
Indicator
on Screen

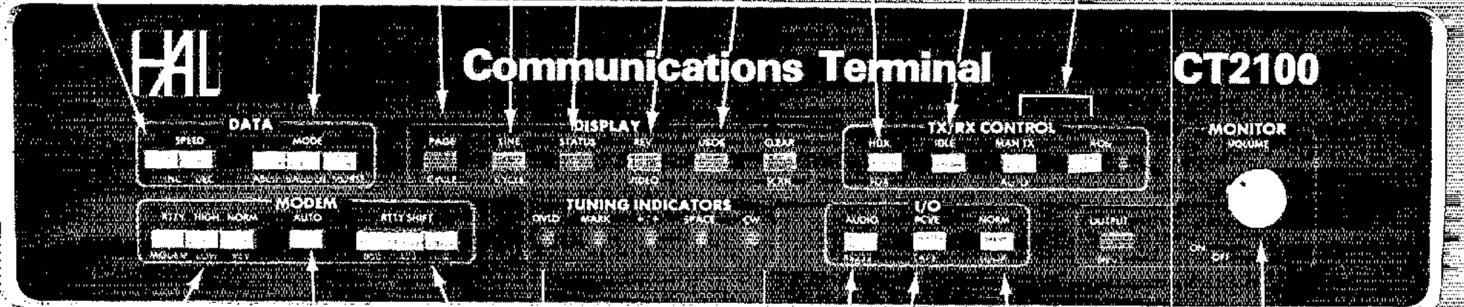
Black
or
White
Characters

Unshift
on
Space
(For Baudot)

Half
or
Full
Duplex

Synchronous
Idle
("Diddle")

Auto
TX/RX
Control



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RTTY Demodulators
- High Tones (U.S. Standard)
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- 103 Modem (1070/1270 HZ)
- 202 Modem (1200/2200 HZ)

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Mark-Hold

All 3 RTTY
Shifts
(High or Low Tones)

LED Tuning Indicators
Plus
On-Screen Tuning Bar
Plus
Ext. Scope Connections

Audio or
RS232
Data

Input Audio
From
Receiver or Tape

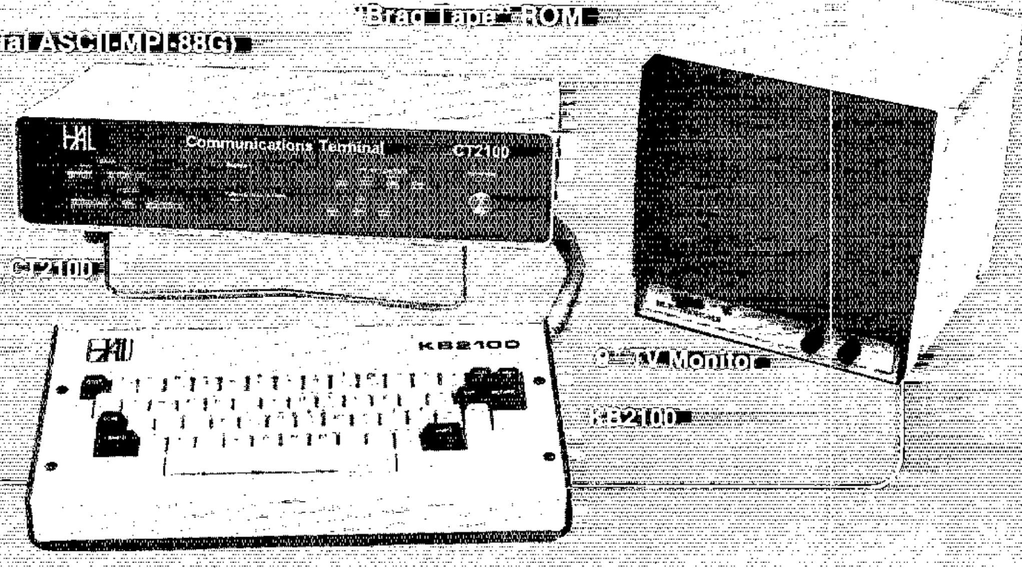
Transmit
and Receive
With RTTY Loop Devices

Audio Monitor
For Either
Input or Output
Signals
Internal Speaker
Plus External Output

CT2100 System:

- CT2100 Communications Terminal
- KB2100 Keyboard
- Video Monitor
- Printer (300Bd Serial ASCII-MPI 88G)
- RM2100 Rack Adapter
- MSG2100 2000 Character "Brag Tape" ROM

- 24 Line Display
- 2 Pages of 72 Character Lines
  or
  4 Pages of 36 Character Lines
- Split Screen (with KB2100)



CT2100

9" TV Monitor

KB2100

HAL COMMUNICATIONS CORP.
Box 365
Urbana, Illinois 61801
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NOW! HAL Equipment is in stock at leading Amateur Dealers. See page 174 for the location of your nearest dealer.

ICOM Presents the Minicom IC-25A

Imagine...25watts/5 memories/2 scanner systems in a 2"H x 5½"W x 7"D 2 meter transceiver!

A new small package with a 25 watt punch, the IC-25A is a full featured FM transceiver for the space conscientious operator. Nearly the same size as an automotive AM radio, the IC-25A will fit in places usually considered impossible for a one piece 2 meter transceiver. The IC-25A is no lightweight when it comes to features.

- 5 memories. Store your favorite frequencies.
- Priority channel. Monitor your most important frequency.
- 25 watts high/1 watt battery saving low power.
- "touchtone" mic standard, no extra cost, to work your favorite autopatch repeater.
- Full band scan/programmable scan (set your own limits)/memory scan, all with automatic resume after preset delay or carrier drop.
- 2 VFOs with data transfer standard.
- 2 tuning rates 5KHz (A VFO) or 15 KHz (B VFO).
- Nor/Rev switch for instant monitoring of repeater inputs.
- Memory back up power supply option holds memory when attached.

Actual Size

(Clip this actual photo out and try it in your car.)

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

ICOM

November 1981 *Volume LXV Number 11*

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Member of the Audit Bureau of Circulations

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THE COVER

This 65-foot solar collector dish furnished power for the Field Day operations of the Texas Tech University Amateur Radio Club. See page 94 for the details. *(photo courtesy KC5W)*

Contents

Technical

Beginner's Bench

Operating

Organizational and Regulatory

Departments

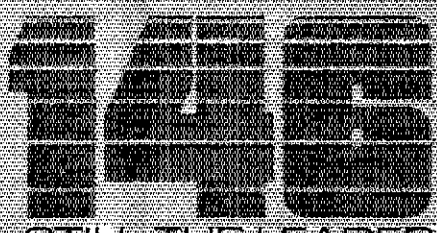
SYNTHESIZED

INTRODUCING SANTEC'S ST-7/T

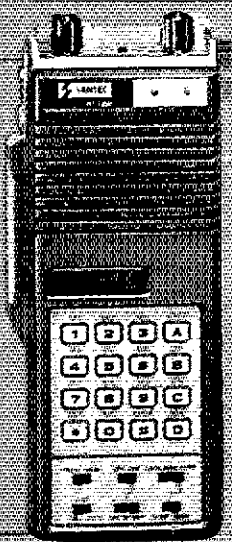
SANTEC•NOLOGY breaks into the 440 band with style! The new ST-7/T synthesizes the entire band in 5 kHz steps, works both up and down repeater splits and does it all right from your hand, with versatile power options of 3 watts, 1 watt or even 50 milliwatts (all nominal), to reach out to where you want. The high power mode of 3 watts radiates on 440 like 5 watts on 2 meters ... and that's a handfull!

Tones? This one has them ... tones and subtones! The 16 button tone pad is a SANTEC standard at no extra cost, and the ST-7/T's optional synthesized subtone encoder is controlled by the radio's front panel switch.

All the regular SANTEC accessories used with your HT-1200 fit the ST-7/T as well, meaning that you can enjoy both bands fully with a smaller cash investment. Grab the new SANTEC ST-7/T and join the fun on 440 MHz. See your SANTEC Dealer for delivery details*.



STILL THE LEADER



HT-1200

SANTEC'S popular HT-1200 is the incomparable 2 meter leader. This little rig is handing over quality, power and features that you'd expect from something nearer the size of a bread box. SANTEC packs a 2 meter ham shack into the palm of your hand!

You can carry scan, search, 10 memories and fully synthesized key pad control around with you and still get out with a big 3.5 watts (nominal). Compare them apples to anything you want, and settle for nothing less.

*Sale of the ST-7/T is subject to FCC Certification.

SANTEC

The SANTEC HT-1200 is approved under FCC Part 15 and exceeds FCC regulations limiting spurious emissions.

2000 Avenue G, Suite 800, Plano, Texas 75074
Phone (214) 423-0024 • INTL TLX 203920 ENCOM UR

Encomm, Inc.
2000 Avenue G
Suite 800
Plano, TX 75074

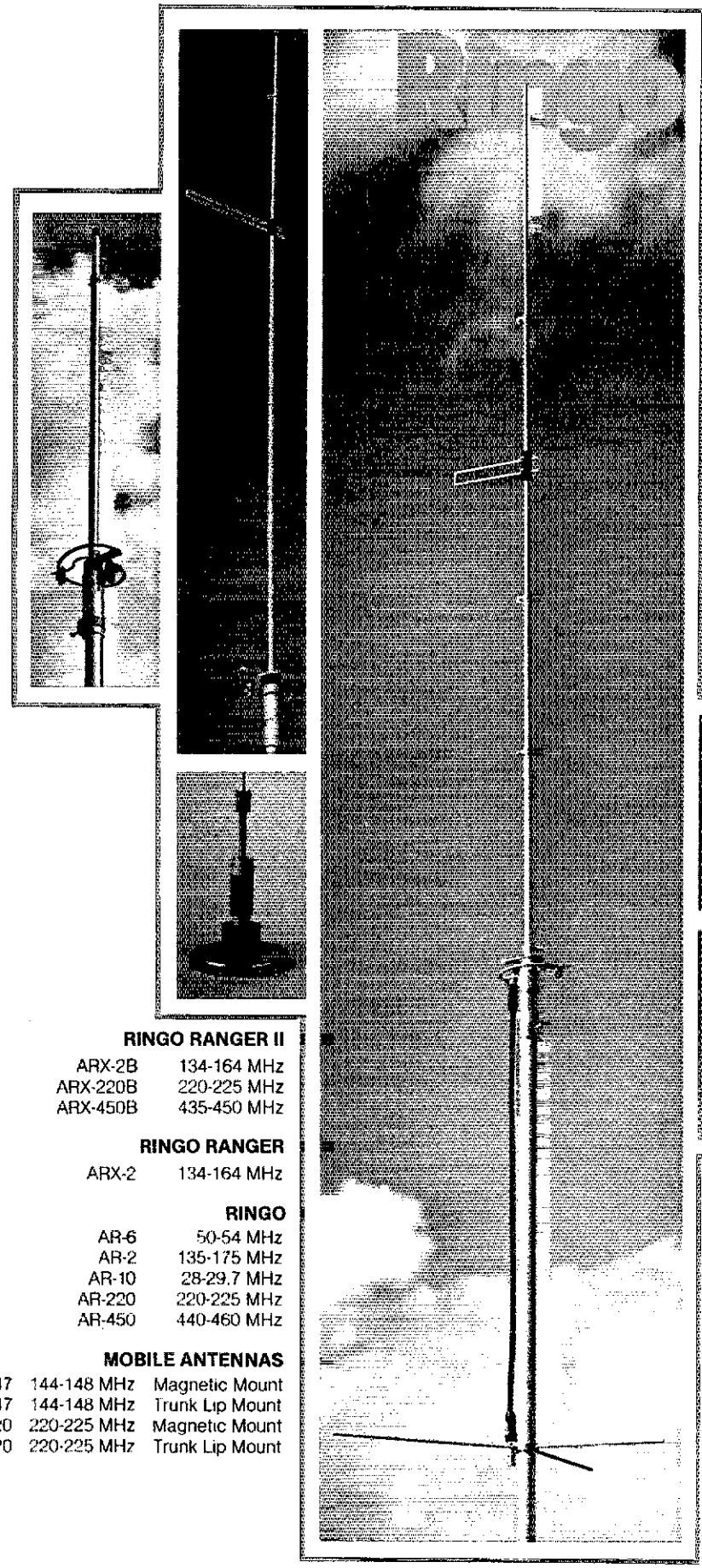
Please send me more information about.
- [ ] SANTEC HT-1200
- [ ] SANTEC ST-7/T
- [ ] Authorized SANTEC Dealers

NAME _____ CALL _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

YOU MAY SEND A DUPLICATE OF THIS FORM.



Ranger II

Simply the best

The best combination of gain, bandwidth and low angle radiation from simplex or repeater operation.

Quick easy assembly and installation

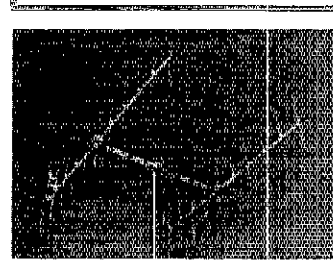
Mount anywhere with compact dimensions and neat appearance

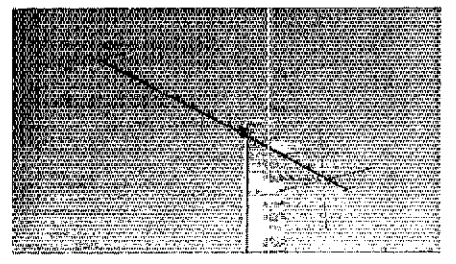
Proven performance and durability in all environments

Complete FM band coverage

One year warranty

Cushcraft antennas created the FM antenna revolution by making the best performance and value available to every ham. We continue to set the pace with a broad line of antennas for every FM application. Tune across the band and you will find the overwhelming majority of hams using one, two, or more Cushcraft antennas. The reason is very simply that they are the best. Now is the time for you to enjoy the value of a Cushcraft antenna. See your nearby dealer today.





RINGO RANGER II

ARX-2B	134-164 MHz
ARX-220B	220-225 MHz
ARX-450B	435-450 MHz

RINGO RANGER

ARX-2	134-164 MHz

RINGO

AR-6	50-54 MHz
AR-2	135-175 MHz
AR-10	28-29.7 MHz
AR-220	220-225 MHz
AR-450	440-460 MHz

MOBILE ANTENNAS

AMS-147	144-148 MHz	Magnetic Mount
ATS-147	144-148 MHz	Trunk Lip Mount
AMS-220	220-225 MHz	Magnetic Mount
ATS-220	220-225 MHz	Trunk Lip Mount

YAGIS

A147-4	145.5-148 MHz	4 Element
A147-11	145.5-148 MHz	11 Element
A147-22	145.5-148 MHz	22 Element
214-FB	145.5-148 MHz	14 Element
A220-7	220-225 MHz	7 Element
A449-6	440-450 MHz	6 Element
A449-11	440-450 MHz	11 Element

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FOR CW/SSB and FM

A147-20T 144-146 MHz Horizontal
145.5-148 MHz Vertical

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"Cents-ational."

IF shift, digital display, narrow-wide filter switch

TS-530S

The TS-530S SSB/CW transceiver is designed with Kenwood's latest, most advanced circuit technology, providing wide dynamic range, high sensitivity, very sharp selectivity with selectable filters and IF shift, built-in digital display, speech processor, and other features for optimum, yet economical, operation on 160 through 10 meters.

TS-530S FEATURES:

- **160-10 meter coverage, including three new bands**
  Transmits and receives (LSB, USB, and CW) on all Amateur frequencies between 1.8 and 29.7 MHz, including the new 10, 18, and 24 MHz bands. Receives WWV on 10 MHz.
- **Built-in digital display**
  Large, six-digit, fluorescent-tube display shows actual receive and transmit frequencies on all modes. Backed up by analog subdial.
- **IF shift**
  Moves IF passband around received signal and away from interfering signals and sideband splatter.
- **Narrow/wide filter combinations**
  Any one or two of three optional filters . . . YK-88SN (1.8 kHz) SSB, YK-88C (500 Hz) CW, YK-88CN (270 Hz) CW . . . may be installed for selecting (with "N-W" switch) wide and narrow bandwidths on CW and/or SSB.
- **Wide receiver dynamic range**
  Greater immunity to strong-signal overload, with MOSFET RF amplifier operating at low level for improved IMD characteristics, junction FETs in balanced mixer with low noise figure, and dual resonator for each band.
- **Built-in speech processor**
  Combines an audio compression amplifier with change of ALC time constant for extra audio punch and increased average SSB output power, with suppressed sideband splatter.
- **Two 6146B's in final**
  Runs 220 W PEP/180 W DC input on all bands.
- **Advanced single-conversion PLL system**
  Improved overall stability and improved transmit and receive spurious characteristics.
- **Adjustable noise-blanker level**
  Pulse-type (such as ignition) noise is eliminated by built-in noise blanker, with front-panel threshold level control.
- **RF attenuator**
  The 20-dB RF attenuator may be switched in for rejecting IMD from extremely strong signals.
- **Optional VFOs for flexibility**
  VFO-240 allows split-frequency operation and other applications. VFO-230 digital VFO operates in 20-Hz steps and includes five memories and a digital display.
- **RIT/XIT**
  Front-panel RIT (receiver incremental tuning) shifts only the receiver frequency, for tuning in stations slightly off frequency. XIT (transmitter incremental tuning) shifts only the transmitter frequency, for calling a DX station listening off frequency.

More information on the TS-530S is available from all authorized dealers of Trio-Kenwood Communications, 1111 West Walnut Street, Compton, California 90220.

Matching accessories for fixed-station operation:

- SP-230 external speaker with selectable audio filters
- VFO-240 remote VFO
- AT-230 antenna tuner/SWR and power meter
- MC-50 desk microphone

Other accessories not shown:

- VFO-230 remote digital VFO with 20-Hz steps, five memories, digital display
- TL-922A linear amplifier
- SM-220 Station Monitor
- KB-1 deluxe VFO knob
- PC-1 phone patch
- HS-5 and HS-4 headphones
- HC-10 digital world clock
- YK-88C (500 Hz) and YK-88CN (270 Hz) CW filters and YK-88SN (1.8 kHz) SSB narrow filter
- MC-30S and MC-35S noise-canceling hand microphones

KENWOOD
...pacesetter in amateur radio

Specifications and prices are subject to change without notice or obligation.

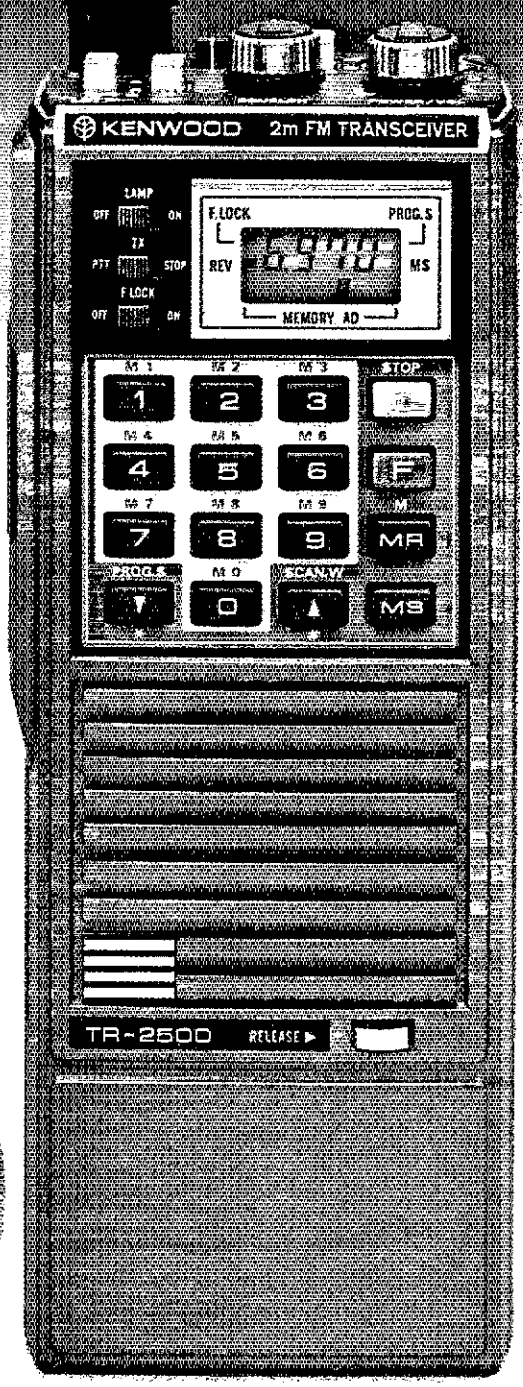
"Comm-packed."

NEW

BIG performance... small size... smaller price!!!

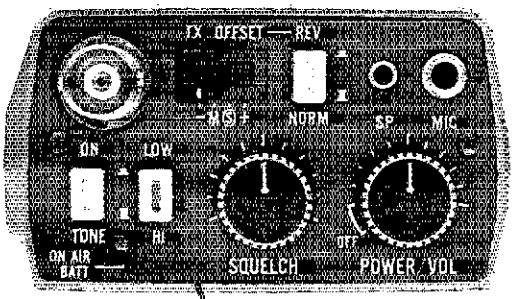
TR-2500

The TR-2500 is a compact 2 meter FM handheld transceiver featuring an LCD readout, 10 channel memory, lithium battery memory back-up, memory scan, programmable automatic band-scan, Hi/Lo power switch and built-in sub-tone encoder.



- **Extremely compact size and light weight**
  Measures 66 (2-5/8) W x 168 (6-5/8) H x 40 (1-5/8) D, mm (inches). Weighs 540 grams (1.2 lbs) with Ni-Cd pack. (Photo shown, actual size).
- **LCD digital frequency readout**
  Easy to read in direct sunlight or dark (with lamp switch). Low current drain. Shows frequencies and memory channels, plus four "Arrow" mode indicators.
- **Ten channel memory**
  Nine memories for simplex or ±600 KHz offset. "M0" memory for non-standard split frequency repeaters.
- **Lithium battery memory back-up**
  Built-in Lithium battery (estimated 5 year life) maintains memory when Ni-Cd pack is fully discharged or removed.

CONVENIENT TOP CONTROLS



- **HI/LO power output selection**
  Allows operation at 2.5 watts or 300 mw RF output.

Actual size

- **Memory scan**
  Scans only channels in which frequency data is stored. Stops on busy channel, resumes scan approximately 2 seconds after signal ceases.
- **Programmable automatic band scan**
  Upper and lower frequency limits and scan steps of 5 KHz and larger (5, 10, 15, 20, 30 KHz, etc.) may be programmed. Scan locks on busy channel, resumes approximately 2 seconds after signal ceases.
- **UP/DOWN manual scan**
  Up/Down manual scan in 5 KHz steps.
- **Built-in tuneable sub-tone encoder**
  Sub-tone encoder, with activate switch, tuneable (variable resistor) to desired CTCSS tone. Optional TU-1 programmable (DIP-switch) encoder accessory available.
- **Built-in 16 key autopatch encoder**
  16 keys provide telephone dual tone modulation.
- **"SLIDE-LOC" battery pack**
  Slides into position, locks into place.
- **Reverse operation**
  Shifts receiver to transmit frequency, and transmitter to receive frequency.
- **Keyboard frequency selection**
  Sets operation frequency across full range.
- **Extended frequency coverage**
  Covers 143.900 to 148.995 MHz in 5 KHz steps.
- **Optional power source**
  Using optional MS-1 mobile or ST-2 AC charger/power supply, radio may be operated while charging. (Automatic drop-in connections.)
- **High impact plastic case**
  Provides extra strength to resist damage.
- **Battery status indicator**
  Flashes to indicate low battery charge level.
- **Two lock switches**
  Prevent accidental frequency change and accidental transmission.

Standard accessories included:

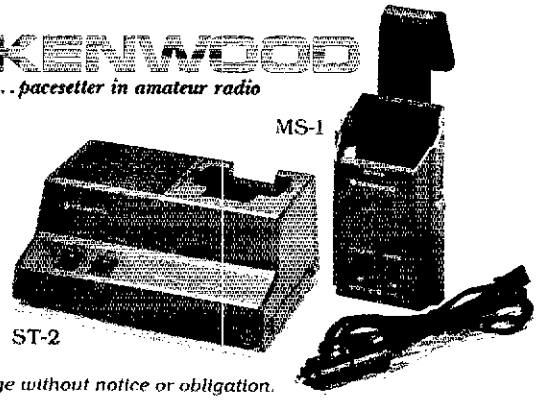
- Flexible rubberized antenna with BNC connector
- 400 mAH heavy-duty Ni-Cd battery pack
- AC charger
- Plugs for external microphone and speaker

More information on the TR-2500 is available from all authorized dealers of Trio-Kenwood Communications 1111 West Walnut Street, Compton, California 90220.

KENWOOD
...pacesetter in amateur radio

Optional accessories:

- ST-2 Base station power supply and quick charger (approx. 1 hr)
- MS-1 Mobile stand/charger/supply
- TU-1 Programmable sub-tone (CTCSS) encoder
- SMC-25 Speaker microphone
- LH-2 Deluxe top grain cowhide leather case
- PB-25 Extra Ni-Cd battery pack, 400 mAH, heavy duty
- BH-2 Belt hook
- WS-1 Wrist strap
- EP-1 Earphone
- _____ RF power amplifier (To be announced later.)



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

*Executive Committee Member

Section Communications Managers of the ARRL

Reports Invited: The ARRL Board of Directors (see list at left) determines the policies of ARRL. The 16 divisions of the League are further arranged into 73 administrative "sections," each headed by an elected Section Communications Manager. Your SCM welcomes reports of individual and club activity. ARRL Field Organization appointments are available covering a wide range of amateur radio operating interests. Whatever your license class, your SCM has an appointment available. Check with your SCM (below) for further information. Section boundaries are defined in the booklet *Operating an Amateur Radio Station*, free to members.

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Maritime-Nfld — Donald R. Welling, VE1WF, 36 Sherwood Dr., St. John, NB E2J 3H6 (506-696-2913)
Ontario — L. P. Thivierge, VE3GT, 34 Bruce St. W., Renfrew K7V 3W1 (613-432-5967)
Quebec — Harold Moreau, VE2BP, 80 Principale, St. Simon Co., Bagot J0H 1Y0 (514-798-2173)
Saskatchewan — W. C. "Bill" Munday, VE5WM, 132 Shannon Rd., Regina S4S 5B1 (306-586-4963)

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New Hampshire — Robert Mitchell, W1SWX/W1NH, Box 137-A, Chester 03036 (603-895-3456)
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THE AMERICAN
RADIO RELAY
LEAGUE, INC.

"It Seems to Us..."

International Phone Patching

One of the most tenuous privileges we have as radio amateurs is that of conducting third-party traffic; that is, the handling of messages on behalf of anyone other than the control operator. Few amateurs realize that the international radio regulations actually *prohibit* international third party traffic. The wording of the pertinent rule is quite explicit:

> It is absolutely forbidden for amateur stations to be used for transmitting international communications on behalf of third parties.

How is it, then, that we *are* allowed to conduct third-party traffic with amateur stations in so many countries? The answer is that the same regulations which *forbid* international third-party traffic also contain a provision whereby individual countries, on a case-by-case basis, may modify the preceding provisions so as to allow their radio amateurs to handle third-party traffic with one another. That so many countries *have* made such special arrangements is a tribute to the international stature that Amateur Radio has attained. Nevertheless, each third party agreement is an *exception* to the general prohibition against international third-party traffic.

As such, we must constantly strive to avoid even the *appearance* of any abuse of third-party privileges. Within the U.S., we are fortunate that the FCC permits its amateurs to handle third-party messages freely (with the conditions that no business related messages may be passed and that no benefit may accrue to any of the parties). But the situation in other countries is drastically more restrictive. In most countries, telephone facilities are owned and operated by the government, and therefore represent an important source of revenue. If the government were to think that its citizens might turn to radio amateurs in lieu of the telephone, it would not be likely to allow amateurs to handle third-party traffic. This, too, is addressed in the international radio regulations:

> When transmissions between amateur stations of different countries are permitted, they shall be limited to messages of a technical nature relating to tests and to remarks of a personal character for which, by reason of their unimportance, recourse to the public telecommunications service is not justified.

In other words, if it's important, use the telephone, or a commercial radio facility!

We are growing more and more concerned that attempts are being made to circumvent these regulations, particularly in regard to international phone patching. Of particular concern are phone patches conducted in a language that the control operator does not understand. Remember, you are responsible for the content of a transmission regardless of the language. If you have any doubt, don't run the patch.

At the recent International Amateur Radio Union Region 2 Conference in Lima, Peru, the following resolution was adopted:

> PHONE PATCHING AND INTERNATIONAL THIRD-PARTY MESSAGE TRAFFIC
>
> To assist in preserving order in the exercise of third party traffic privileges, the following guidelines are being adopted:
>
> 1) International phone patches shall be conducted in full compliance with national and international regulations governing third party traffic and in such a way as to minimize any adverse impact upon other amateur activities.
>
> 2) Each international phone patch shall be as brief as possible, preferably not to exceed 5 minutes.
>
> 3) International phone patches shall be conducted in the official language of one of the countries of the amateurs involved in conducting the phone patch.
>
> 4) Phone patching of extraneous material, such as conversations with the telephone operator or dialing sounds, shall be avoided.
>
> 5) Use of third party message traffic, in lieu of phone patching, shall be encouraged wherever possible.
>
> 6) Each Region 2 Member-Society shall take the necessary and appropriate measures to educate its members about the concern expressed in this Resolution.

For this issue to receive the attention of the representatives of the 22 countries attending the conference is an indication of the importance placed on it by the delegates. We echo their concern. — *Hal Steinman, K1FHN*

League Lines...

The League's present General Manager has announced his retirement, to be effective in the spring of 1982. The ARRL Board is now conducting a search for his successor. If you think you might be qualified to tackle this challenging role, see the box on page 21 of this issue. If you'd like additional information, don't hesitate to call W1RU at Hq.

S-929, Senator Goldwater's bill which would give the FCC authority to establish minimum radio-frequency rejection standards for electronic equipment, has been passed by the U.S. Senate. The bill includes granting the FCC authority to use volunteer licensed Amateur Radio operators to monitor unlicensed stations or stations in violation of the rules, and authority to use volunteer hams to prepare and administer exams for entry-level amateur licenses. S-929 would also exempt Amateur Radio transmissions from the secrecy provisions of the Communications Act, and would change the term of an amateur license from 5 to 10 years. Approval of the House of Representatives is still needed. Details about S-929 appear in June 1981 QST, p. 53. Members supporting S-929 should write their Congressmen.

Special DX information. The ARRL Awards Committee has accepted the DX Advisory Committee's recommendation to add the Sovereign Military Order of Malta to the DXCC list of countries. Previous contacts with 1AØKM will count for DXCC credit, but cards should not be submitted before January 1, 1982. Cards submitted before that date will be returned without credit.

Great Britain's first Amateur Radio satellite, UoSAT-OSCAR 9, has been launched into earth orbit. Details about this satellite appear on page 105.

On its open meeting September 30, 1981, the FCC denied the ARRL Petition for Reconsideration in the National Radio Quiet Zone Docket, SS Docket No. 78-352. Details can be found on p. 53 of June 1981 QST.

The Commission also adopted a Notice of Proposed Rulemaking which would relax the effective radiated power limitations for amateur stations in repeater operation between 52 and 54 MHz. The NPRM would also extend these relaxed limitations to stations in repeater operation on the 10-meter repeater sub-band, 29.5 to 29.7 MHz, where no such limitations now exist. Details next month in "Happenings."

Also, the Commission rejected a petition for reconsideration concerning changes in power restrictions near certain military areas for amateur operation on the 420- to 450-MHz band. For details, see p. 66, April 1981 QST and p. 55, June 1981 QST.

ARRL director and vice director elections are shaping up in the following divisions where there are two or more candidates for an office: Atlantic, Delta, Great Lakes, Midwest, Pacific and Southeastern Divisions. Ballots were in the mail October 1 to ARRL Full Members of record September 10, 1981, in those divisions where elections are being held. There are uncontested nominations for director and vice director in the Dakota and Canadian Divisions. Ballots must be returned to Hq. by noon, November 20, to be counted. Eligible voters not receiving ballots by November 1 should notify Donna Frechette at Hq. More details appear in this month's "Happenings."

For many years, as a membership service, the League Hq. has offered photocopies of requested material, principally QST articles, for a flat fee of 25 cents per page. Increasing costs have forced us to increase the charge for photocopies effective December 1. Orders for photocopies received after December 1 will be $1 per page, with a $5 maximum for any individual QST article in a single issue.

Hey, repeater owners/operators! Time is running out. Have you mailed in your registration forms? The registrations must be in by November 1. Form CD-240 is available for an s.a.s.e. from Hq.

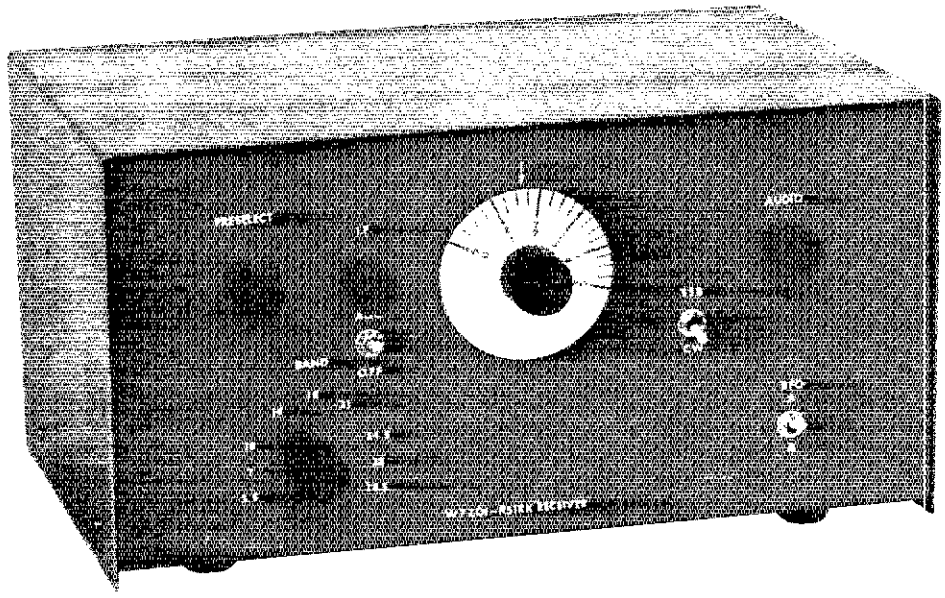
Attention recent upgrades. If your interim permit is nearing expiration and your new license has not yet arrived, FCC will consider requests for extensions of time. Send a photocopy of your permit along with your request to the FCC office that issued the permit.

September 13 closed out an era of League-sponsored frequency measuring tests. Dwindling participation, coupled with the sudden retirement of long-time umpire K7AS, prompted a review of the program's objectives with reference to state of the art. The difficulties of continuing the program were shared by letter with the active participants. The response generated clearcut, but sorrowful, concurrence.

A Progressive Communications Receiver

Try your hand at building a good receiver! This two-step approach combines construction simplicity with performance that equals or exceeds that of many commercial units. You'll be proud to say, "I built it myself!"

By Wes Hayward,* W7ZOI and John Lawson,** K5IRK



The word "progressive" has a multiplicity of meanings. When applied to a receiver construction project it might imply that the work *progresses* from a simple beginning to something more elaborate. The receiver user, however, would assume that a *progressive* receiver is modern in design, having progressed with the state of the amateur art.

Both meanings apply to the receiver described here. The initial project results in a simple, but well-performing direct-conversion (D-C) receiver. Phase two adds circuits to provide an 80-meter superheterodyne. Multiband coverage is then provided for on an as-needed basis by the addition of carefully designed crystal-controlled converters. Virtually all of the components used for the D-C receiver are contained in the final version, saving time and money.

We should emphasize that although simple, this receiver is not a toy. The final superheterodyne features excellent stability, selectivity (consistent with the filter used), adequate sensitivity and a dynamic range that rivals or exceeds that of many commercial equivalents. The major compromise is the utilization of dual conversion on the higher bands. This penalty is small, for the gain distribution has been controlled carefully through proper design. Achieving good performance in simple equipment is not something that just happens — it must be *designed*. The reader is urged to review the thoughts on this subject presented by Roy Lewallen, W7EL.[1]

Some prospective builders may have little interest in a simple D-C receiver. Step-by-step construction of a D-C version is not shown here. However, bypassing that part of the project and proceeding directly to the final "superhet" design is *strongly* discouraged, especially if the builder lacks construction experience. The two-step method of construction facilitates later debugging and adjustment.

Simplicity and ease of duplication were considered paramount in the design. Readily available components are used throughout; alternatives are suggested where appropriate. Circuits are insensitive to the transistor type, thereby allowing component-substitution freedom.

A variety of construction methods may be used. Some builders may wish to etch their own circuit boards.[2] This is not meant to imply that etched boards are necessary or even desired. All of the circuit was initially breadboarded using "ugly" methods;[3] while not as professional in appearance, performance is vir-

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[1]Notes appear on page 21.

tually identical. Where a performance difference could be detected, the ugly breadboards proved superior, usually a result of improved grounding. An added virtue of the ugly boards is that they are built in less than half the time required to lay out, etch, drill and construct the etched versions. Also, an "ugly board" is altered easily allowing a builder to incorporate design changes.

Ugly boards are built using scraps of unetched circuit-board material, which serve as the ground foil. Components are supported by those parts that are attached to the ground foil. Additional support may be provided with suitable tie points. Large-value resistors can serve this purpose well, especially in rf circuits where impedance levels are generally low.

The Progressive System

The system will be described in block-diagram form before we proceed with circuit details. This shows what the final result can be and aids in module interconnection. Fig. 1 is the block diagram of an 80-meter D-C receiver. The preselector filter is followed by the product detector and audio amplifier module. A doubly balanced diode-ring mixer serves as the detector. Four audio stages provide sufficient output to drive low-impedance headphones. An optional R-C active filter is shown. The remaining circuit section is the VFO.

A three-band superheterodyne version of the receiver is presented in Fig. 2. With the band switch in the 80-meter position, incoming signals are applied first to the preselector filter. This is the same one used in the D-C receiver. The preselector output is routed to a mixer module. This board contains a diode-ring mixer and a bipolar transistor i-f amplifier. Output of the mixer module is fed to the i-f amplifier board, which contains the crystal filter and a simple i-f derived agc system.

The i-f amplifier drives the detector/audio board used originally in the D-C receiver. Except for a couple of resistor value changes, the audio amplifier is unaltered. Detector injection voltage is provided by a crystal-controlled BFO. Use of two BFOs provides convenient sideband selection.

The 80-meter mixer is driven by the same VFO that was used in the D-C receiver. Some capacitors have been changed to move the output frequency of 3.5 to 4 MHz up to 5 to 5.5 MHz.

Multiband reception is provided by a crystal-controlled conversion process. While the receiver shown in Fig. 2 has only three bands, the band coverage and means of switching are flexible. The converter filter section *may* contain an optional rf amplifier (recommended only for the higher bands). A separate preselector filter is required for each band to be covered. The filter section is followed by a mixer module that feeds the 80-meter part of the receiver. Only one mixer module is used in the converter section. Mixer LO injection is provided by a group of crystal-controlled oscillators. One oscillator is required for each band.

There is considerable board commonality in the superhet. All of the converter filters have identical layouts; the converter mixer module is identical to that used in the 80-meter receiver. The crystal oscillators used for the BFOs and converters are identical.

80-Meter Preselector Filter

This filter (Fig. 3) consists of two cascaded sections. The first section is a 7-pole high-pass filter (3-MHz cutoff) composed of the components located between the two 650-pF capacitors. It is used to suppress spurious responses from mf broadcast signals.

The second filter section is unusual. While basically a low-pass type, it was designed for a very pronounced peak, resulting in a sharp, bandpass-like response. A front-panel mounted PRESELECTOR control is required. A 365-pF broadcast band replacement type of capacitor is used. If it is located remotely from the rest of the filter, a short length of small-diameter coaxial cable (RG-174/U) may be used for interconnection. A filter tuning range of 3 to 4 MHz may be useful for some applications to be discussed later. Data is provided for this variation.

Some builders may wish to construct a receiver without the front panel PRESELECTOR control. In that case, we suggest a 9-pole low-pass filter be designed for a 1-dB ripple (Chebyshev response) and a cutoff frequency of 4.1 MHz. This can be cascaded with the 7-pole high-pass filter of Fig. 3.

Detector-Audio Section

Shown in Fig. 4 is the backbone of the D-C receiver — the product detector and audio amplifiers. For ease of construction and component procurement, no ICs have been used. Although discrete-component detectors were used in early versions of the receiver, the Mini-Circuits Labs SBL-1 doubly balanced mixer was finally chosen. Not only does it offer excellent performance in D-C receiver applications, but the improved balance helps to eliminate problems caused by the agc system of the superhet being activated by BFO leakage. Other commercial mixers or homemade equivalents will also work well.

Detector output is fed to a diplexer network consisting of RFC1 and the related components. This network ensures that the detector is terminated properly at all frequencies from audio to vhf, providing optimum dynamic range in D-C receiver applications. Additional information about product detectors for D-C receivers is presented in *Solid-State Design for the Radio Amateur*[4] and in the paper by Lewallen.[5] We have borrowed liberally from his work in much of this design.

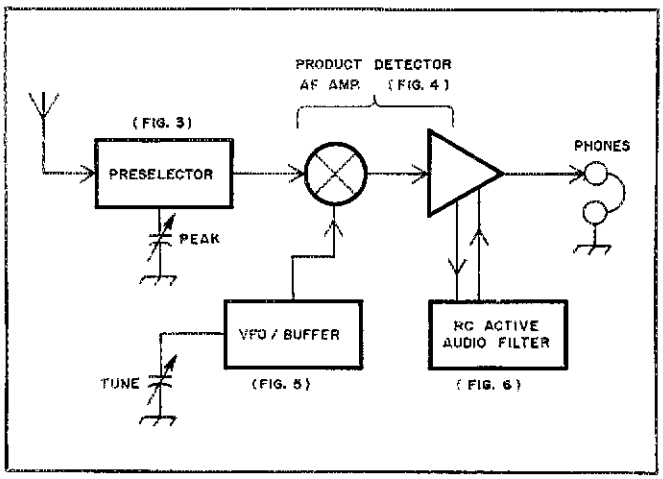
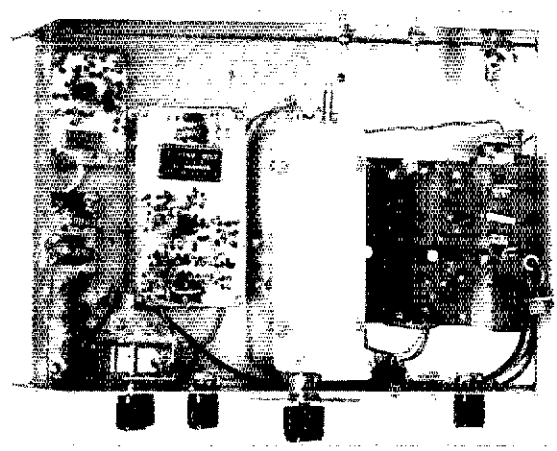


Fig. 1 — Block diagram of an 80-meter direct-conversion receiver. The receiver may be constructed for use on other bands.



An inside, top view of the Progressive Receiver. The unit shown in the photos was constructed by John Lawson, K5IRK. *(photos by Roger Hayward, KA7EXM)*

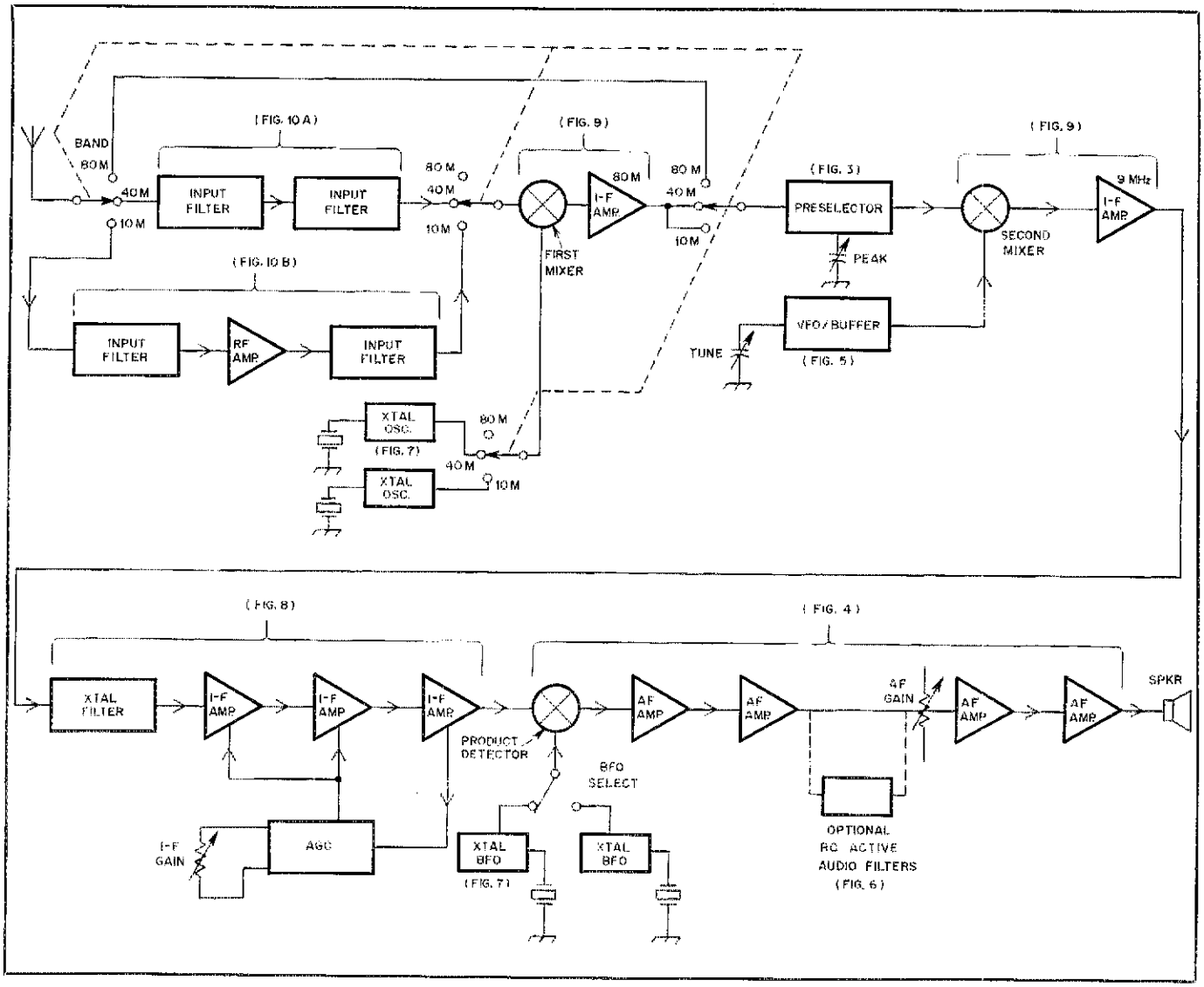


Fig. 2 — Superheterodyne receiver block diagram. As shown, the receiver covers three bands: 80, 40 and 10 meters. All bands from 80 through 10 meters (including the WARC frequencies) may be added to the basic receiver at the builder's discretion. Refer to the text for details.

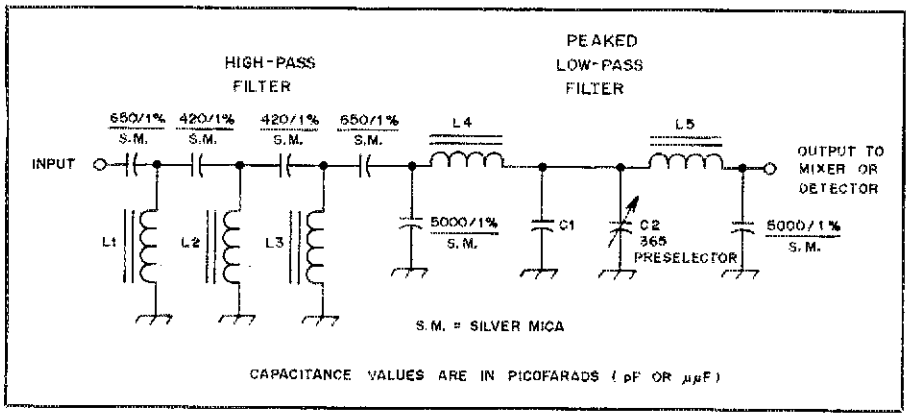


Fig. 3 — The 80-meter preselector filter. A high-pass filter is used at the input; a peaked low-pass filter comprises the output section. Nearest value 5% silver-mica capacitors may be substituted for the 1% units shown.

C1 — 560-pF silver-mica capacitor for 3.5- through 4-MHz coverage, 250-pF silver-mica unit for 3- through 4-MHz coverage (see text).
C2 — Broadcast replacement type of variable capacitor, 365 pF or more.
L1, L3 — 21 turns no. 22 enameled wire on T50-2 core.
L2 — 20 turns no. 22 enameled wire on T50-2 core.
L4, L5 — 30 turns no. 22 enameled wire on T68-2 core for 3.5- through 4-MHz coverage; 45 turns no. 24 enameled wire on T68-2 core for 3- through 4-MHz coverage.

First audio amplifier Q1 is connected in a common-base configuration to terminate properly the diode-ring detector. It is biased to an emitter current of about 0.5 mA to present an input resistance of 50 ohms. Q2 is a direct-coupled pnp amplifier that functions as the second audio stage. The receiver may be muted by shorting the collector of Q2 to ground. This is accomplished by applying a positive potential of a few volts to the muting input to saturate Q5. The output of Q2 is fed to an AUDIO GAIN control on the front panel. If the optional R-C active filter is used, it is inserted in series with the output of Q2.

Q3 is a common-emitter amplifier. Q4 is an emitter follower. Q4 has an emitter-current bias of about 30 mA to provide enough audio output to drive low-impedance (4- to 16-ohm) headphones. Two series-connected, 75-ohm, 1/4-watt emitter resistors are used to provide sufficient power dissipation and to ensure

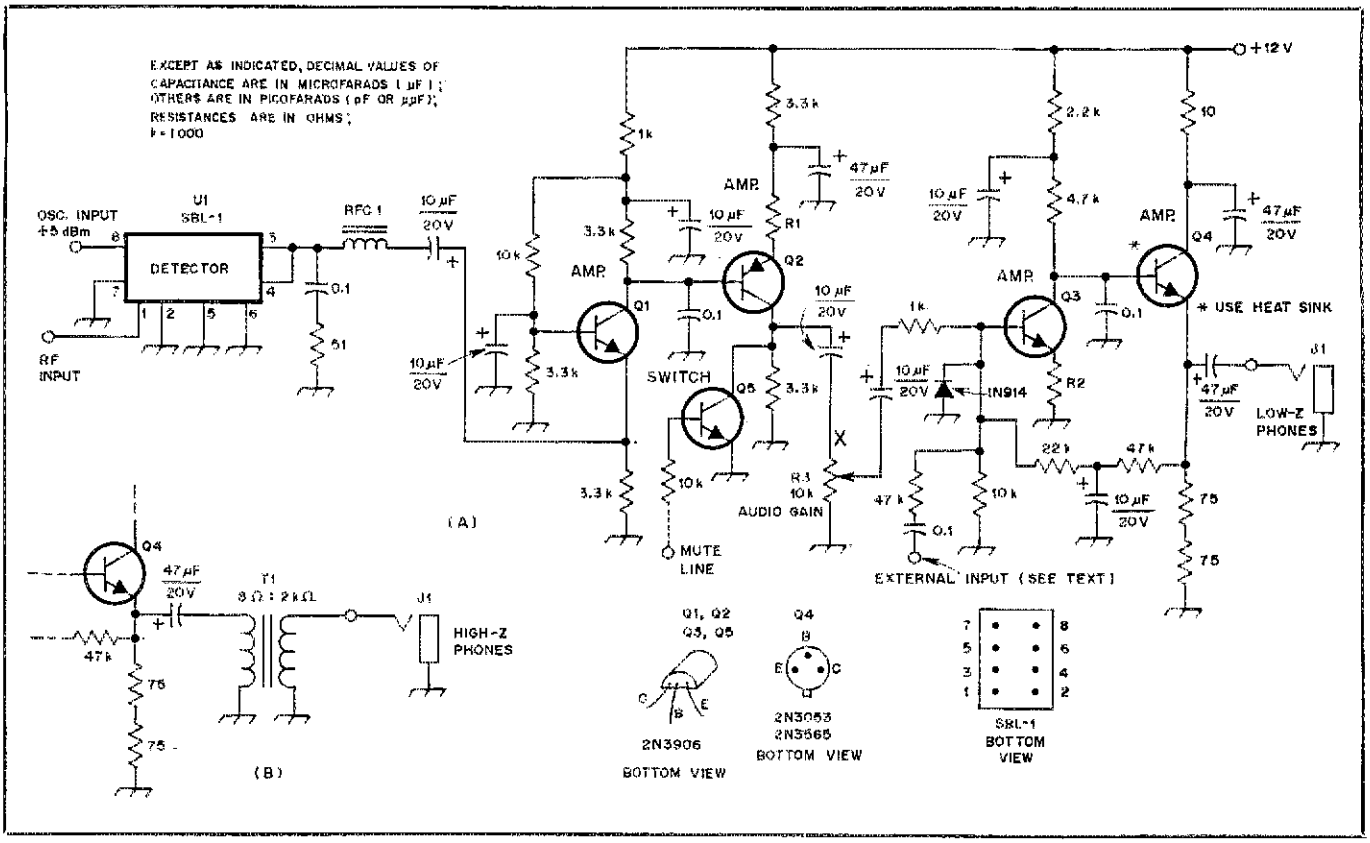


Fig. 4 — Schematic diagram of the product detector and audio-amplifier section is shown at A. The circuit at B may be added if high-impedance headphones are used. When the recommended optional audio filters are employed, they are inserted at the point marked X. All resistors are 1/4-watt composition or metal film types. Pin 1 of the SBL-1 is beneath the MCL marking on the top of the case.

Q1, Q3 — Silicon npn low-noise bipolar transistor 2N3565 or equiv.

Q2 — Silicon pnp general-purpose bipolar transistor, 2N3906 or equiv.

Q4 — Silicon npn bipolar transistor, 2N3053 or equiv., with small heat sink.

Q5 — Silicon npn general-purpose bipolar transistor, 2N3904, 2N2222, 2N3565 or equiv.

R1, R2 — 10 Ω for direct-conversion receiver, 220 Ω for superheterodyne version.

R3 — 10-kΩ audio-taper potentiometer.

RFC1 — 20 turns no. 28 enameled wire on FT37-43 core.

T1 — Reverse-connected miniature audio-output transformer, 8 Ω to 2 kΩ.

U1 — Doubly balanced diode-ring mixer, Mini-Circuits Laboratory SBL-1 or equiv. (see text). The SBL-1 may be obtained from Mini-Circuits Laboratory, 2625 East 14th St., Brooklyn, NY 11235.

reliability. A small heat sink is used on Q4. If low-impedance headphones are used, they should be the inexpensive types. Those designed for high-fidelity applications are usually too inefficient for use in this circuit. Should you wish to use high-impedance headphones, the circuit of Fig. 4B should be employed to achieve the required voltage amplification.

Two resistors in the audio system (R1 and R2) must be changed when the board is used in the superhet version. This is because higher audio gain is needed in the D-C receiver. An auxiliary input is provided in the audio-amplifier section. This is intended for cw sidetone signal injection.

The VFO

A general-purpose VFO is shown in Fig. 5. It will function well at frequencies in the 2.5- to 10-MHz range. Only the capacitors need to be changed to alter the tuning range.

Q6 is employed in a JFET Hartley circuit that has the virtues of simplicity and good stability. Recent work by Lewallen[6] has optimized this oscillator for thermal stability. Best stability results if a toroid core of the SF type (Amidon — 6 code)[7] is used for the inductor. This material has a + 50 ppm/C° temperature coefficient — much better than the usual slug-tuned inductor. All fixed-value capacitors should be NP0 ceramic units. They have the lowest temperature coefficient of any of the readily available types. Use of silver-mica and polystyrene capacitors should be avoided. The latter exhibit a temperature coefficient of — 150, ± 50 ppm/C° and are not recommended. Their popularity in VFO applications results from frequent use with slug-tuned inductors, which often have temperature coefficients of about + 150 ppm/C°.

The resonator (tuned circuit) should be lightly loaded by the FET. This is ensured by keeping the gate-coupling capacitor as small in value as possible. If the specified 2.7-pF NP0 ceramic unit cannot be found, a small air-variable of similar capacitance may be substituted.

Excellent VFO stability is obtained easily if these precautions are followed. Oscillators operating at 5 or 7 MHz have exhibited a typical warm-up drift of less than 200 Hz over a period of about 10 minutes. Afterward, the VFO does not move more than 10 or 20 Hz in a five-minute period, assuming the ambient temperature is reasonably constant. This data is not the result of a single measurement. Literally dozens of these oscillators have been built, all producing predictable results.

Capacitor values for the circuit of Fig. 5 may be taken from Table 1 if a 365-pF variable is used for C6, the MAIN TUNING capacitor. Considerable flexibility exists, and the equations in the appendix may be used to calculate the values for C3, C4 and C5 if another type of variable capacitor is used for C6. The Table 1

Table 1

VFO Capacitor Values For Different Operating Frequencies

Frequency Range (MHz)	*C3 (pF)*	*C4 (pF)*	*C5 (pF)*
3.5 to 3.8	281	200	120
3.5 to 4.0	290	200	40
3.0 to 4.0	305	1000	18
5.0 to 5.5	126	100	82
5.0 to 6.0	66	200	120
7.0 to 7.2	60	50	200

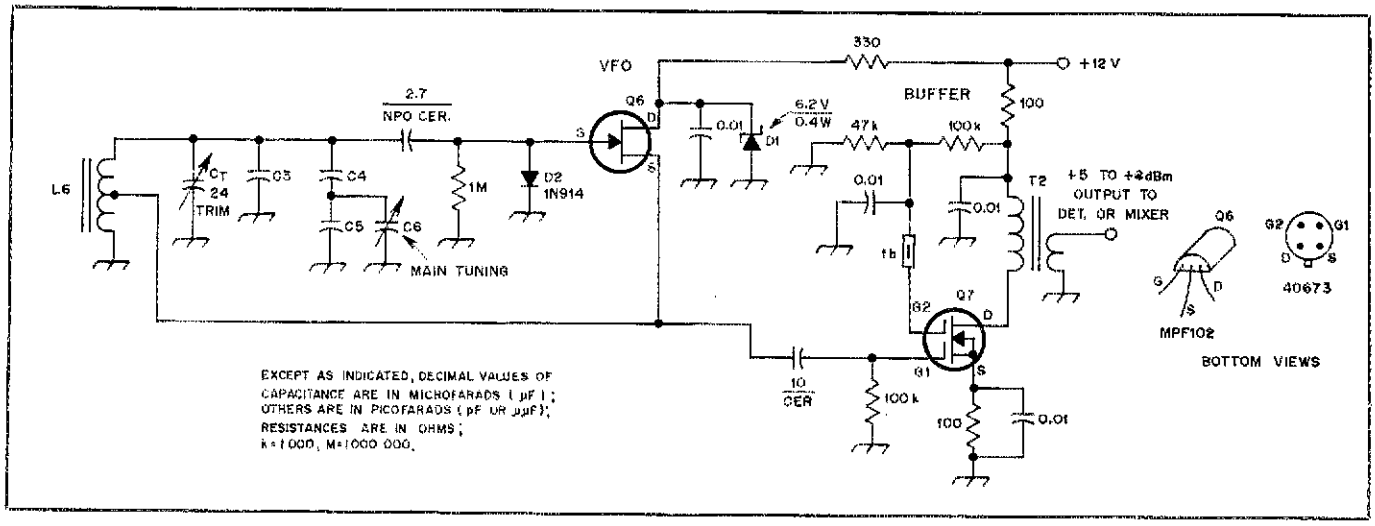


Fig. 5 — VFO schematic diagram. This circuit performs well at frequencies between and including 2.5 and 10 MHz. Refer to the text, Table 1 and the Appendix for component selection information. Resistors are 1/4-watt, 5% composition or metal film types. All fixed-value capacitors are disc-ceramic types.

C3-C5, incl. — NPØ ceramic. See Table 2 and Appendix.
C6 — Air variable capacitor, 100 pF or more total capacitance variation.
L6 — Approximately 4.9 μH, 35 turns no. 28 enameled wire on T50-6 core, tapped at 8 turns from ground end.
Q6 — Silicon n-channel high-frequency JFET, MPF-102, 2N4416, TIS-88, 2SK19GR or equiv.
Q7 — Silicon n-channel dual-gate rf-amplifier MOSFET, 40673, 3N140, 3N211, 3SK40 or equiv.
T2 — Ferrite transformer, 18-turn primary, 5-turn secondary, no. 28 enameled wire on FT37-43 core.

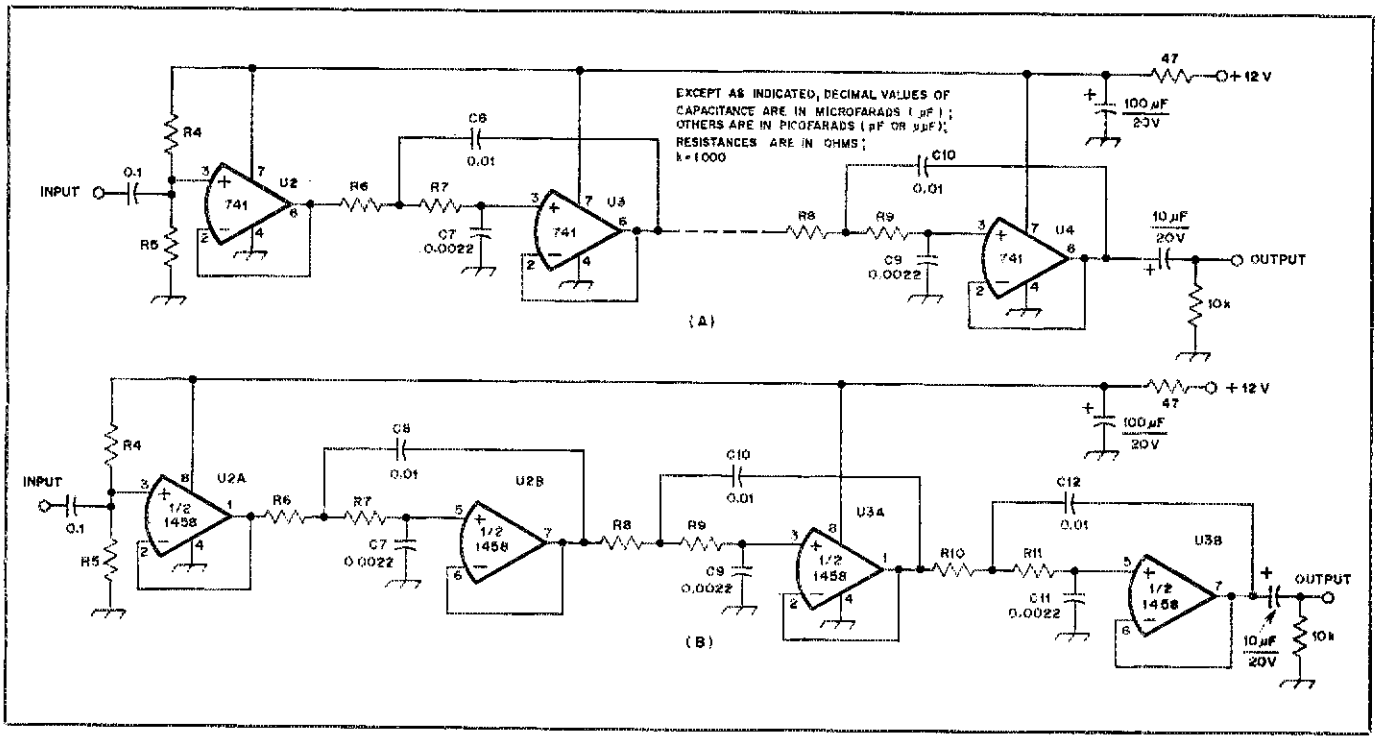


Fig. 6 — An optional R-C active audio filter. At A, a 4-pole, low-pass filter using 741 (single-section) op amps is shown. The circuit at B employs two 1458 (dual-section) op amps and provides six poles of low-pass filtering; more poles are recommended for improved performance. Other types of op amps may be substituted, but use caution as pin numbers may differ. Resistors are 1/4-watt, 5% composition or metal film types.

C7, C9, C11 — 0.0022 μF ceramic or polystyrene, 10% or better tolerance.
C8, C10, C12 — 0.01 μF ceramic or polystyrene, 10% or better tolerance.
R4-R11, incl. — 33 kΩ, 5% for cw filter, 15 kΩ for ssb filter.
U2-U4, incl. — See caption.

value for C3 includes the capacitance of the trimmer, C_T.

A dual-gate MOSFET is used for the buffer amplifier, Q7. The circuit is conventional except for the use of a broadband output transformer. Good isolation is provided, and the power output is ample for driving a diode-ring mixer or detector. Power values of +5 to +8 dBm have been measured, using a 50-ohm load. A ferrite bead is placed directly on gate 2 of Q7. While we attempt to design without "Band-Aids of anticipation," this one is worthwhile; it introduces loss, which will stop uhf oscillations.

Mechanical construction is important in a VFO. Any of the available reduction drives are suitable for the direct-conversion model of this receiver. Additional bandspread is desirable for superhet applications. A Jackson Brothers dual-

speed drive, type 4511/DRF,[8] was used in the K5IRK receiver, and it is adequate. The receiver built at W7ZOI contains a surplus capacitor and drive unit from a BC-455.[9]

Optional R-C Audio Active Filter

Additional selectivity may be desired for either phase of the project. The R-C active filter shown in Fig. 6 is designed to fulfill this need. The filter has a single pole of high-pass filtering followed by a series of low-pass poles. The cutoff frequency is about 1 kHz for cw and 2 kHz for ssb. Filter bandwidth is selected by a proper choice of the resistor values. More filter sections may be added for improved skirt selectivity. The Q of the individual low-pass sections may be increased if a narrower bandwidth is desired. While the filter is shown with operational amplifiers as the active elements, discrete transistors are also suitable.[10]

The performance of the D-C receiver is excellent. Detailed measurements have not been done on this unit, but Lewallen has done some while using a similar circuit.[11] Good D-C receivers display a quality of exceptional "cleanliness" and "presence", and this one is no exception. Indeed, the effect is perhaps more pronounced because of improved audio fidelity.

Crystal Oscillators

The circuit shown in Fig. 7A is used for all of the crystal oscillators in the receiver. One or two will serve as the BFO. Additional units are required for each band to be covered by means of the crystal-controlled converters. Though the circuit may appear to be strange (something of a "trick" circuit), this is not the case. If the diagram is redrawn with the ground point placed at the transistor base, it becomes clear that this is nothing more than a Hartley oscillator with the crystal in series with the feedback tap from the coil.

A capacitor in series with the crystal permits adjusting the oscillator to the operating frequency. This is vital only for the oscillators used for the BFOs. This capacitor may be eliminated (using a jumper wire) in those modules used for converter application. C12 is tuned for maximum output and reliable oscillator starting. The + 12-volt operating bias is applied through the resonator output link for ease of band switching. Power is supplied to any single oscillator, as shown in Fig. 7B. The method used for sideband and band selection is shown in Fig. 7C. Only the oscillator in use has power applied to it.

These crystal oscillators will deliver an output power of about + 10 dBm. This is more than enough to drive the detector or mixer. The circuits are adjusted easily as long as they are terminated properly — they are best adjusted with the mixer or detector attached. If experimentation is done with the circuits for other than their intended application, they should be ac coupled to a 50-ohm load.

One crystal type, a KVG XF-903,[12] will function well for all 9-MHz BFO applications. Two crystals can be used in separate BFO units, or a single BFO can be mounted near the receiver front panel, with an operator-adjusted variable capacitor used for the BFO control.

A list of oscillator frequencies and component values appears in Table 2. Use of the 3.3-MHz oscillator frequency will convert the 7- through 7.3-MHz band to the 3.7- through 4-MHz tuning range. The virtue of this scheme is that all bands will

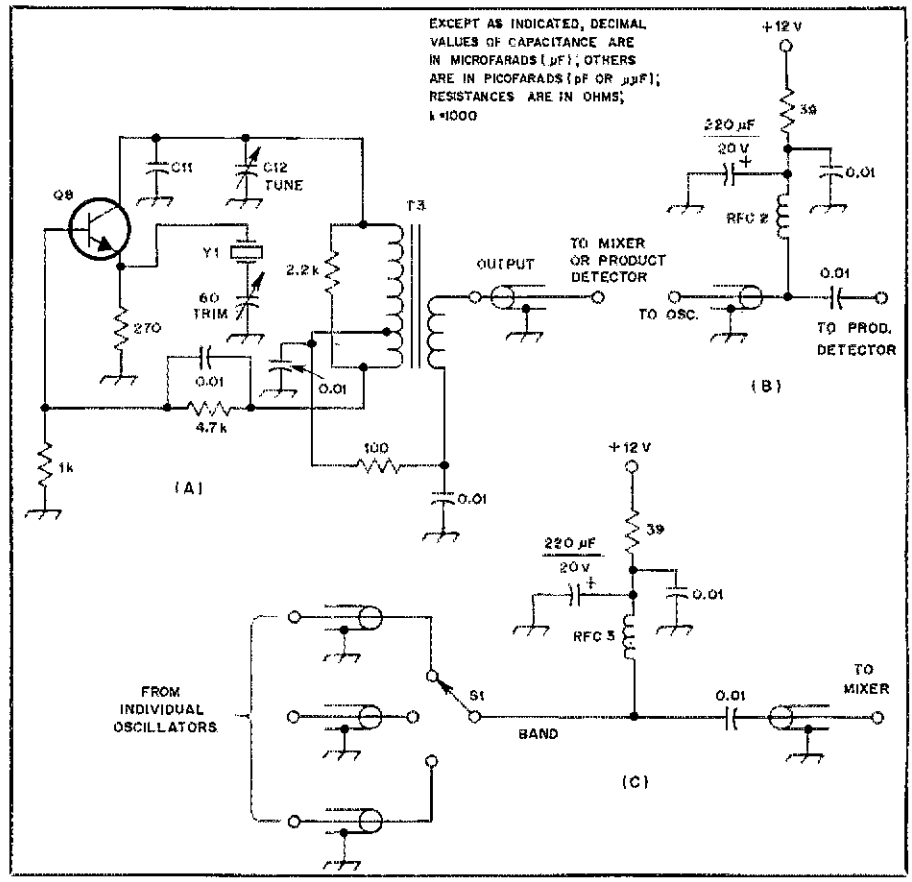


Fig. 7 — At A, the crystal oscillator schematic diagram. This module is duplicated a number of times in the receiver. It is used for the BFO as well as for the individual conversion oscillators. Refer to the text for circuit details. Component information is given in Table 2 and the parts list. Resistors are 1/4-watt composition or metal film types, 5% tolerance. B and C show the methods used to couple the oscillator output to the product detector and mixer circuits, respectively.

C11 — Silver-mica or ceramic capacitor; see Table 2.
C12 — Mica compression or similar trimmer capacitor; see Table 1.
Q8 — Silicon npn general-purpose bipolar transistor, 2N3904, 2N2222 or equiv.
RFC2, RFC3 — Approximately 20 turns no. 28 enameled wire on FT37-43 core.
S1 — Part of band switch or sideband-selector switch; see text.
T3 — Wound with no. 28 enameled wire; see Table 2.
Y1 — Series-resonant crystal for use at required frequency shown in Table 2. For 9-MHz BFO applications, the KVG XF-903 is suitable for lsb or usb.

Table 2

Crystal Oscillator Component Selection

Y1 (MHz)	Frequency (meters)	C11 (pF)	C12 (pF)	Core type	T3 Primary turns	Tap turns	Secondary turns
3.3	40	100	90	T68-2	65	13	10
6.5	30	100	60	T50-6	35	7	6
9	BFO	56	60	T50-6	35	7	6
10.5	20	56	60	T50-6	30	7	6
11	20/40	22	60	T50-6	30	7	6
14.5	17	33	60	T50-6	23	5	4
17.5	15	33	60	T50-6	23	5	4
20.5	12	none	60	T50-6	20	4	4
24.5	10/15	none	60	T50-6	20	4	4
32	10	none	60	T50-6	15	3	3

Note: No. 28 enameled wire is used for T3 windings.

then tune in the same direction, a subjective detail of consequence to some. Forty-meter reception may be achieved by using an oscillator frequency of 11 MHz. But the tuning direction will be opposite that on 80 meters. The latter method is used by the writers.

Many converter-construction options are available. You can build the basic 80-meter receiver to tune the wider range of 3 to 4 MHz. Then, all five bands from 80 to 10 meters may be received using only two crystal oscillators (11 and 25 MHz). This scheme would be ideal for the economy-minded builder. Data for this approach is presented for the construction of the VFO and 80-meter preselector.

I-F Amplifier

An important part of any superheterodyne receiver is the i-f section. A 9-MHz i-f is used in this receiver (Fig. 8). Selectivity is provided by a crystal filter of the builder's choice. This circuit accepts

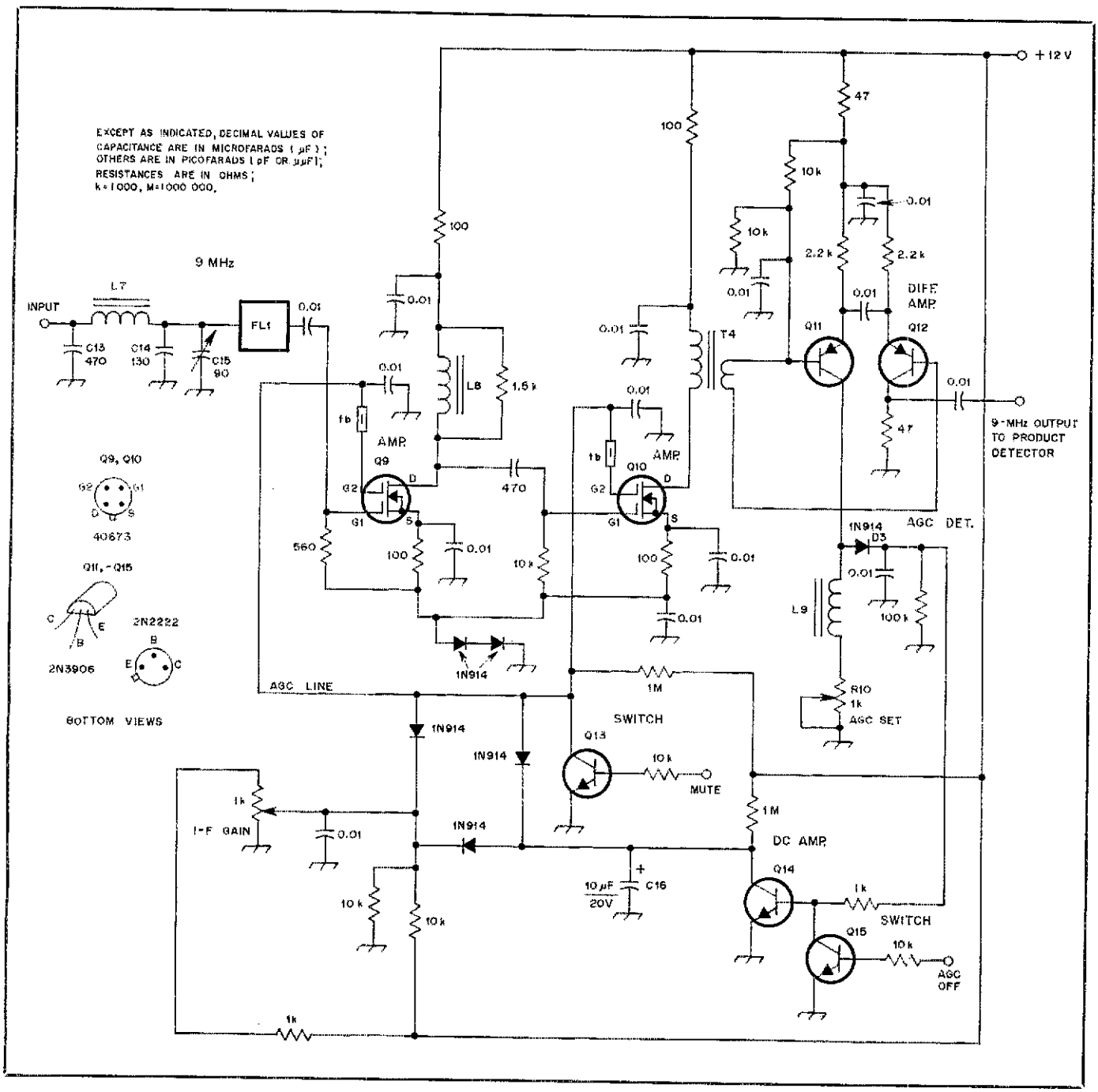


Fig. 8 — Schematic diagram of the 9-MHz i-f amplifier. All fixed-value resistors are 1/4-watt, 5% carbon or metal film types. The adjustment of R10 is discussed in the text.

C15 — 90-pF mica compression trimmer.

FL1 — 9-MHz crystal filter, 500-Ω input/output impedance; for ssb, KVG type XF-9B or Yaesu XF-92A; for cw, KVG type XF-9M, XF-9NB or Yaesu type XF-90C. KVG filters may be obtained from Spectrum International, Inc., P.O. Box 1084, Concord, MA 01742. Yaesu filters may be obtained from Yaesu Electronics Corp., P.O. Box 498, Paramount, CA 90723.

L7 — 23 turns no. 22 enameled wire on T50-6 core.

L8, L9 — 15 turns no. 28 enameled wire on FT37-43 core.

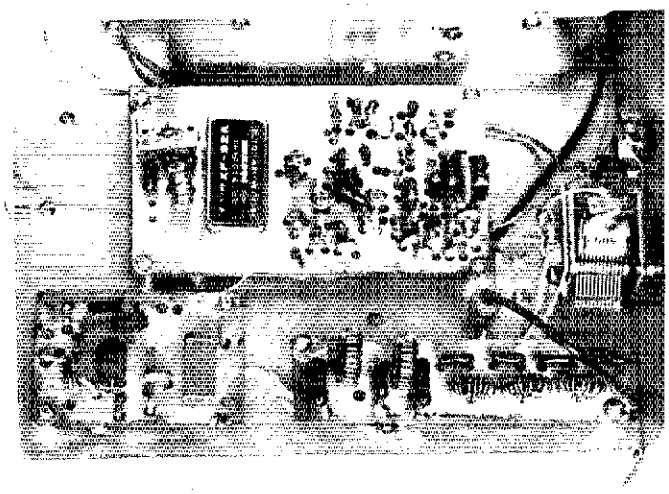
Q9, Q10 — Silicon n-channel dual-gate rf-amplifier MOSFET, 40673, 3N211, 2SK40 or equiv.

Q11, Q12 — Silicon pnp general-purpose bipolar transistor, 2N3906 or equiv.

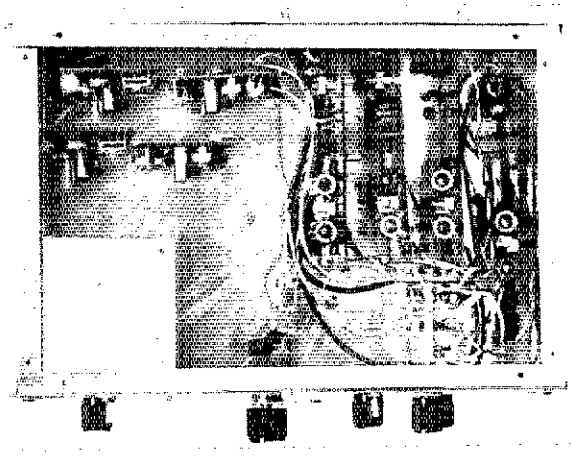
Q13-Q15, incl. — Silicon npn general-purpose bipolar transistor, 2N3904, 2N2222 or equiv.

R10 — 1-k, pc-mount, linear-taper potentiometer.

T4 — Ferrite transformer, 15 primary turns and 3 secondary turns of no. 28 enameled wire on an FT37-43 core.



In this close-up photo, the 80-meter preselector and 2nd mixer module may be seen in the foreground. The 9-MHz i-f board is in the center, and a portion of the VFO enclosure is at the top of the photo.



At the lower left, a pc-board enclosure houses the BFO circuitry. Immediately above the BFO four crystal oscillator modules may be seen. Four input filter boards are arranged behind the BAND switch. The two input-filter boards at the extreme right are without rf amplifier components. Another mixer module is at the lower center of the chassis.

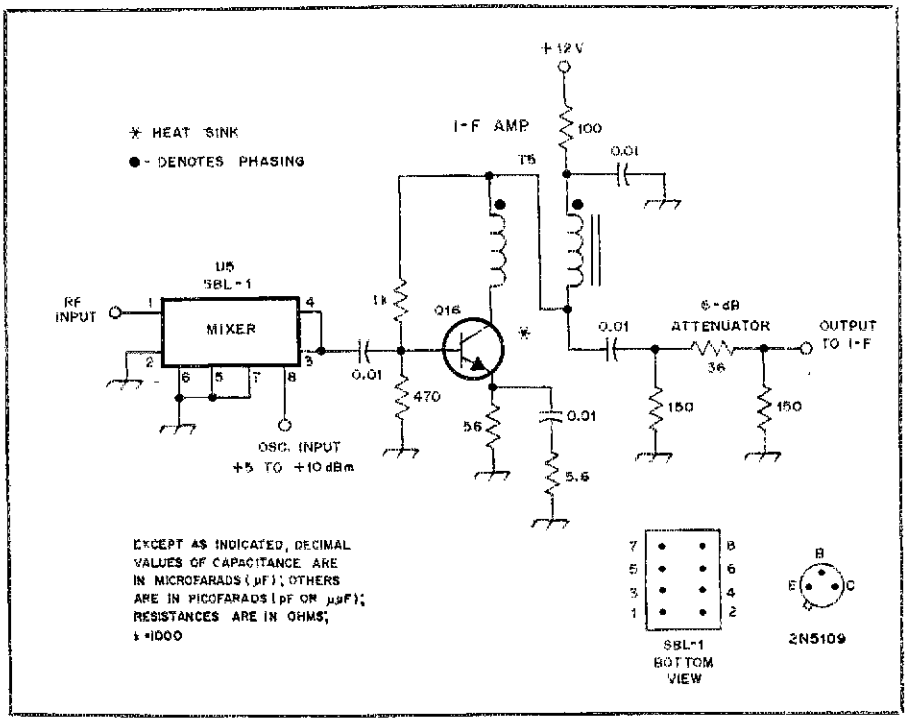


Fig. 9 — Mixer-module schematic diagram. Two of these units are required when constructing the superheterodyne version of the receiver. One module is used as a first mixer stage for input signal frequencies of 40 through 10 meters, with an output at 80 meters. The other module (the second mixer stage) converts 80-meter input signals to the 9-MHz i-f. All resistors are 1/4-watt, 5% composition or metal film types.

Q16 — Silicon npn CATV amplifier (f_T = 500 MHz or greater) bipolar transistor, type 2N5109, 2N3866, 2SC1252, 2SC1365 or equiv. A small heat sink should be used on Q16.

T5 — Broadband ferrite transformer, 10 bifilar turns no. 28 enameled wire on FT37-43 core.

U5 — Doubly balanced diode-ring mixer, Mini-Circuits Laboratory SBL-1 or equiv.

filters requiring 500-ohm terminations. A pi-network input circuit transforms the 50-ohm source impedance of the mixer module to the 500-Ω load required by the filter. The filter output is terminated in a 560-ohm resistor. An unusual feature of the i-f system is the lack of tuned circuits other than the pi network. All transformers are ferrite types that are designed for broadband performance.

A majority of the i-f gain is provided by two dual-gate MOSFETs, Q9 and Q10. The bias on these stages is raised by placing a pair of silicon diodes in the source lead. This extends the gain control range as the gate 2 bias is altered.

The last i-f stage is a differential pair of transistors, Q11 and Q12. Output is available from each of the collectors. The output of Q12 is routed to the product detector by means of small-diameter coaxial cable, while Q11 output is fed to the age detector, D3. A voltage appears at the base of Q14 when high-amplitude signals are present. C16, the timing capacitor, is then discharged. To reduce i-f stage gain, this voltage change is coupled to the age line by means of a diode. R10, the AGC SET, is adjusted for a dc voltage of 0.4 to 0.5 at the base of Q14. This adjustment should be made with the age system activated and with no signals present. The potential on the age line will then be about 6 volts with manual I-F GAIN set at maximum. A high-impedance (10 megohms or greater) voltmeter should be used for any age-line measurements.

Two transistor switches are contained in the i-f strip. Q15 defeats the age when a positive voltage is applied to the AGC OFF line. Q13 is attached directly to the age line. A positive input voltage to that switch shorts the age line to ground to mute the receiver. The age line diodes allow muting to occur quickly without discharging C16. The i-f strip returns quickly to full gain after muting periods.

Age response is more than adequate, with minimal overshoot. Recovery time is relatively independent of the signal level. By decreasing the value of C16 or its associated 1-megohm resistor, the recovery time may be shortened.

Mixer

Fig. 9 is the schematic diagram of the 80-meter mixer. A Mini-Circuits Lab SBL-1 or similar unit may be used. Again, homemade mixers will also work well. A suitable substitute can be built from a pair of Amidon FT37-43 toroid cores and four hot-carrier diodes.

Q16, a 9-MHz i-f amplifier, follows the mixer. This is one of the more critical stages of the receiver. It must have a low noise figure, for it will determine the receiver sensitivity. Intermodulation

distortion must be low, and the input and output impedances need to be 50 ohms. A bipolar transistor with negative feedback is used to establish the gain and required impedance levels. The stage is biased to draw a moderately high current. This ensures low distortion. A 6-dB pad at the output preserves the impedances at the input and output of the amplifier.

Transistor type *is* critical for Q16 because it should be one with a high gain-bandwidth product (f_T) — at least 500 MHz. Amplifier gain, minus the loss in the pad, is about 16 dB. The mixer has a conversion loss of about 6 dB, leaving a net gain of 10 dB. The amplifier output intercept is approximately +30 dBm. Careful measurements have shown that a diplexer network is not required between the mixer and this amplifier.

Assuming the VFO frequency has been changed to cover 5 to 5.5 MHz, the receiver is now ready for operation on 80 meters. A few circuits requiring alignment are adjusted for maximum output. Homebuilt instrumentation[13] is adequate for use during alignment. It was used by the writers. The adjustments may also be performed "by ear," listening to incoming signals with the agc defeated.

Crystal-Controlled Converters

To receive other bands of interest, suitable converters can be added to the basic receiver. Net gain through the converters is kept low to preserve the overall receiver dynamic range. An additional mixer module, identical to that used in the 80-meter front end, is needed. Each band to be added will require a band-pass preselector filter and a crystal oscillator. You may wish to include an rf amplifier on the higher frequency bands; none is required for the 40-meter band.

Fig. 10 shows two versions of the input filter. That at A is without the optional rf-amplifier stage, while that at B shows a filter with the rf amplifier. The same board layout is used for both versions; a wire jumper (W) between points X and Y is used when the amplifier is omitted.

Consider first the option without the rf amplifier stage. There are two filter circuits shown that may be separated at points X-Y. The input filter (to the left of the X) is a five-pole low-pass type. Use of this filter section was necessary to eliminate spurious responses resulting from strong TV and fm broadcast station signals. This problem results from the tendency of diode-ring mixers toward harmonic mixing. The second filter (to the right of point Y) provides the major portion of the front-end selectivity. It is a double-tuned circuit composed of L12, L13 and the related capacitors. These filters were designed for a Butterworth response, but may be shifted to a Chebyshev response with a slight increase in the value of C22. The filters were designed while using the equations presented in Appendix 2 of reference 4.

A variable capacitor (C22) is used as the coupling element between the resonators. This was done in the interest of component selection. Small, nonstandard capacitance values are often difficult to obtain, whereas a 1- to 5-pF variable trimmer is common. The proper capacitance setting for C22 may be taken from Table 3.

Use a signal generator to align the filters. If one is not available, a crystal calibrator may be used. Terminate the filter input with a 50-ohm resistor. C22 is set initially near minimum capacitance, and the receiver is tuned to the band center. C23 and C25 are adjusted to provide a peak response. The capacitance of C22 is then increased, and C23 and C25 are repeaked. Filter bandwidth is estimated by tuning toward the band edges, repeating the alignment procedure until the desired bandwidth is realized.

A dual-gate MOSFET is used for the rf amplifier in the version shown in Fig. 10B, along with a modified input low-pass filter. This modification produces a pi network that transforms the 50-ohm filter

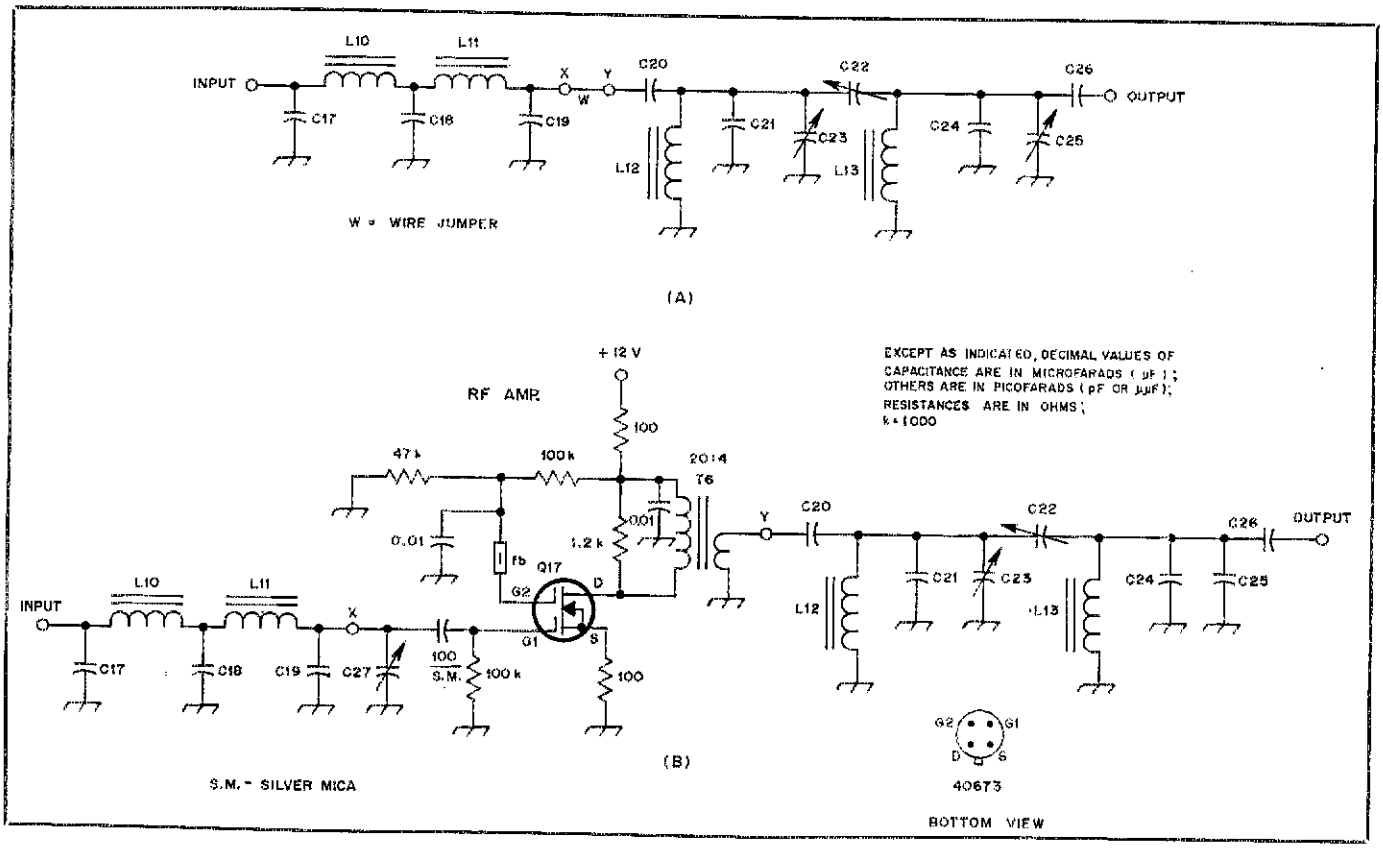


Fig. 10 — Input filter/amplifier circuitry. The same pc board pattern is used for the circuits of A and B. At A, a jumper wire is used when no rf amplifier (as shown at B) is employed. The circuit at B is recommended for operation at frequencies above 40 meters. Resistors are 1/4-watt, 5% composition or metal film types. Refer to the parts list and Table 3 for component descriptions.

Q17 — Silicon n-channel dual-gate rf-amplifier MOSFET, 40673, 3N211, 3SK40 or equiv.

T6 — Ferrite transformer, 20-turn primary, 4-turn secondary, no. 28 enameled wire on FT37-43 core.

Table 3

Input Filter Components

Without rf amplifier:

Frequency (MHz)	C17 C19 (pF)	C18 (pF)	L10* L11 (turns)	C20 C26 (pF)	C21 C24 (pF)	C23 C25 (pF)	C22 (turns)	L12* L13 (turns)
7.1	430	860	17	42	50	180	4.6	25
10.1	300	600	13	32	50	180	4.1	17
14.2	220	430	12	20	—	180	2.3	17
18.2	180	360	10	22	50	180	3.9	10
21.2	150	300	10	18	—	180	3.0	10
24.2	130	270	9	14	—	180	2.1	10
28.5	110	220	8	12	—	180	1.6	10

With rf amplifier:

Frequency (MHz)	C17 (pF)	C18 (pF)	C19 (pF)	C27 (pF)	L10* (turns)	L11* (turns)
10.1	300	680	33	50	13	29
14.2	220	500	22	50	12	25
18.2	180	390	—	50	10	22
21.2	150	330	—	50	10	20
24.2	130	300	—	50	9	19
28.5	110	250	—	50	8	17

Note: Other filter parts identical to that without rf amplifier.
*All inductors wound with no. 22 enameled wire on T50-6 cores.

Table 4

Performance Summary

Circuit	Rf amp.	Bandwidth (Hz)	NF (dB)	IP_{in} (dBm)	MDS (dBm)	DR (dB)
Single conv.*	no	500	16	+18	−131	99
Single conv.	no	2500	16	+18	−124	94
Single conv.	yes	500	5	+2	−142	96
Single conv.	yes	2500	5	+2	−135	92
Dual conv.	no	500	18	+12	−129	94
Dual conv.*	no	2500	18	+12	−122	89
Dual conv.	yes	500	6	−2	−141	92
Dual conv.*	yes	2500	6	−2	−134	88

Rf amplifier assumed to have a 3-dB noise figure, a 15-dB gain and a +22-dBm output intercept. Circuits marked (*) are measured cases. All measurements done at 14 MHz.

impedance up to about 2000 ohms, with a Q of 10, to provide a near optimum driving impedance for the amplifier. The amplifier output circuit uses a broadband ferrite transformer to present a 50-ohm output impedance to the following double-tuned circuit. This ensures a proper termination. This two-pole input preselector filter is aligned as previously described, then the pi network section is adjusted, peaking the response by means of C27 at the band center.

The amplifier uses no source-bypass capacitor. During evaluation it was found that the gain of the rf amplifier was excessive when such a bypass was included, resulting in degraded receiver dynamic range. Removal of the capacitor dropped the gain from 25 to 15 dB with little change in the distortion characteristics; noise figure was still low enough.

Thoughts, Hints and Results

A number of construction details have been left to the discretion of the builder — band switching, the power supply and an enclosure. Band switching is not critical, because all switched points are low impedance. A multiwafer rotary switch would serve nicely. Something as mundane as a group of slide switches will work just as well. Small-diameter coaxial cable, such as RG-174/U, should be used for all signal lines. Some builders may wish to include an auxiliary audio power amplifier for speaker operation. Suitable circuits have been described in *QST*.

Other refinements could be included: an S meter (using a simple high-impedance voltmeter circuit attached to the agc line), a crystal calibrator or a digital readout. The constructor looking toward the future may want to include the WARC bands. Calculated data for these bands is provided, although the writers have yet to build these circuits.

Just as the receiver can be refined and made more elaborate, simplification is also possible. For example, a converter may be used with the original D-C receiver. Or, a simple superhet may be built by eliminating the i-f amplifier. A crystal filter mounted on a board with a pair of impedance-matching, 50-ohm pi networks could be inserted between a mixer module and the detector. This could be refined by placing a single i-f stage after the filter. A single-conversion receiver for 14 MHz may be built by replacing the 80-meter preselector with one for 20 meters and by choosing the appropriate VFO frequency. There is no need to include bands that you are not interested in. Use of an ssb filter, with provisions for selecting sidebands, is not warranted for the devoted cw enthusiast.

System measurements were performed on constructed receivers at various stages of development. The data is summarized in Table 4. Measured data is extended with calculations to give the prospective builder some feel for the performance to be expected.[14] Measurements and calculations generally agreed within 1 dB.

Table 4 reveals no surprises. The nature of the trade-off between single and dual conversion is well illustrated, as is the effect of adding an rf amplifier stage. That system showing the greatest dynamic range is the single-conversion design without the rf amplifier. It should be emphasized that the data in Table 4 pertains to the modules described. Changes in gain, noise figure or intercept of any stage will change the results.

The dual-conversion systems are about 5 dB "weaker" than the single-conversion ones — a typical situation. It should be understood that this observation applies only to dual-conversion systems with a wide bandwidth, first i-f section. Modern systems that use a crystal filter at the first i-f will display performance much the same as that of a single-conversion receiver, even if they use many conversions. Still, traditional dual conversion seems to be a reasonable compromise if the overall gain distribution is well controlled.

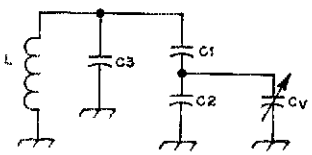
No gain compression was measurable in a single-conversion model without an rf amplifier stage while using an input signal level of −10 dBm. The VFO phase noise was measured to be −152 dBc/Hz at a spacing of 10 kHz. While the writers have access to laboratory-quality instrumentation, all of the evaluations were done with home-built test equipment. This was done to emphasize that a reasonable receiver *can* be built and evaluated without the need for exotic instruments.

The results quoted represent performance that rivals or exceeds that of most commercial equipment available to the amateur. These receivers are pleasing to use, offering a clean, crisp sound that is not always found in the commercial equivalents. Of great significance is that the receiver should be easily duplicated, with a cost well under that of a similar "appliance."

The writers gratefully acknowledge the interest and ideas of many friends. We would especially like to thank Roy Lewallen, W7EL, for all of the data he has shared with us during the two-year period devoted to this project.

Appendix

Calculation of capacitor values for a VFO using an arbitrary capacitor.



In the following equations, the inductance (L) is expressed in henrys, capacitance (C) in farads and frequency (f) in hertz. Follow the sequence of equations as shown. f_b and f_u represent the lower and upper frequency limits to be tuned. C_v is the *range* of the variable capacitor.

$$\omega_b = 2\pi f_b$$

$$\omega_u = 2\pi f_u$$

$$C_b = \frac{1}{\omega_b^2 L}$$

$$C_u = \frac{1}{\omega_u^2 L}$$

$$\Delta C = C_b - C_u \qquad \text{(Eq. 1)}$$

Pick a value for C1 and C_v. Then let:

$$x = 2C1 + C_v$$

$$y = C1C_v + C1^2\left(1 - \frac{C_v}{\Delta C}\right) \qquad \text{(Eq. 2)}$$

Then, C2 and C3 are given by:

$$C2 = 1/2\left(-x + \sqrt{x^2 - 4y}\right)$$

$$C3 = C_v - \left(\frac{1}{C1} + \frac{1}{C2}\right)^{-1} \qquad \text{(Eq. 3)}$$

Example:

L = 3μH, f_b = 7 MHz and f_u = 7.2 MHz.

Then $C_b = 172.3 \times 10^{-12}$ F
$C_u = 162.8 \times 10^{-12}$ F.

Choose C1 = 50 pF and C_v = 355 pF (variation in a 365-pF variable capacitor).

Then, $x = 455 \times 10^{-12}$,
$y = -73.76 \times 10^{-21}$, yielding
$C2 = 126.8 \times 10^{-12}$ F and
$C3 = 127.02 \times 10^{-12}$ F.

Notes

[1]R. Lewallen, "An Optimized QRP Transceiver," *QST*, Aug. 1980, p. 14.
[2]Etched circuit boards and many of the required parts are available from Circuit Board Specialists, P.O. Box 969, Pueblo, CO 81002. Pc templates and parts overlays are available from the ARRL for $2 and an s.a.s.e.
[3]R. Hayward and W. Hayward, "The Ugly Weekender," *QST*, Aug. 1981, p. 18.
[4]W. Hayward and D. DeMaw, *Solid-State Design for the Radio Amateur* (Newington: American Radio Relay League, 1977).
[5]See note 1.
[6]See note 1.
[7]Toroid cores used in these receivers are available from Amidon Associates, 12033 Otsego St., North Hollywood, CA 91607.
[8]See note 2.
[9]Fair Radio Sales, P.O. Box 1105, Lima, OH 45805.
[10]See note 4.
[11]See note 1.
[12]Spectrum International, P.O. Box 1084, Concord, MA 01742.
[13]See note 4.
[14]The noise factor formula for two cascaded stages is given in Chapter 6 of reference 4. Also presented are the relationships between intercepts, noise figure and dynamic range. The output and input intercepts of a given stage differ only by the stage gain. Intercepts may be combined for a cascade by noting that the output intercept of one stage adds to the input intercept of the following one in exactly the same way that resistors in parallel combine so long as the intercepts are presented in milliwatts rather than in dBm. This relationship assumes that the third-order intermodulation distortion is coherent. (This relationship is derived in Hayward's *Introduction to Radio Frequency Design*, Prentice-Hall, Englewood Cliffs, NJ 07632, to be published early in 1982. Also see B. P. Gross, "Calculating the Cascade Intercept Point of Communications Receivers," *Ham Radio*, Aug. 1980, and W. Sabin, "A BASIC Approach to Calculating Cascaded Intercept Points and Noise Figure," *QST*, Oct. 1981.)

Strays

"Thanks for the memories . . ." might better have been sung, "Thanks for jogging the public's memory circuits," as Jim Dudley, W5HYW, presented an award to comedian Bob Hope in appreciation of his efforts in promoting Amateur Radio. A plaque, outlined by Hope's famous profile, was given by the Port Arthur (Texas) ARC on the occasion of the Bum Phillips Celebrity Golf Tournament. Amateur Radio fraternities from Jefferson and Orange Counties, Texas, served as the communications arm of the event. *(photo by WB5YIF)*

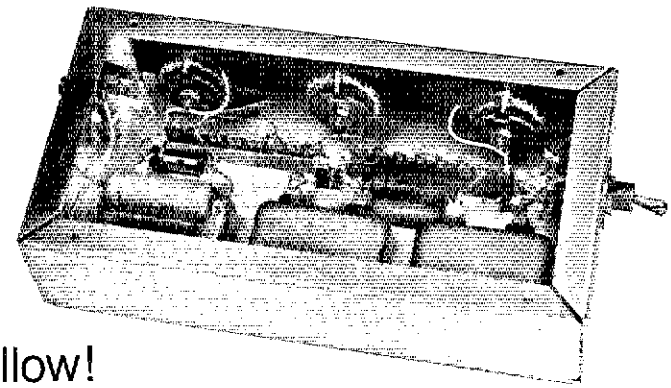
APPLICATIONS FOR GENERAL MANAGER, ARRL

The present General Manager of the League is retiring in the spring of 1982, and the Board of Directors seeks a qualified replacement. Those wishing to submit their applications for this challenging post should do so prior to January 1, 1982. Send your resumes and any supporting data to Ray Wangler, W5EDZ, Chairman of the ARRL Management & Finance Committee, 642 Beryl Dr., San Antonio, TX 78213.

The General Manager, ARRL, is charged with managing and directing League operations under policies established by the Board of Directors. He employs and oversees the operations of a staff of 115, ensuring that they maintain professional standards. He maintains sound financial policies and procedures, involving an annual budget of six million dollars. He assists the president in representing the League with national and international government agencies and other Amateur Radio organizations, and serves as secretary of the International Amateur Radio Union. He is responsible for developing effective programs for the growth of the Amateur Radio population and of League membership, which currently stands at over 150,000. He is responsible for initiating plans, programs and policies for the advancement of Amateur Radio which are presented to the Board for approval. He must monitor all aspects of the Amateur Radio Service in order to advise and counsel the Board. He also serves as the Editor of *QST*.

A demonstrated knowledge of management skills, a wide-ranging interest in and knowledge of Amateur Radio and ARRL, and evidence of leadership will be in your favor.

New Selectivity for Old Receivers



Razor-sharp selectivity aids in sorting out those signals when the band is crowded. The performance of this filter provides a difficult act to follow!

By Frank Noble,* W3MT

Most old, tube-type receivers have a passband that is far too wide for modern cw reception. Some have drifting oscillators and sloppy tuning (backlash); for these there is little hope. But, if the receiver is frequency stable and has good tuning, the performance can be improved greatly with a narrow band-pass filter in the audio-output circuit. The filter described here is inexpensive and crude, but *very* sharp and unconditionally stable. The owner must be willing to make a simple modification to the receiver when using it.

If the loudspeaker is disconnected, the output transformer becomes an audio choke that passes dc, but has a fairly high impedance at audio frequencies. Now, let's install the simple R-C network shown in Fig. 1. It produces a high-level (up to 175 V) source that measures 5-kΩ internal impedance, typically. The 470-kΩ resistor has no audio function; it simply charges the coupling capacitor so the output will not shock the operator or harm the filter.

The filter (Fig. 2) consists of three telephone toroids tuned to the same frequency and top coupled by means of large-value resistors. This arrangement has a single sharp-resonance peak, a bandwidth as narrow as can be used with moderate-speed cw and good skirt selectivity. The circuit has been designed so that all three resonant circuits have the same Q; this was done to achieve the best possible skirt selectivity for a given bandwidth. The performance approximates that of a cascaded set of three isolated tuned circuits, each having a Q of 14.3, as shown in Fig. 3.[1] (The response is approximately symmetrical with respect to the resonant frequency.) It will be observed that the skirt selectivity improves as the number of tuned circuits increases. Unfortunately, the attenuation also increases with the number of tuned circuits so that three is the maximum practical number unless additional amplification is used.

Tuning Procedure

For a filter this sharp it is vital to tune all LC circuits to exactly the *same* frequency. (The absolute frequency is inconsequential.) To do this, the following procedure is recommended. With reference to Fig. 4, the oscilloscope indicates the phase angle of LC. At exact resonance, the phase angle is zero, as indicated by a line slanting upward to the right. Find which LC network resonates at the lowest frequency. Leaving the oscillator set at this frequency, remove this network and install another. Add capacitance until the line is restored on the oscilloscope. Repeat for the third LC network. Then recheck all LC assemblies to

*10004 Belhaven Rd., Bethesda, MD 20817

[1]Notes appear on page 23.

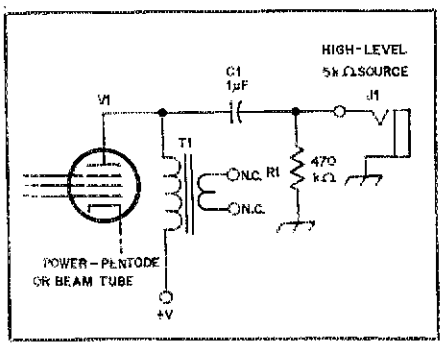


Fig. 1 — Receiver modification to drive the filter. The 1-μF capacitor should be rated at 600 V and may be a paper or film type. J1 is a single-circuit, nonshorting phone jack. R1 is 1/2 watt, carbon composition.

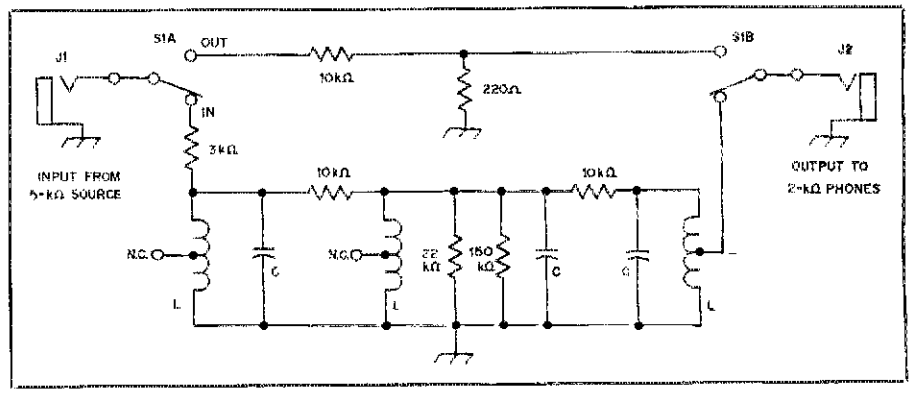


Fig. 2 — Schematic diagram of the narrow band-pass filter. C is rated at 1 μF at 400 V and may be paper or film. J1 and J2 are single-circuit, nonshorting phone jacks. Each toroid (L) is 44 mH. The resistors are 1/2 watt, carbon composition. S1 is a dpdt toggle switch.

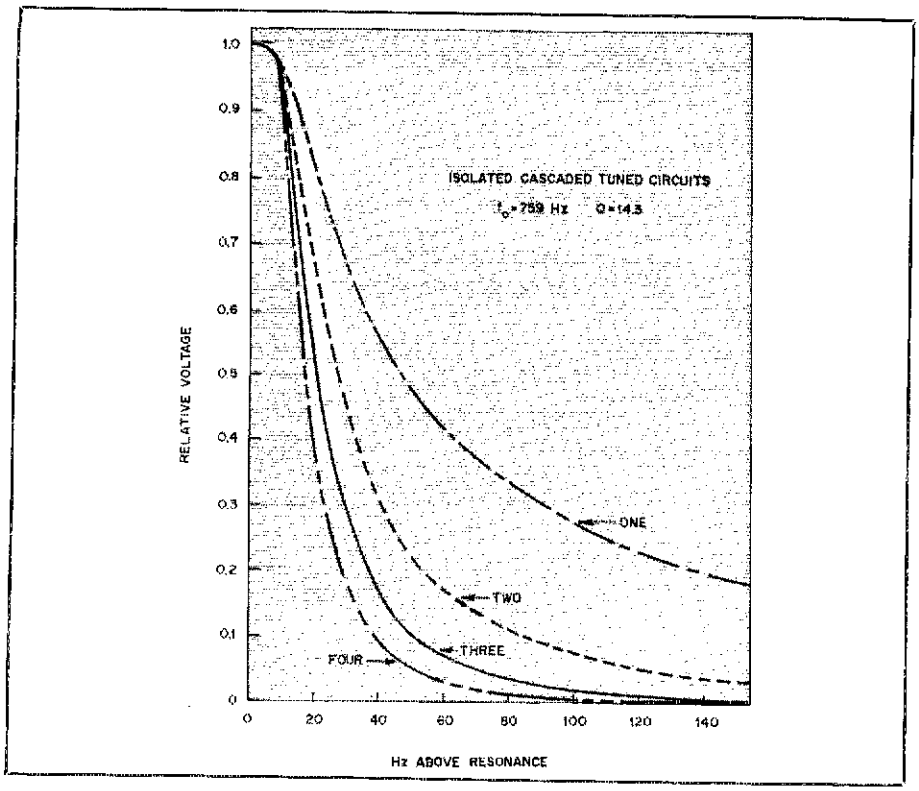


Fig. 3 — Frequency response of cascaded resonant circuits. The sharpness becomes greater as the number of circuits is increased from one to four.

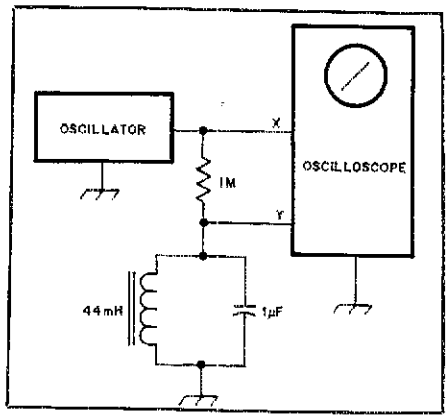


Fig. 4 — Arrangement for setting tuned circuits on frequency. The procedure, described in the text, is to tune the oscillator for a slanted line on the oscilloscope ($f_o \approx$ 759 Hz). Resistance is in ohms.

be sure the oscillator has not drifted. When all three produce the desired "scope" line, they are on the same frequency, with a high order of accuracy.

The circuit may be wired now and put to use. Note that 2-kΩ phones are specified. Phones having another impedance should be matched to 2 kΩ, preferably with a transformer, to minimize loss.

Since the toroids have no external field (self-shielding), by reciprocity, they will pick up no external fields; hence shielding is not necessary. Any enclosure (or none) will be quite satisfactory. The layout is entirely noncritical.

Theory

At resonance, a parallel LC circuit looks like a resistance

$$R_O = Q_O\sqrt{\frac{L}{C}} \qquad \text{(Eq. 1)}$$

For the 44-mH toroid resonated with a 1-μF capacitor, the unloaded Q_O measures 35, so for this case R_O = 7342 ohms. The loaded Q is $R_p\omega C$, where R_p is the parallel value of R_O and the net resistive shunt imposed by the external circuit. If we were to connect the 2-kΩ phones directly across the coil, R_p would become 1572 ohms, and the Q would drop to

$$\frac{35 \times 1572}{7342} = 7.494 \qquad \text{(Eq. 2)}$$

corresponding to a bandwidth of 101 Hz, as determined by

$$B = \frac{f_o}{Q} = \frac{759}{7.494} \qquad \text{(Eq. 3)}$$

The additional loading imposed by the signal circuit would lower the Q further, making the bandwidth still greater. To prevent this, we connect the phones to the center tap, so that they reflect 8 kΩ across the coil. This shunt will reduce Q_O by less than half, which is far more reasonable. The output impedance now looks like a resistance on the order of 3828 ohms. The coupling resistor should be of a large value compared to 3828 ohms to prevent excessive reduction of the Q and to provide the isolation between resonators required to obtain selectivity. On the other hand, too much resistance will make the attenuation excessive. We arbitrarily assign the value 10 kΩ. Recall that all resonators are to have the same Q. Referring to Fig. 2, to simplify matters, we make the center section symmetrical by using two 10-kΩ coupling resistors. Now, whatever shunting is done on the center coil for Q adjustment will result in equal loading effects on the other two coils. If all Q values are to be the same, we must start by making the loading the same on the input and output coils. This means the input coil must see 8 kΩ looking back at the source; since the source impedance is 5 kΩ, we use the 3-kΩ series resistor to satisfy this requirement. The procedure to find the shunt for the center coil is too lengthy to present here. It turns out to be about 19 kΩ and is provided by the parallel resistors. The Q factor mandated by the calculation is 14.3. Fig. 3 shows that the 6-dB (or 0.5 relative voltage) bandwidth is 40 Hz.

When the filter is switched out, the resistive attenuator sets the level to equal the peak output level of the filter. If the filter is not terminated in 2 kΩ, the Q factors will not be identical, and the skirt selectivity will be degraded.

Results

The minimum bandwidth required to copy 25-wpm cw under good conditions is given as 60 Hz;[2] no conditions on the filter shape factor are given. Although the details are beyond this writer's ken, it is generally accepted that ringing is related to the way the filter rolls off. Even with 40-Hz bandwidth this filter does not ring objectionably; the writer has been able to copy 40-wpm cw through average QRM and noise. The greatest practical problem is keeping the signal in the slot. This is inevitable if you want just one signal.

A word on low gain: If the receiver gain is low (or the phones are insensitive), the three-coil filter may have too much loss. The best solution is to correct the receiver deficiency, resorting to additional amplifiers if necessary. An easier solution is to eliminate the center coil, then top couple the input coil to the output coil through a 10-kΩ resistor. This will result in degraded skirt selectivity, as shown in Fig. 3. However, the writer has used several filters of this type, and the performance was still good. The filter-out attenuator will need to be changed so the level does not shift greatly when the switch is thrown. A good start would be to replace the 220-ohm resistor in Fig. 2 with an 820-ohm resistor.

Notes

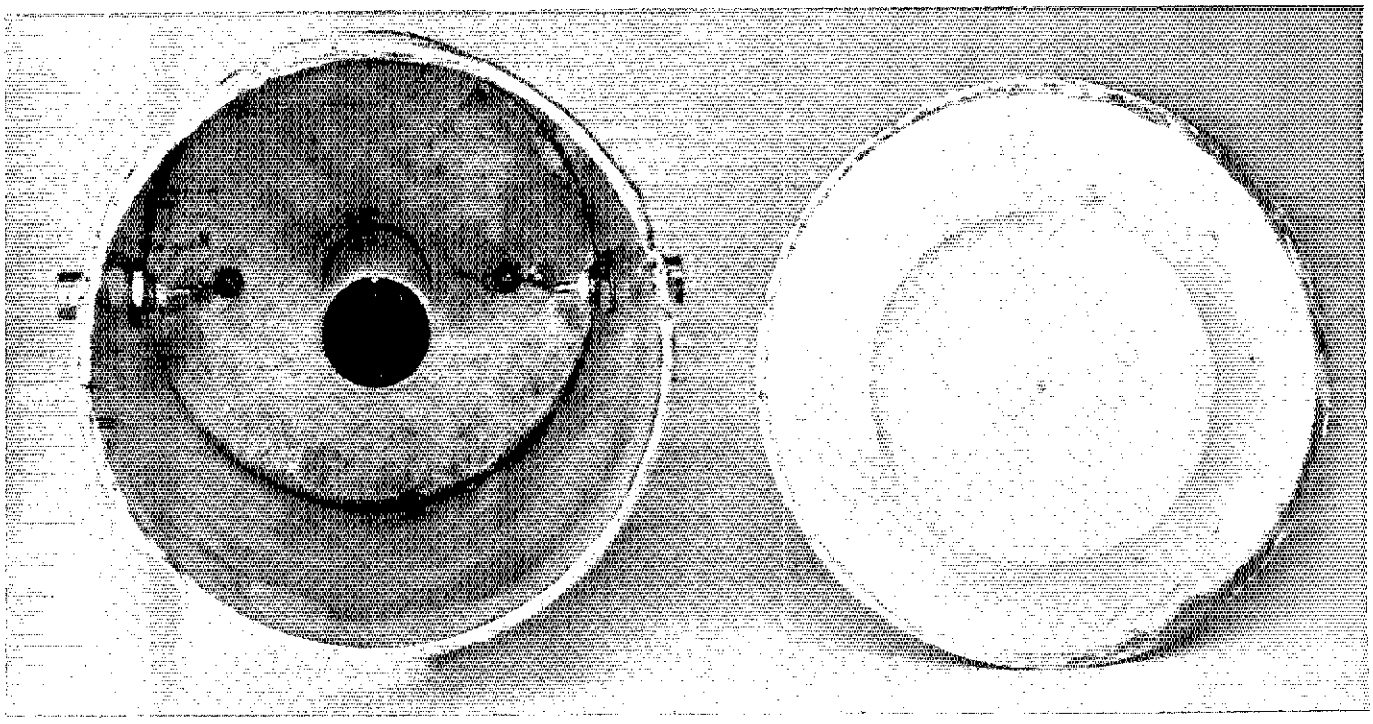
[1] Adapted from the Universal Resonance Curve presented in Terman, *Electronic and Radio Engineering* (New York: McGraw-Hill, 1955), p. 48.

[2] *Reference Data for Radio Engineers*, 3rd ed. (New York: International Telephone and Telegraph Corp.), p. 18.

Simple, Inexpensive Plating Methods for VHF and UHF

Have you noted degraded vhf or uhf circuit performance after a few months' use? The cure may be easier than you think.

By Robert D. Shriner,* WAØUZO



Some vhf and uhf circuit failures can be traced to oxidation of components, circuit-board foils, grounds and other conducting surfaces. Unprotected copper surfaces often fall victim to this naturally occurring process. As operating frequency increases, skin effect (the tendency for rf currents to flow nearer to the surface of a conductor) becomes more pronounced. Oxides that are of no consequence at audio or hf suddenly take on villainous significance! I have discovered a few situations where oxides had formed de facto semiconductors.

Remedies

I suppose that the best solution is to use components with pure gold leads but that is impractical. Pure silver is another expensive option. Electroplating systems offer the best industry compromise in terms of performance and cost, but the plating equipment may be too expensive for the home-construction enthusiast. Immersion plating techniques, however, when done carefully, can provide a workable alternative for the individual builder. The drawback is that the coat of plating material is thin and can be removed easily with light scratching.

Immersion silver plating on copper is, in my opinion, the easiest plating operation for the home-construction devotee. A similar process can be used to plate copper onto steel or iron with a hydrated copper sulphate (sold by drug stores under the name "blue vitrol"). Once this operation is complete, silver can be plated on the copper coating. Aluminum can be plated, but the process requires a skill level beyond that of the novice plater.

Surface Considerations

The surface to be plated must be thoroughly clean. To test for cleanliness, pour on a little water. If the water spreads evenly without beading or breaking, the surface is clean enough. If it beads or breaks, additional cleaning is called for. Muriatic acid, a diluted solution of hydrochloric acid, may be used to cleanse the surface. I suggest that you use a solution of no greater strength than 10%. As with all other chemicals mentioned in this article, *please use caution* and follow the directions on the containers. Once the surface has been polished with fine steel wool, use rubber gloves and small balls of cotton to apply the acid cleaner. After

Photo: Internal view of a 220-MHz cavity. Although somewhat discolored, the silver-plated conductors have been in service for several years without degraded performance.

*Box 969, Pueblo, CO 81002

light rubbing, rinse the material under cold running water to remove any traces of the acid. Set it aside to dry and make absolutely sure that nothing comes in contact with the surface to be plated after it has been cleaned.

Probably the least expensive silver-plating solution is discarded "fixing solution" used in developing black-and-white photographic film. You can probably obtain this from a local photographic studio or from businesses doing X-ray work. Some fixing solutions make better plating agents than others. You may have to try different sources before you find one that will work satisfactorily. Or if you choose, you may purchase a silver-plating solution from a chemical supply house.

Make sure that your hands are clean and avoid touching the surface that is to be plated. Pour a small amount of the plating solution into two containers. Use a steel-wool pad dipped in the first container to polish lightly the surface to be plated. This will further clean the surface and leave a bit of the plating on the material. Immerse the material in the second container or use a cotton swab to spread the solution evenly over the surface. You should now have a uniform layer of silver on the copper. Thoroughly wash the surface to remove all traces of the plating solution by holding the plated surface under running water for several minutes. Next, carefully dry the surface with a soft cotton cloth. Do not allow any sharp object to come into contact with the newly plated surface. The silver plating is thin and not very durable if left exposed. However, the layer is adequate for surfaces not subjected to handling. Don't worry if the plating discolors, because silver changes into silver oxide, which is a good conductor at vhf and uhf. Do not try to protect the plated surface by spraying it with paint or lacquer: This will destroy the effectiveness. Once the surface is plated, do not touch it with your fingers, because the body oils left behind in the fingerprint will destroy the plating. This will degrade the performance at vhf or uhf.

Really, the only question left is whether a particular surface should be plated. Why risk finding out later that you should have plated it initially? I've never enjoyed taking a piece of equipment apart to fix something that was not done right in the first place. To paraphrase a popular advertisement, "you can plate it now or you can plate it later." The choice is yours.

[Editor's Note: There is a general belief that the Q of a silver-plated inductor or conductor is higher than that of a plain-copper conductor. This appears to be true at vhf and higher, but in the hf range and lower (owing to greater "skin-effect" penetration) there was no discernible difference in the unloaded-Q readings obtained with a specified coil during ARRL lab tests. However, even an hf-band inductor looks nicer when silver plated, and is less prone to severe oxidation than an equivalent inductor made from bare copper wire or tubing.]

New Products

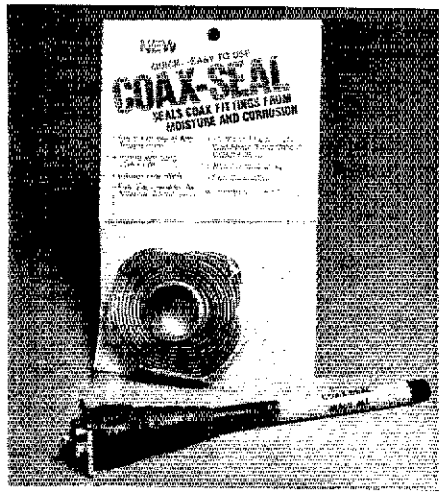
UNIVERSAL ELECTRONICS, INC. COAX-SEAL

☐ Any Amateur Radio operator who has to contend with outdoor antenna and feed-line connections (and that includes most of us) faces the problem of effectively sealing those connections from the elements. Many of us, I'm sure, have tried a number of sticky, messy and malodorous concoctions in an effort to ensure the integrity of the transmission line/antenna system. The degree of success obtained varies, and the search for the "right" sealing material continues. Perhaps your search has now ended.

Coax-Seal is a pliable, rubber-based plastic material that is easy to use and appears to be "just what the doctor ordered." It is supplied in 1/8-in. (mm = in. × 25.4) thick by 1/2-in. wide rolls, having a removable backing paper. Each roll is 60 in. long, supplying enough material to cover approximately five or six coaxial connector/cable assemblies. The green, tacky material may be hand-molded over fittings of any size or shape and adheres well to the coaxial cable outer vinyl jacket. The manufacturer claims flexibility, though not tested in the ARRL lab, will be maintained over a temperature range of −25° to 350° F (−4° to 177° C).

Tom Harrington, president of the company, says that Coax-Seal has been used commercially for eight years. It was first developed for microwave and TV system use. The material will not stain paint and is nontoxic and noncorrosive. It is meant to be applied to clean, dry surfaces at ambient temperatures between 50° and 90° F (10° and 32° C).

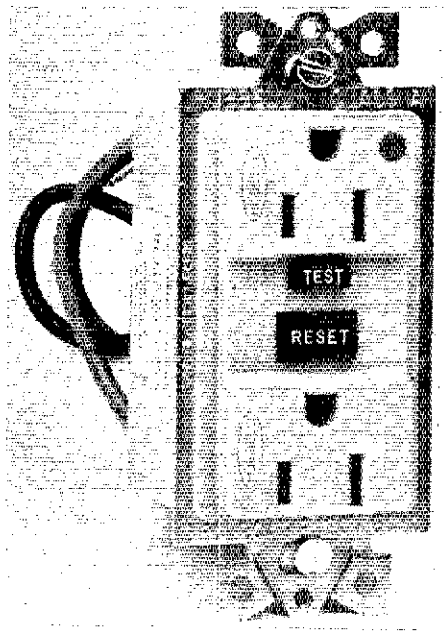
Members of the ARRL staff who had an opportunity to use samples of the material all reported that its application and sealing qualities are favorable. Exterior surfaces covered with Coax-Seal were clean and unaffected by the weather when uncovered months later.



Coax-Seal is available from Universal Electronics, Inc., 1280 Aida Dr., Reynoldsburg, OH 43068. Price class for the 60-in. roll is $2; 50-ft rolls are also available. — *Paul K. Pagel, N1FB*

HUBBELL GROUND FAULT INTERRUPTER RECEPTACLES

☐ The Hubbell Corporation has recently announced the addition of ground fault interrupter receptacles (GFIR) to their product line. Designed to replace standard 3-wire ac receptacles, the GFIRs provide safety by opening the line circuit in the presence of line-to-ground electrical shock hazards if the leakage level exceeds the unit trip level of 4 to 6 mA. This type of hazard may develop in faulty tools or appliances, or from defective insulation in line and extension cords.



Hubbell receptacles are available in either specification or hospital grade, 15 or 20 A/120 V units and in five different colors: brown, ivory, red, gray or white. All units feature external indication of ground fault, as well as front-mounted test and reset buttons. In addition, a feed-through feature allows the GFIR to provide shock-hazard protection for standard receptacles located downstream on the ac line. Installation is simple, for the units are engineered to fit in any standard 2-1/2-inch box. No additional spacers are needed.

Additional information and pricing are available from your local distributor or the Wiring Device Division, Harvey Hubbell, Inc., State St. and Bostwick Ave., Bridgeport, CT 06602. — *Dennis J. Lusis, W1LJ*

Compact Multiband Antenna Without Traps

Looking for an inexpensive, easy-to-build, portable antenna to use with your tube-type transmitter? This first cousin of the G5RV may be the aerial of your dreams.

By Taft Nicholson.* W5ANB/AAR6AG

Do you need an antenna for portable operation? I do! My preference is for making things as simple as possible. I don't like traps and matching units. The antenna shown in Fig. 1 has no traps, needs no matching unit for the 10-, 20- and 40-meter bands (when used with vacuum-tube PAs), is lightweight and installs easily. What more could you ask for?

Construction

Construction is simple. Cut two lengths of stranded copper wire (such as Radio Shack 278-1292) to 44 feet, 2 inches each (m = ft × 0.3048). Attach 36 feet, 8 inches of 300-ohm twin lead as shown in Fig. 1. Coaxial cable attaches to the other end of the twin lead at the points marked A and B in the diagram. I wound 7 feet, 2 inches of RG-58/U coaxial cable into an rf choke to minimize problems with rf flowing on the outside of the coaxial cable. This length of cable in the choke evolved from an attempt to match the antenna to the transmitter for operation on 15 meters.

Alternatively, you could use open-wire feeders in place of the twin lead. If you choose that method, you will need to make the section 42 feet, 6 inches long. Or you could attach the twin lead or open-wire conductors to a matching unit. When using a matching unit, there is no particular merit in the lengths given in the diagram.

SWR

The SWR of the antenna is less than 3:1 on 10, 20 and 40 meters. I have no difficulty loading transmitters with tube-type PAs (e.g., Galaxy V, Swan 350 or Drake T4X). This antenna will work with some transmitters on 15 meters, but tuning is quite critical.

*2304 Willow Dr., Alamogordo, NM 88310.

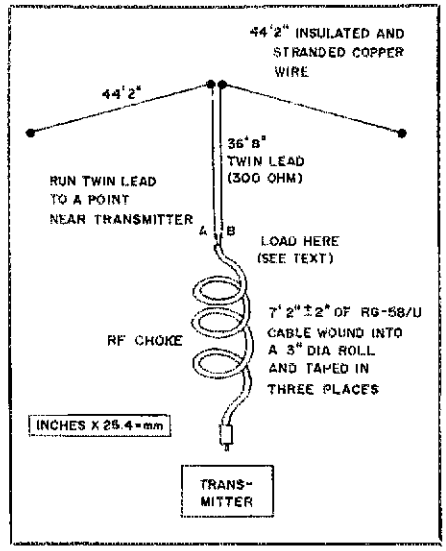


Fig. 1 — Diagram of the compact multiband antenna. For 80-meter operation the loading coil is inserted at points A and B. Banana plugs and jacks may be added here to facilitate insertion and removal of the loading coil.

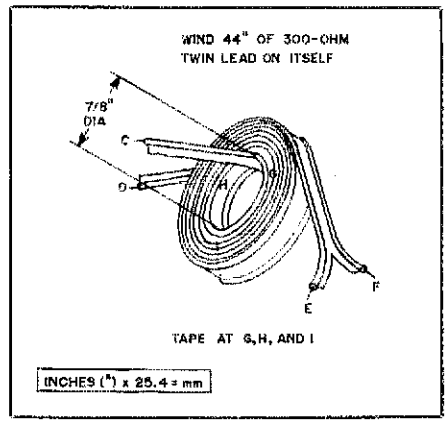


Fig. 2 — Loading coil for 3500-3750 kHz operation. Points E and F on the coil are connected to the coaxial cable. Points C and D are connected to the twin lead.

However, 80-meter operation is a problem. I have not been able to obtain full output power with these transmitters on frequencies below 3.750 MHz. The SWR measures between 5:1 and 8:1 for the lower part of the band. I constructed a loading coil to go between the choke and the twin lead (Fig. 2). The coil consists of 44 inches of twin lead wound on a 7/8-inch diameter form (my left thumb). Once the coil was wound, I removed it from my thumb and used electrical tape to secure it. For 80-meter operation, attach ends C and D to the choke and ends E and F to the twin lead. Remove the coil for operation on the other bands. Banana plugs and sockets can be used to facilitate the insertion and removal of the coil.

Installation

The antenna should be as high as practical. I've had satisfactory results with the center of the antenna only 25 feet above ground, with the ends tied to fences or other convenient supports. Telescoping TV mast sections make a good support if nothing else is available. The legs of the antenna serve as two of the guy wires. One or two additional guy supports should be added (nonconducting material such as nylon rope is best).

This compact multiband antenna works satisfactorily on all bands from 20 through 80, and 10, meters. It has no traps and requires no matching unit when used with tube-type equipment. I have used it for portable operation in and out of the country. It is easy to pack, carry and erect. Perhaps you might want to try one. I think you'll like it! A brief discussion of the theory of operation follows in the appendix.

[Editor's Note: A description of the G5RV appears in the RSGB *Radio Communications Handbook*. Gray described it in the June 1977 issue of *Ham Radio Horizons*. A similar design was depicted in the Collins Radio manuals of the 1930s.]

Appendix

This multiband antenna evolves from two connected transmission lines with critical length and ratios of surge impedances. The system is self resonant at a fundamental frequency and at most of the even harmonics and several of the odd harmonics. The first five are 2nd, 4th, 5th, 7th and 8th.

Consider the transmission lines in Fig. 3.

The two lines are of equal length, "ℓ" and different surge impedances, Z_o and Z_s.

Looking into the lines:

$$X_o = \frac{Z_o}{\tan(2\pi\ell/\lambda)} \text{ and } X_s = Z_s \tan(2\pi\ell/\lambda)$$

where

λ = wavelength

X_o = reactance looking into open line

X_s = reactance looking into shorted line

From the theory of resonant circuits, we know if we connect the lines the system will be resonant at all frequencies where $\bar{X}_o = \bar{X}_s$, provided the two reactances are of equal value and opposite signs. The open and shorted line provide this condition except at some harmonics.

Joining the lines as depicted in Fig. 4 we find that

$$\frac{Z_o}{\tan(2\pi\ell/\lambda)} = Z_s \tan(2\pi\ell/\lambda)$$

$$\frac{Z_o}{Z_s} = \tan^2(2\pi\ell/\lambda) = \tan^2(360°\ell/\lambda)$$

If the angle $2\pi\ell/\lambda$ is made 60°, then the amplitude of the tangent at 120° or second harmonic will be the same. This will be true for 240° (4th harmonic) and 300° (5th harmonic). Similarly, these harmonic responses will continue at discrete angles above 360°, e.g., 7th, 8th, 10th, 11th, 13th, 14th and so on. The signs of the tangents wash out when squared.

The angle $2\pi\ell/\lambda$ becomes 60° by making $\ell = \lambda/6$ (1/6 of a wavelength) at the fundamental frequency.

$$\frac{Z_o}{Z_s} = \tan^2(360° \times 1/6)$$

$$= \tan^2 60° = (1.73)^2 = 3$$

Therefore $Z_o = 3Z_s$. This equation makes practical the multiband antenna because Z_o can represent the antenna proper and Z_s can represent the resonant feeder.

Z_o for the antenna may be computed from formulas in radio engineering handbooks or text books. For a piece of wire above the earth and parallel to it as shown in Fig. 5C

$$\frac{Z_o}{2} = 138 \log \frac{4h}{d}$$

For no. 12 wire, d = 0.08081 in.
Let h = 20 feet or 240 in.

$$\frac{Z_o}{2} = 138 \times \log\left(\frac{960}{0.08081}\right)$$

138 log (11879) = 562 ohms

This value is not critical. One can use 300-ohm twin lead or 400-ohm open line with good results. The harmonics will be displaced somewhat, but with variable tuning of the transmitter the system can be brought on frequency.

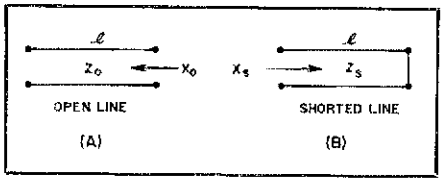


Fig. 3 — Two identical lengths of transmission line. Looking into the lines, the opposite ends are open and shorted at A and B, respectively.

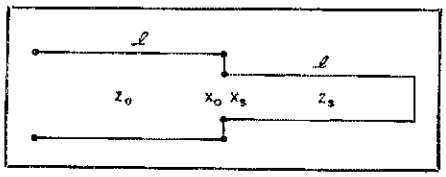


Fig. 4 — The two transmission lines from Fig. 3 are joined to form one line.

If the wire size had been no. 18,

$$\frac{Z_o}{2} = 605 \text{ ohms}$$

If we use no. 12 wire, then we would have 562 ohms on one side and + 562 ohms on the other side.

$$Z_o = \frac{Z}{2} + \frac{Z}{2} = 1124 \text{ ohms}$$

From the formula $\frac{Z_o}{Z_s} = 3$

$$Z_s = \frac{Z_o}{3} = \frac{1124}{3} = 374.6 \text{ ohms}$$

The above indicates that $Z_o/2$ varies with antenna height, wire size and configuration. The function is logarithmic and a lot can be done to the antenna before Z_o changes very much. The inverted V works well; just use the $Z_o/2$ formula for a horizontal wire and let h be the average height of the inverted V. A formula for surge impedance can be worked out for most any configuration, including a vertical. If the reader is interested in feeding a vertical antenna, he is referred to LaPort,[1] which has the fundamental information for finding surge impedance or characteristic impedance of antennas.

The system could be used for a single-ended antenna fed with a balanced transmission line with a balun at each end. Another possibility for a vertical is the use of a two-wire, grounded, open transmission line, as discussed in LaPort's book. The ground system would be critical.

When experimenting with these multiband lines, it is convenient to have some "stock" numbers to apply to the lines (see Fig. 6). One-sixth of a wavelength is one-third of a half wavelength. A convenient length for a half wave on 80 meters is 135 feet. One-third of that is 45 feet or $\lambda/6$ for 80 meters. One-sixth of a wavelength on 40 meters is 22-1/2 feet. When you are designing an antenna, these lengths need to be multiplied by the propagation constant of the line. After construction and testing, the dimensions can be pruned for end effect, etc.

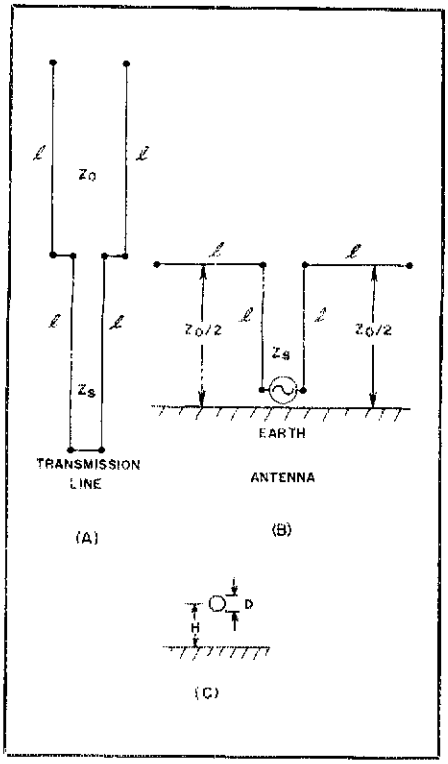


Fig. 5 — At A and B, the open portion of the transmission line evolves into the flat-top portion of the antenna. At C, diagram illustrating the formula for calculating Z_o for the antenna.

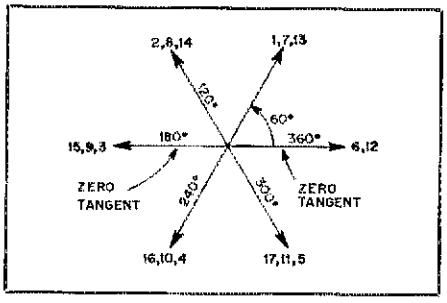


Fig. 6 — Angular position chart useful for determining "stock numbers" to apply to the chart.

When operated as a transmision line, the system as described may have application in end-feeding half-wave antennas, especially two half waves in phase. The system transforms a high impedance to a low impedance as a quarter-wave line will; however, it will do this at several even harmonics, in contrast to the quarter-wave line that is only responsive to odd quarter wavelengths.

The author wishes to thank Walt Maxwell, W2DU, for his detailed analysis of the theory section of this article. Further information about this antenna is available from the author. Please enclose a self-addressed, stamped envelope with your request.

Notes

[1] E. LaPort, *Radio Antenna Engineering* (New York: McGraw-Hill Book Co., 1952).
[2] See note 1.

Auto-start and Anti-space for the State-of-the-Art TU

Warm up that soldering iron and add these welcome features to that new terminal unit. They may be just what you've been waiting for.

By Robert Witmer,* W3RW

The terminal unit (TU) in December 1980 *QST* is a fine example of the simplicity of sophisticated electronic equipment designed and built with special-function ICs.[1,2] I built only the receive portion of the circuit and use it with a model 15 printer to monitor activity on a local 2-meter fm RTTY repeater. This demodulator is a "natural" for this type of service because of the noise-free nature of 2-meter fm operation. Described here is the circuit I added to the original demodulator to incorporate auto-start and anti-space. The parts needed should be easy to find and are inexpensive.

What is Auto-start?

The function of auto-start (also called automatic printer control) is to energize the RTTY printer only when an RTTY signal is present. Auto-start is almost essential if you want to monitor RTTY signals with an unattended printer — unless you don't mind the noise and power consumption of perhaps all but the newest printers when they are left on all of the time. If you don't want or need printer control, you can use the relay contacts to control an audio cassette recorder, which will record the received audio signal for later playback through the demodulator and printer.

The RTTY signal identification function has often been implemented with circuitry that samples the MARK and SPACE channels. It turns on the printer only when a signal with a duty cycle in excess of 75% has been sensed.,[3,4] Most cw and voice signals have a lower duty cycle. The 2-meter fm RTTY repeater I monitor performs this screening process for me as the repeating process ignores other modes of transmission and involves regeneration of the RTTY signal. The MARK (lock) detector output of the XR-2211 (pin 5) also performs a type of signal identification; this output will be used with the auto-start function. With the signal screening process completed, the only other desirable features to incorporate are turn-on and turn-off delays and anti-space circuitry. The delays minimize printer cycling when the repeater is keyed up by a "kerchunker" or between a series of transmissions. Anti-space circuitry keeps the printer in a MARK-hold condition during an absence of signal and when the motor control relay is timing out.

Adding Auto-start

The auto-start circuit of Fig. 2 consists of a modified 555 timer circuit employing U1, with the timer output driving a relay-driver transistor, Q2. The relay contacts control the application of 117 V ac to the RTTY printer motor. (An extra set of contacts could be used to open the loop supply to minimize power dissipation when the system is awaiting a valid signal.)

R1, R2, D1 and C1 form the input turn-on time delay part of the circuit and connect to the lock-detect output of the XR-2211 demodulator. This output goes low only when a signal within the lock range of the IC is present. Since this output is normally high, D1 provides a quick charge path for C1 when no signal is present, which keeps pin 2 of U1 high. When a signal is present, the lock-detect output goes low and provides a discharge path for C1 through R2, creating a turn-on delay of approximately five to seven seconds. U1 is triggered on the negative-going edge of an input pulse caused by the discharge of C1. When triggered, U1 starts a timing cycle with the output at pin 3 going high until the timing cycle is completed. The internal voltage comparator of U1 resets, completing the timing cycle, when the voltage on C3, charged through R4, reaches the trip point.

Without Q1, U1 would go through a timing cycle on the low input from C1 (discharged) and then reset — even if a low continued to be present. The function of Q1 is to keep C3 from charging and to prevent the timing cycle of U1 from being completed until the XR-2211 output goes high, indicating a loss of signal. Q1 provides a discharge path to ground for C3 as long as pin 2 of U1 is low. When pin 2 goes high, Q1 is turned off, C3 is allowed to charge and U1 completes the timing cycle, turning off the drive to Q2. The time delays can be varied by changing the values of R2/C1 for the turn-on delay and of R4/C3 for the turn-off delay.

Control Relay

I use a 12-volt dc, dpdt, 110-ohm coil relay with 10-A rated contacts for K1. Fig. 2 indicates the parts for R5 and Q2. Other relays can be accommodated by supplying the required dc operating voltage for the relay, choosing the correct transistor for Q2 and the proper value for R5. Q2 acts as a ground-return switch for the relay. It should be chosen to have a collector-to-emitter breakdown voltage (V_{CEO}) at least twice that of the relay supply voltage. A current-handling capability of at least several times that required by the relay coil should be ensured. In any case, do not forget D2; it protects Q2 from the high-voltage transients generated by the relay coil during switching. R5 should be chosen to provide a base current for Q2 at least equal to the relay current divided by the dc current gain of Q2. Being a little on the high side never hurts in switching applications like this, provided you don't ex-

[1]Notes appear on page 30.

*79 Blaine Ave., Leola, PA 17540

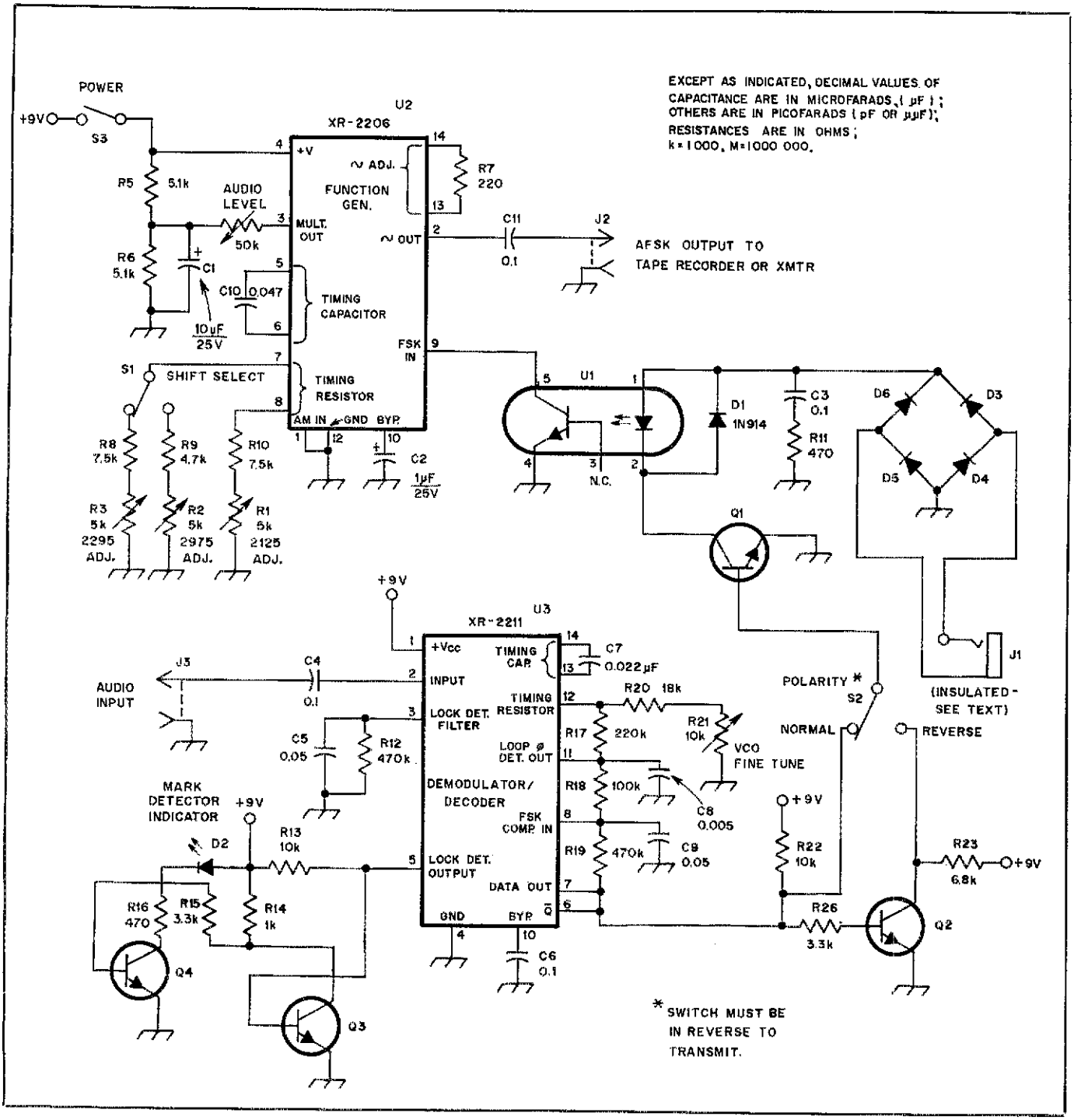


Fig. 1 — Diagram of the State-of-the-Art TU that was described in December 1980 *QST*. The diagram includes the correct value for C8 and connection data for R14. C3 should have a 400-V rating if a 150-V loop supply is used.

ceed the maximum base current limit.[5]

Anti-space

R8, R9, D3 and Q4 form the anti-space circuit. When the correct signal is not present, pin 5 of U1 (Fig. 1) is high. This turns on Q4, which supplies current through R9 and D3 to the base of the loop-keying transistor, keeping the printer in a MARK condition when no signal is present. Without this circuit the loop opens with a loss of signal, and the resulting chatter from the printer can be annoying.

A 1N914 diode must be added to the original circuit of Fig. 1 between the NORMAL/REVERSE switch (S2) and the base of the loop-keying transistor. This diode and D3 connect directly to the base of the loop-keying transistor, as shown in Fig. 3.

Construction

Both the demodulator and auto-start circuits were constructed originally on perf board because of the simplicity of the receive-only circuitry. Another system is being built with Radio Shack IC prototyping pc boards. Two types are available, bearing part numbers 276-159 and 276-151. The use of these inexpensive boards is a great help during construction; the end product will have a more professional look than that obtainable with most perf boards.

I utilize a different MARK (lock) detector indicator circuit (shown in Fig. 2), which consists of R6, Q3, R7 and DS1. Those wishing to duplicate this circuit can disconnect the components from pin 5 of the XR-2211 IC and connect that pin

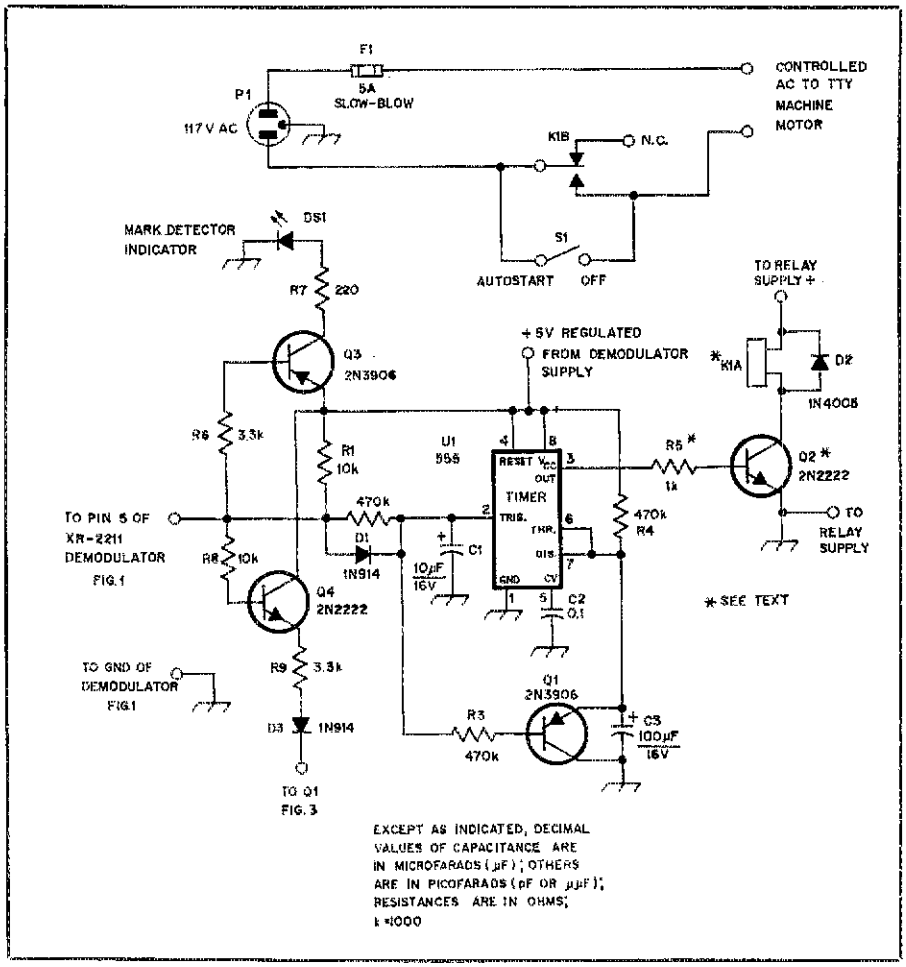


Fig. 2 — Auto-start, anti-space and mark-detector indicator circuit additions for the TU. The selection of K1 and Q2 is discussed in the text. All resistors are 1/4 watt, 5 or 10% tolerance units. Capacitors with polarity indicated may be electrolytic or tantalum types.

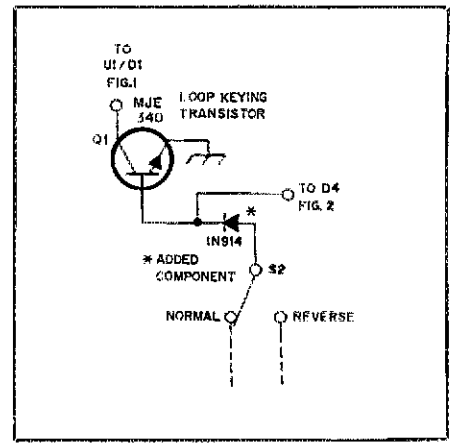


Fig. 3 — A diode must be added in the original circuit to incorporate the anti-space circuit.

directly to the point shown in Fig. 2.

Supply Voltages

For my demodulator and auto-start circuits, I chose to use a 5-volt supply. A 12-volt, 450-mA battery eliminator (wall transformer) with a 5-volt regulator IC is employed. Changes required to the original demodulator circuit of Fig. 1 for operation with a 5-volt supply are the use of a 5.1-kΩ resistor for R22, a 3.3-kΩ resistor at R23 and a 1.8-kΩ resistor for R26. Since I did not use the transmit portion of the TU, I replaced the optoisolator diode of the original circuit with a 1N4005 diode. Note that both the demodulator and auto-start circuits should be operated at the same supply voltage. The afsk generating part of the TU can continue to be operated at 9 volts, since the optoisolator provides the necessary isolation.

Operation

When the demodulator/auto-start circuit is first powered up, the timer starts a complete timing cycle, and the motor control relay is energized. I find this to be a useful check of the auto-start function (not a problem). If desired, a switch can be placed in parallel with the relay contacts to provide a means of manual auto-start on/off control (S1 of Fig. 2).

The modifications and additions described here are easy to perform. Try them — it won't take you long to enjoy the improved operating conveniences.

Notes

[1]M. J. Di Julio, "A State-of-the-Art Terminal Unit for RTTY," *QST*, Dec. 1980, p. 20. Also, Feedback, *QST*, Feb. 1981, p. 46 and March 1981, p. 51; and Hints and Kinks, *QST*, July 1981, p. 45.

[2]"XR-2211 FSK Demodulator/Tone Decoder," *Phase-Locked Loop Data Book*, EXAR Integrated Systems, Inc., 750 Palomar Ave., Sunnyvale, CA 94088.

[3]I. M. Hoff, "The Mainline ST-3 RTTY Demodulator," *QST*, April 1970, p. 11.

[4]I. M. Hoff, "The Mainline ST-6 RTTY Demodulator," *Ham Radio*, Jan. 1971, p. 6.

[5]W. Hayward and D. DeMaw, *Solid State Design for the Radio Amateur* (Newington: The American Radio Relay League, 1977).

Strays

EXPERIMENTAL RADIO NET

☐ The communications subsection of the Long Island chapter of IEEE and the Long Island Amateur Radio Club will initiate an experimental radio net whose purpose will be to disseminate information about trends in the communications and electronics industry. Originating from Plainview, New York, the net should be accessible throughout Long Island and southern Connecticut. The net will operate on an output frequency of 147.375 MHz, and the target date for start up is November 11, at 8:30 P.M. Thereafter, it will operate on the second Wednesday of each month, directed by Ed Piller, W2KPQ. Interested Amateur Radio operators are being sought who can originate speakers and help with administrative details. Contact W2KPQ days at tel. 516-349-2484, other times at 516-938-5661.

I would like to get in touch with . . .

☐ anyone with a circuit diagram for an Eico Signal Generator Model 315. Bill O'Hara, W7TOJ, 3126 SE 36, Portland, OR 97202.

☐ amateurs who are board sailors to exchange information and discuss advancements in the sport of wind surfing. Jerry Swalling, WA7ZTT, 8525 Naketa Beach Rd., Mukilteo, WA 98275.

The Euro-Asia to Africa VHF Transequatorial Circuit During Solar Cycle 21

Part 1: "VHFers" have long suspected that Transequatorial Propagation would support 2-meter contacts over great distances. In 1978 that suspicion became reality. This is a two-part report on research conducted since then.

By Ray Cracknell,* ZE2JV, Fred Anderson,** ZS6PW and Costas Fimerelis,*** SV1DH

The current world long-distance record for a 144-MHz two-way QSO via the ionosphere, a distance of 4475 miles (kilometers = mi × 1.6093), is held by SV1AB and ZS6LW. The longest distance over which 144-MHz signals have been heard and recorded is from ZS3B in Luderitz (26°38′ S, 15°10′ E) to I4EAT in Faenza (44°17′ N, 11°48′ E), a great circle distance of 4930 miles.

Transequatorial Propagation

Countries bordering on the Mediterranean in Europe and Asia, as well as the coastal strip of North Africa, are ideally situated to enjoy optimum vhf and uhf transequatorial propagation (TE) into a belt of Africa stretching from somewhere north of Zambesi to the Orange River (approximately 15-30° S). Following is an account of the use made of these opportunities by a group of amateurs in Cyprus, Greece, South Africa and Zimbabwe during the high solar activity of Solar Cycle 21.

Twenty-two years ago, during solar cycle 19, amateurs in these areas explored the possibilities of TE at 50 and 70 MHz[1] with encouragement from The ARRL Propagation Research Project.[2] When solar-cycle 21 promised to produce peaks of solar activity almost as high as those experienced in solar-cycle 19, and propagation at 144 MHz was found possible,[3] old friends of the Africa circuit[4] got together with several new ones to take up the investigation again.

As the basic method of investigation, we monitored continuous transmissions from ZE2JV in Salisbury, Zimbabwe, on 29, 144 and 432 MHz; ZS6DN, near Pretoria, South Africa, on 28 and 144 MHz; and ZS6PW, in the suburbs of Pretoria, on 28, 50 and 144 MHz. Stations 5B4WR, 5B4AZ and 5B4HY in Limassol, Cyprus, and SV1DH and SV1AB in Athens, Greece, were on the monitoring end. We resumed propagation time measurements with much improved techniques. We successfully obtained Doppler-shift measurements between ZS6PW and SV1DH at 144 MHz. We looked at angles of arrival and again found they vary considerably. The characteristics of the signals, especially the flutter-fading and frequency spreading, were compared at various frequencies.

The Experiments

Our experiments this time concentrated on the 144-MHz band, but not exclusively. Communications at 432 MHz over the 3750-mile circuits proved to be possible, and we made detailed observations of the 10- and 6-meter transmissions and propagation times as well as those for 4 meters. As a result we were able to say, without fear of contradiction, that propagation on all these frequencies did indeed occur across the equator via the ionosphere. At times, particularly at night in years of high solar activity, the tropical ionosphere is capable of supporting propagation between optimum areas over a wide band of frequencies including the whole of the vhf and the lower portion of the uhf spectrum.

*13 Rowland Square, P.O. Belvedere, Salisbury, Zimbabwe
**101 van Niekerk St., Meyerspark 0184, near Pretoria, South Africa
***23 Ellanou St., Athens 817, Greece

[1]Notes appear on page 36.

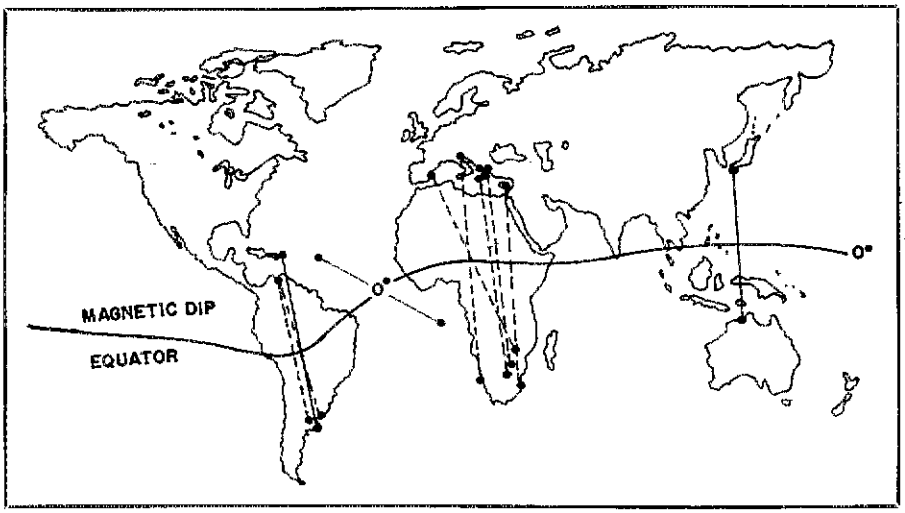


Fig. 1 — TE paths worked by amateurs on 144 MHz, showing the symmetrical distribution of stations with respect to the magnetic dip equator drawn on a map of magnetic inclination or dip, published by the U.S. Defense Mapping Agency Hydrographic Center.

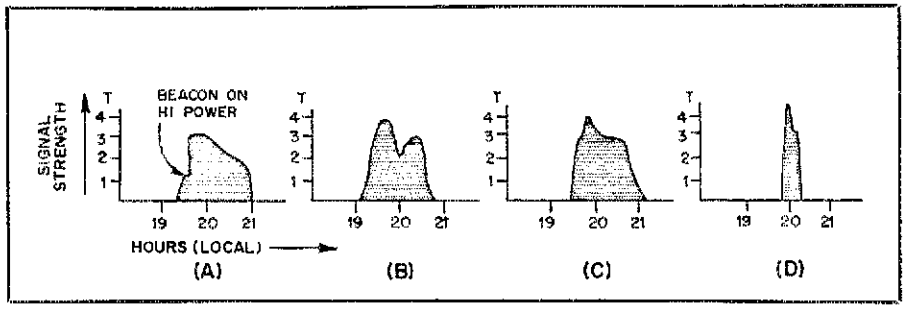


Fig. 2 — Typical signal strengths and duration of openings on 144 MHz: at A, ZE2JV at 5B4WR October 10, 1978; at B, ZE2JV at 5B4WR March 14, 1979; at C, ZE2JV at SV1DH March 25, 1980; and at D, ZS6DN at SV1DH March 25, 1980.

We found that as the signal frequency increased, the zones became more restricted to those equidistant from and perpendicular to the magnetic dip equator (Fig. 1). The duration of openings tended to be shorter and closer to 8 P.M. local time. We also found that the rate of flutter-fading and the degree of frequency spreading, both of which tend to characterize pure TE signals, likewise increased with signal frequency.

At lower frequencies (below 70 MHz) two-hop F-layer and F-type TE, which are supported by the high-density belts of the ionosphere forming on each side of the magnetic dip equator, may provide very strong signals during the afternoon and early evening. Later at night and sometimes in the early morning as well, only the weak and watery type of propagation we call pure TE was likely to be operative on frequencies of 50 MHz and above. In this two-part series we concentrate on pure TE, describe our experiments, detail the results achieved, and discuss modern theories and research relevant to the tropical ionosphere.

The Early Contacts

The initial contacts on 144 MHz occurred later over the African circuit than over Central/South American circuits. The strong signals reported by YV5ZZ' were not at any time in evidence. The first signals received in Cyprus by 5B4AZ from ZE2JV on April 8, 1978, and then by 5B4WR, SV1AB and SV1DH, were very weak, diffuse and difficult to copy because of rapid flutter-fading and frequency spreading. We were excited and thrilled because these QSOs arose, not from a chance hearing, but from careful preparation, and only after weeks of unsuccessful monitoring. Conditions improved thereafter, but the excitement died down, only to be revived by the appearance later in 1978 of ZS6DN's 144-MHz signal in Athens, and of ZE2JV's 432-MHz transmission in Athens and Cyprus in March and May 1979.

The geographical distribution of the TE paths worked by amateurs on 144 MHz is illustrated (Fig. 1) on a map of magnetic inclination, as published by the U.S. Defense Agency. TE paths are all between stations spaced more or less at equal distances from the magnetic dip equator and on paths that cross it at right angles. The greatest deviation experienced at 144 MHz is EA6FB on the Island of Ibiza, hearing ZE2JV's signal and ZD8DT on Ascension Island hearing KP4EOR.

Reliability and Seasonal Variation

After the excitement of the first QSOs, stations in Cyprus and Athens concentrated on monitoring beacon transmissions and plotting the daily and seasonal variations in reliability. SV1DH had spent 2500 hours monitoring by the end of December 1980. A comparable effort was maintained in Cyprus. Because of the low signal strengths encountered, the wide frequency spectrum to be covered and the number of stations to be monitored, mechanical means were not feasible. The combined efforts of our stations represent the only known systematic investigation so far made of the TE phenomenon above 100 MHz.

We first conducted tests on a 24-hour basis. Although some short, early-morning openings were recorded, no other daytime signals were heard. It soon became apparent that at 144 MHz the most significant openings were confined to a period of a little over two hours after the setting of the sun on the ionosphere. 5B4WR plotted graphs of every evening reception of ZE2JV's signals from April 1978 to December 1979. The results of two good evenings (October 10, 1978, and March 14, 1979) are illustrated in Fig. 2, together with SV1DH's reception of ZE2JV and ZS6DN on March 25, 1980. The Salisbury-to-Cyprus path proved to be the most reliable and provided, by a small margin, the strongest signals. It is remarkable that the South African stations were heard rarely in Cyprus, and when they were, they were very weak.

The monthly reliability of occurrence of propagation at 144 MHz over three circuits (Pretoria-Athens, Salisbury-Athens and Salisbury-Limassol) is illustrated in Fig. 3 for the period from March 1978 to December 1980. The three monthly running means are illustrated in Fig. 4. From these, the seasonal dependence, with maxima shortly after the equinoxes and minima at the summer and winter solstices, is clearly apparent. These results can be compared with the smoothed monthly value of solar flux and the average monthly values of geomagnetic activity that are illustrated in Fig. 5.

Complex Relationship

The relationship is complex. In general, it may be said that the high level of ionization that results from high solar flux is essential for TE at 144 MHz, and that magnetic disturbances disrupt it. How-

ever, when the solar flux is below about 180, and as the seasons near the summer and winter solstices, ionization is pushed high enough only for propagation at 144 MHz to occur in the period immediately following a solar outburst and before the arrival of the associated disrupting magnetic disturbance. Hence, prior to mid-1979, the reliability curves tend to follow the geomagnetic activity curve. After that time, when the magnetic index decreased, the curves follow the solar-flux curves much more closely. These conclusions are confirmed when our results and solar data are compared on a daily basis.

Signal strengths at 144 MHz were generally low. At SV1DH the strongest signal received via 144-MHz TE was from ZS6DN. This produced 0.6 microvolt across the 50-ohm input to the receiver. It represents a propagation loss of 43 dB, relative to free-space attenuation over a comparable propagation distance. Signals from ZE2JV were weaker, but lasted longer with a minimum propagation loss of 47 dB compared with free space. The strongest signals were received over the Salisbury-Cyprus (ZE2JV and 5B4WR) circuit with a minimum propagation loss of 40 dB, relative to free space being recorded.

Receivers

A good receiver with a front-end noise figure of 2 dB or less is essential for TE work at 144 MHz. As with other modes of ionospheric propagation, the noise level rises when the band opens; efforts to reduce the noise figure below 2 dB may not pay off. Above that figure many openings may be missed. Variable selectivity is desirable, but when the signal is broad because of frequency spreading, narrowing the selectivity excessively is not helpful.

Weak signals, received with flutter-fading, frequency spreading and poor notes caused by the propagation medium, are not suitable for RST code reporting. We reported with a simple T code in which T1 stood for signal present and

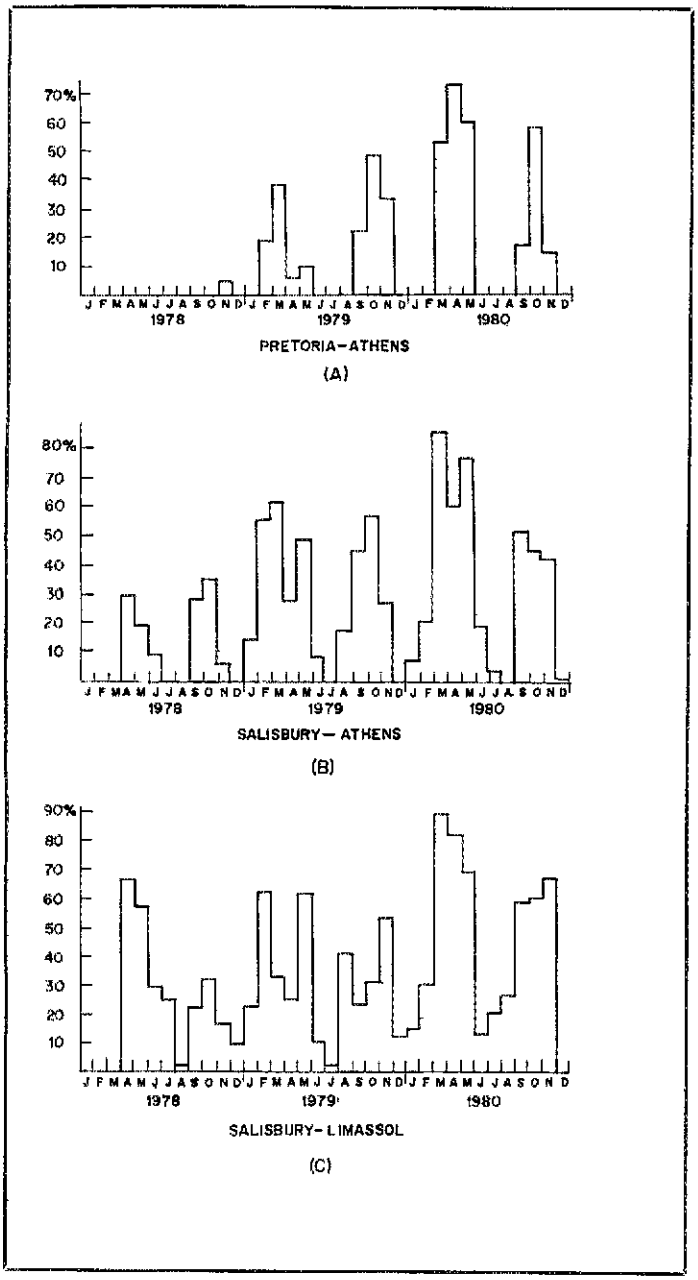


Fig. 3 — Reliability of occurrence of 144-MHz signals: at A, Pretoria-Athens; at B, Salisbury-Athens; and at C, Salisbury-Limassol.

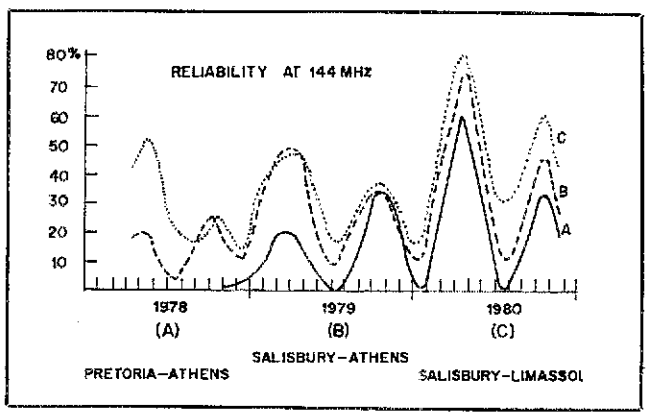


Fig. 4 — Smoothed reliability of occurrence curves for three circuits.

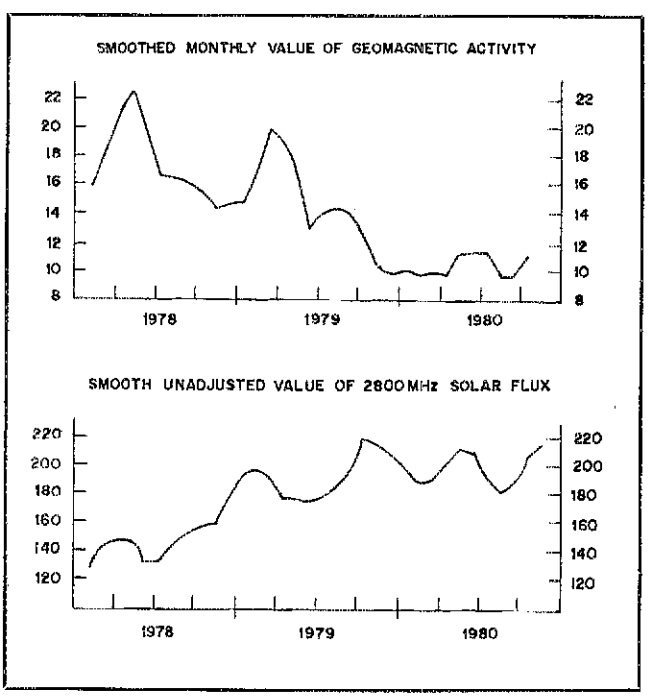


Fig. 5 — Smoothed monthly value of 2800-MHz solar flux and average monthly value of geomagnetic activity based on data extracted from the solar Geophysical Reports published by the National Oceanic and Atmospheric Administration (NOAA), Department of Commerce, USA.

recognizable, T2 for signal copied 50%, and T3 for signal copied 100%. For initial and record-breaking QSOs, we employed the RST code. Reports such as 317F (the report given by ZE2JV to 5B4WR on the first TE 144-MHz QSO over the Africa circuit) seemed to be a poor reward for the effort involved.

Transmitters

Under the best conditions, low-power transmitters (10 to 50 watts output) have been heard across the TE circuit. A power of at least 100 watts into a well-matched antenna proved necessary for comprehensive TE work. The effect of increasing power from the 40-watt, 24-hour beacon to 200 watts for the evening test period is illustrated in Fig. 2A. This resulted in a jump from a T1 (just recognizable) to a T3 (fully readable) signal. Below the 100-watt level the duration of openings is considerably reduced. Above that level, increased power improves the received signal proportionately without extending the length of openings to any appreciable extent.

Crystal oscillators, although quite satisfactory for working QSOs, present drift problems. Stabilization against a frequency standard is necessary when sophisticated measurements are attempted.

Cw (A1) was used for most transmissions, although ZE2JV used fsk (F1) to avoid TVI problems. Fsk has the advantage that casual listeners are less likely to tune through an F1 signal without hearing it. Against this, many operators find it difficult to copy, and more heat has to be dissipated in the PA than when using A1. Two-hundred watts of output on fsk was about as much as ZE2JV's Johnson Thunderbolt (two 4CX250Bs) could manage when running continuously in hot weather. ZS6DN used 100 watts (A1) into a high-gain antenna system on an excellent site. ZS6PW transmitted 150 watts, also on A1.

Between call signs, pulses were applied to these transmitters and used extensively for time-delay measurements. These pulses were in fact a series of dots. It would have been of great advantage to use pulses with much higher peak power, but this was not permissible because of licensing restrictions.

Antennas

We have avoided the term erp (effective radiated power) when discussing power. When working a mode of propagation involving multipath, off-line transmission and variable vertical angles, obtaining the optimum cone of radiation is difficult. Clearly, sharpening the beam directivity below the optimum will not increase the *effective* radiated power. This may even cause the signal to be lost.

An efficiently coupled antenna system is, however, essential for successful TE work. Time spent in optimizing a beam for maximum forward gain usually will be rewarded amply. The aim has to be the maximum transfer of power into or from space. Deficiencies in this respect cannot be compensated for by adding more elements to an array, once the optimum condition has been reached.

Many stations with large stacked beams were unable to work TE. We conducted tests at 432 MHz from ZE5JJ, a well-known moonbounce station, using 1 kW of rf into a 20-ft (meters = feet × 0.3048) parabolic dish, which could be aimed right down to the horizon. The installation produced signals in Athens that were no better, if as good, as ZE2JV's 40-watt one into a pair of horizontally spaced 8-element quagis. Stations farther out from the magnetic dip equator will likely have an ionospheric target low on the horizon. They will seldom be far off a direct great circle line from station to station. They may well benefit from big stacked arrays. ZS6DN used an array of four 16-element Yagis. ZS3B and I4EAT also used big arrays very successfully. Closer in, however, in Cyprus, Athens and Zimbabwe, single Yagis of 10 to 16 elements seem to provide the most reliable results at 144 MHz.

The Transponder System

The first TE propagation time measurements were devised some 21 years ago to prove or disprove a suggestion by Professor Obayashi[6] that TE signals traveled through field-aligned ducts outside the ionosphere. The method used was to transmit a series of dots on cw (A1) to the far end of the TE circuit, where a receiver in the cw mode produced a train of audio pulses. These audio pulses were then applied as modulation and transmitted back to the originating station. The returned pulses and a sample of the original outgoing pulses were displayed on an oscilloscope. Time markers were also applied. This represented the time taken by the signal to cover the distance between stations twice, plus equipment delays. The latter were found readily by repeating the experiment between stations that were a short, known distance apart and that used similar equipment.

Crude as it was, this method demonstrated that TE propagation times were slightly longer than normal two-hop F-layer propagation time. They were never long enough to indicate that any extraordinary path outside the ionosphere was being followed by either the 28- or 50-MHz signals.

The Relative Time Delay System

The suggestion that propagation at 144 MHz was an entirely new mode of propagation led to renewed interest in propagation times. Different modes would be associated with different time delays over the circuit. A transponder system would not be satisfactory because of the poor signal-to-noise ratio, flutter-fading and

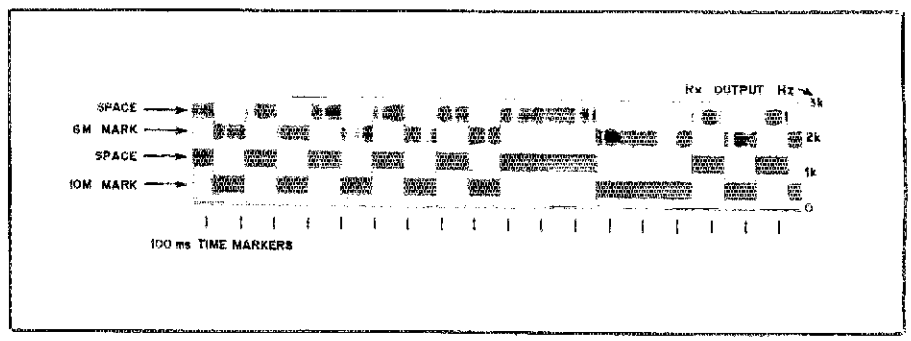


Fig. 6 — Spectrogram of simultaneous 28- and 50-MHz transmissions from 5B4CY in Limassol, Cyprus, as received by ZS6PW in Pretoria, South Africa.

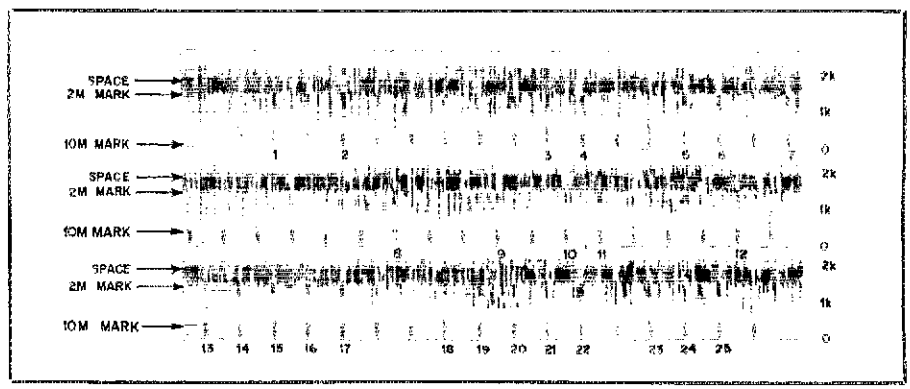


Fig. 7 — Spectogram of simultaneous fsk pulses on 28 and 144 MHz as received by SV1DH in Athens from ZE2JV in Salisbury.

frequency spreading experienced on 2 meters. Also, we knew from the original tests that multipath propagation takes place on 10 meters, the band that would have had to be used for the retransmission back to the originating station. The resulting oscilloscope display would have been completely unintelligible.

The interest lay, however, in determining whether signals on one band had traveled over a longer or shorter path than those on another band. The measurement of *relative* propagation times would provide the required information.

We therefore conducted a series of tests in which the call sign 5B4CY was keyed simultaneously on the Cyprus 28- and 50-MHz beacons. The ZE2JV beacons were arranged to transmit call sign and pulses simultaneously on 28 and 144 MHz. At the receiving end of the TE circuit we adjusted two receivers, operating in the cw mode, to produce different audio notes, which were summed and recorded on tape. We subsequently analyzed the tape recordings on a sonograph. This is a device that provides a running display of the audio spectrum over several seconds.

Some results of these tests are shown in Figs. 6 and 7. In Fig. 6, the "5B" of the call sign 5B4CY is shown as received simultaneously on 50.498 and 28.220 MHz by ZS6PW. It can be seen that any difference in the time of arrival of the transitions from mark to space, or vice versa, is less than the resolution of the system — some 2 milliseconds in this case. Band conditions at the time were typical for evening propagation with slight, slow fading on 10 meters and moderate flutter-fading on 6 meters. Note the excellent signal-to-noise ratio presented in Fig. 6.

Fig. 7 shows a series of pulses that were received simultaneously by SV1DH from ZE2JV on 144.160 and 29.266 MHz. Band conditions were typical, with slight QSB on 10 meters and severe flutter-fading on 2 meters. Owing to the poor signal-to-noise ratio, not all the 2-meter pulses are visible. The best 25 have been marked, and none appear to occur at times that are not coincident with those at which the 10-meter pulses were received.

Although this system showed that there were no significant differences in the propagation times on 10, 6 and 2 meters, its limitations are fundamental. It is cumbersome and places great demands on the operator to adjust two receivers to produce the optimum audio notes. Furthermore, the bandpass of the analyzing filter has to be narrow to resolve the limited frequency shift of the F1 signals. This severely limits the time resolution. There is, of course, no measurement of the actual time taken by either signal.

A System for Measuring Absolute Propagation Times

Consider the transequatorial circuit involved, the probable virtual height of the ionosphere and the propagation modes that could be in operation. A little geometry plus a few simplifying assumptions lead to Fig. 8. The range of values to be expected for the propagation time over the Pretoria-to-Athens circuit for the two normal propagation modes would be some 2 or 3 milliseconds. Hence, a system providing a time resolution of 0.1 millisecond would be very useful in estimating the propagation parameters involved. The 2-ms resolution of the previous systems only indicated broad trends.

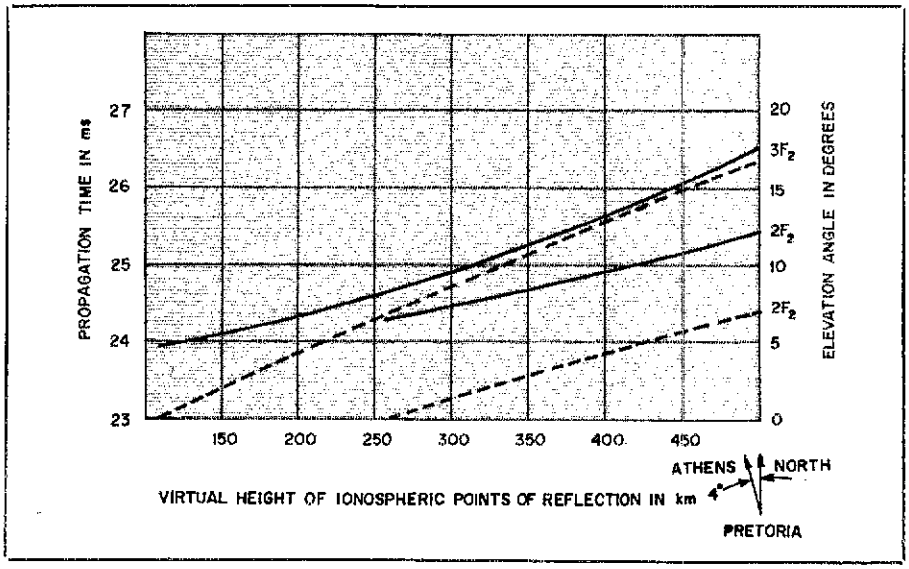


Fig. 8 — Propagation time and angles of arrival of normal multi-hop, F_2-layer propagation between Pretoria, South Africa, and Athens, Greece.

These considerations, as well as the drawbacks to the relative time measurements mentioned above, led to the decision to set up an entirely new one-way measuring system, based on Universal Coordinated Time (UTC). UTC was available with great accuracy at both ends of the Pretoria-to-Athens circuit. In Pretoria at ZS6PW, it is only a short ground-wave path to the vhf transmitter of ZUO, the South African equivalent of WWV. In Athens at SV1DH, UTC was available from the Lampedusa station of the Mediterranean Loran C navigation system operating on 100 kHz. Over both these paths the propagation times are constant and can be calculated with great accuracy.

The system used is based on the transmission by ZS6PW of pulses having the same repetition period as the Mediterranean Loran C eight-pulse groups, namely 79.9 ms. The first pulse of each group as received by SV1DH from Lampedusa triggers a two-channel oscilloscope. In the oscillogram reproduced in Fig. 9, the last

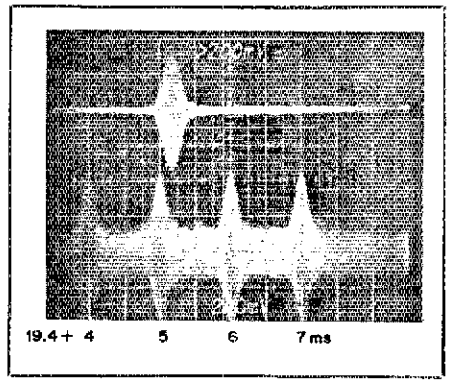


Fig. 9 — Oscillogram of propagation delay photographed by SV1DH, displaying a pulse received from ZS6PW on 28.270 MHz on the upper trace, and Loran C timing pulses on the lower trace. The actual delay is 19.4 plus the 5.2 milliseconds read from the oscillogram.

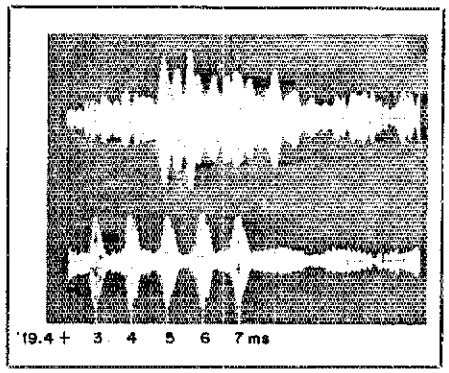


Fig. 10 — Multipath propagation from ZS6PW on 28.270 MHz photographed by SV1DH. There are 10 received pulses from the one transmitted pulse, with time delays from 24.3 to 27.5 milliseconds.

four of the set of eight pulses, which are spaced by 1 millisecond, are displayed on the bottom trace, while a pulse received from ZS6PW is shown on the top trace. From the very convenient Loran C markers the time of arrival can be read off once all delays have been accounted for. These are the offsets from UTC of both pulse systems and the transit time from Lampedusa to Athens. Inherent delays in receivers used for these two signals cancel, provided they have similar band-pass filters and time measurements are taken at corresponding points on the two pulse envelopes, such as at the peaks in Fig. 9. In our system a total of 19.4 ms has to be added, so that the 5.2-ms delay shown in Fig. 9 represents a propagation time between Pretoria and Athens of 24.6 ms. Keeping in mind the distance, time of day and operating frequency, a delay of 24.6 ms is a realistic figure. Propagation was probably by two hops, with the virtual height of the F layer at 210 miles.

Fig. 9 represents almost ideal propagation on 10 meters. The signal-to-noise ratio was very good, the pulse shape well preserved and no multipath propagation could be detected. By way of contrast Fig. 10 shows extreme multipath propagation with numerous pulses arriving between 24.3 and 27.5 ms for every pulse transmitted by ZS6PW. The signal-to-noise ratio is much poorer than in Fig. 9.

Examples of the received pulses are illustrated in Fig. 11 for which much wider (1.8 ms) pulses were used to improve the chances of detection on 2 meters. Fig. 11A shows elongation of a 10-meter pulse to 3.9 ms, its beginning occurring at 24.9 ms. This is an example of severe multipath propagation. Fig. 11B shows a relatively undistorted 6-meter pulse received under typical F-type TE conditions; the propagation time can be read as 25.1 ms. By way of contrast, Figs. 11C and 11D show how typical pure TE propagation causes severe elongation on 6 meters, but rather less on 2 meters. The propagation times were 25.0 and 25.8 ms, respectively.

In February 1980, ZS6PW commenced transmitting these Loran-synchronized pulses simultaneously on the 10-, 6- and 2-meter bands. SV1DH made routine measurements of the propagation time under various propagation conditions.

Of main interest was the measurement of propagation times when the three transmissions of ZS6PW could be heard simultaneously by SV1DH. This normally occurred within the period 7:30 to 8:30 P.M. local time. During the 1980 March and September equinoxes there were 10 evenings when all of these signals were strong enough to make such measurements possible. Their combined results are listed in Table 1. In the case of multiple or elongated pulses the propagation time was logged as the time indicated by the first-arriving peak.

There are significant differences in propagation times at the three frequencies, with a slightly longer time being taken at higher frequencies. The differences are within the limits of error possible in the relative propagation-time tests. The absolute time system, like the transponder system, indicates different modes of propagation are operative on the lower frequencies.

At 28 MHz, measurements were taken during the day as well as during the evening. The dominant mode (the first to arrive) was almost certainly two-hop F-layer propagation. It is occasionally present at 50 MHz and never present at 144 MHz.

At 50 MHz, the dominant mode is likely to be F-type TE, which exhibits a slightly longer propagation time than two-hop F layer. As two-hop F-layer and pure TE are also operative at times on 50 MHz, this frequency shows the greatest variation in propagation time.

At 144 MHz, the only mode that has been observed is pure TE. Even so, there remained considerable variability, and this is a matter of great interest.

In the concluding Part 2 of this article, we will discuss Doppler-shift measurements, backscatter observations, angles of arrival, patterns of fading and the support mechanism. We also include an appendix explaining our propagation time measuring system.

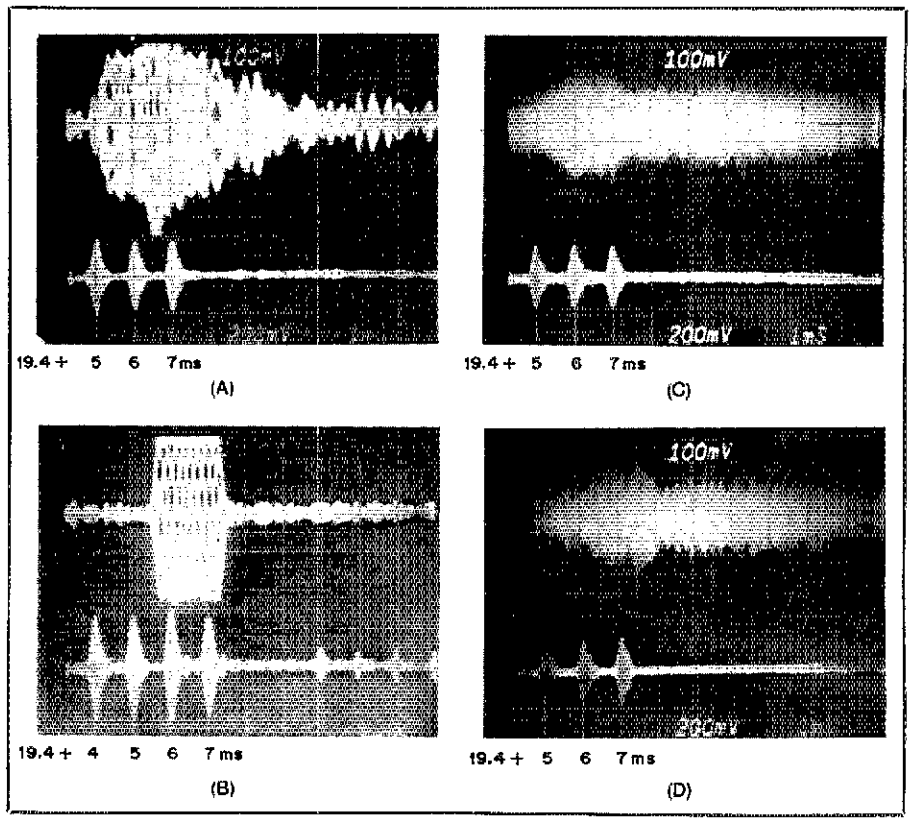


Fig. 11 — Recordings of propagation time between Pretoria and Athens. Pulse width in all cases = 1.8 ms: at A, an elongated pulse on 10 meters (24.8 ms); at B, an undistorted 50-MHz pulse (25.1 ms); at C, pure TE on 50 MHz at 8 P.M. March 18, 1980 (25.0 ms); at D, TE on 144 MHz at 7:45 P.M. on the same evening (25.8 ms).

Table 1

Variations in Propagation Time by Band

Frequency	*Avg. Propagation Time*	*Standard Deviation*
28.270 MHz	24.6 ms	0.2 ms
50.029 MHz	25.2 ms	0.3 ms
144.90 MHz	26.0 ms	0.2 ms

Propagation time recorded between ZS6PW in Pretoria and SV1DH in Athens using the 10-, 6- and 2-meter amateur bands.

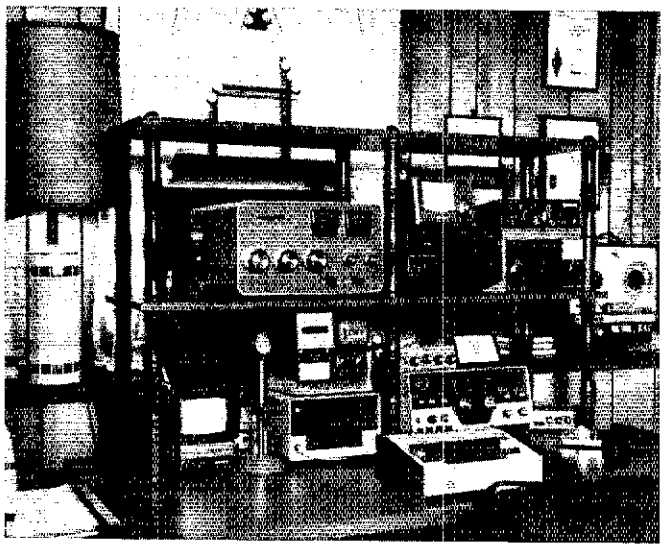
[Editor's Note: The references cited in this article provide excellent background information. Reference 5 is particularly germane and should be readily available to most readers.] QST

Notes

[1]Cracknell, R. G., "The Transequatorial Propagation of VHF Signals," *QST*, Dec. 1959, pp. 11-17.
[2]Southworth, M. P., "A Look Back and Ahead at P.R.P.," *QST*, June 1959, p. 48.
[3]Mueller, E., Letter in *Dubus*, No. 4, 1978, Berlin.
[4]Tilton, E. P., "TE Propagation — VHF Discovery Extraordinary," *QST*, April 1963.
[5]Reisert, J. and Pfeffer, G., "A Newly Discovered Mode of VHF Propagation," *QST*, Oct. 1978, pp. 11-14.
[6]Obayashi, T., "A Possibility of Long Distance HF Propagation Along the Exospheric Field Aligned Ionization," *Journal of the Radio Research Labs.*, 6, 1959, p. 603.

BEGINNER'S BENCH

That First Ham Station — How to Choose It and Set It Up



Station equipment, layout and hookup for the beginner can be perplexing! The major considerations are cost, convenience and safety. Here are some tips.

By Doug DeMaw,* W1FB

I've walked into a number of beginner's amateur stations and found myself gasping in horror at what I saw! In one fellow's shack I observed a 600-volt, 300-mA power supply sitting open (and operating) on the floor just ahead of his feet. Various "hot" terminals were fully exposed while his 3-year-old son played on the radio-room floor! On another occasion I dropped in to visit a young Novice and saw her operating with a 250-watt amplifier her father had helped her build. The entire circuit was assembled on an open chassis that was only 12 inches from her J-38 cw key! Again, high voltage was lethally near the operator as she keyed merrily away. In both examples the operators didn't think the danger was significant, because they stated, in effect, "I won't get a shock. I know the voltage is there and am used to being careful!"

But, safety is not the only consideration in our amateur stations. There is the matter of operator convenience and operating ease. We need to organize our equipment by placing the various pieces in strategic spots on the table, shelves or both (more on this later). Then there is the question of reliability, which rules out haywire hookups between the units of amateur gear, and between the station and the antenna.

A final and vital consideration is the threat of television interference (TVI) and radio-frequency interference (RFI) to a-m radios, fm receivers and hi-fi equipment. There is much we can do in the amateur station to eliminate or greatly reduce interference problems in our neighborhoods. This should be an important objective for all radio amateurs, regardless of license class.

Station Components

One of the biggest "nail biters" faced by the new ham is how to decide *which* and *how much* amateur equipment is necessary to get on the air and have effective communications. We might compare this to any newly discovered hobby, such as photography or archery. Human nature often drives us toward more equipment than we need, or in the direction of gear that is more sophisticated than that which we presently own! But, it is better to learn the fundamentals of Amateur Radio with simple but effective equipment. In the process we will avoid unnecessary expense. Let's go down the list and consider each item.

1) *Separate transmitter/receiver combination:* Frequently, this can be an economic means to an end if used equipment is purchased. For cw operation we might consider a second-hand E. F. Johnson Viking I or II transmitter, or a Viking Ranger I or II. The latter has a built-in VFO (variable-frequency oscillator), but an outboard VFO is needed with the Viking I or II units. Most of these rigs sell used for under $100 (see *QST* Ham Ads). The Viking I and II rigs deliver about 100 watts of rf output power, while the Ranger is in the 50-watt class. The disadvantage in using separate transmitters and receivers is that there are more controls to adjust when changing frequency. Also, the older equipment is somewhat bulky compared to present-day ham gear that uses solid-state devices.

2) *Transceivers:* A good, used hf-band transceiver will cost more than the older "separates," but part of the reason is that the transmitter and receiver are contained in a single box and may be complete with power supply. Some of the earlier units worthy of consideration are the R. L. Drake TR3 and TR4 transceivers. A used

*ARRL Senior Technical Editor

Swan 500C would be suitable, as would the Heath HW-100 or HW-101 transceivers (all use tubes and require outboard power supplies). Used transceivers like these can be purchased (with power supply) in a price bracket of $275 to $500 as a rule. The older Kenwood TS-520 and Yaesu FT-101 transceivers are worth considering also, as they have built-in power supplies. The advantage of the transceiver is that a single frequency-adjusting control and readout dial are used for the combined transmitter/receiver main tuning. Also, transceivers are easy to transport and set up for portable work, because the "works" (except for the key, microphone and antenna) are in one package.

3) *Separate Receiver:* If our choice is to be a separate transmitter and receiver pair, the used market can be searched for a low-price receiver (again, see *QST* Ham Ads). Some pretty good older receivers can be purchased for less than $100 these days. They may not look like works of art by present-day aesthetic standards, but they will do the job nicely for a beginner. Receivers such as the Hallicrafters SX-71, National HRO-50T1 and HRO-60, Collins 75A1/75A2, Hammarlund HQ-180 and Heath SB-300 are suggested. Some amateurs like to have a separate receiver for use with a transceiver. This permits split-band operation (receiving on a different frequency from the transmit frequency) without disturbing the setting of the transceiver main-tuning dial. All of the receivers mentioned here are tube-type units.

4) *New Equipment:* Most of the new amateur apparatus on the market is compact, has solid-state circuitry and is capable of better overall performance than older, used gear can provide. That isn't to say that old gear is unsatisfactory. Rather, it implies that many operating aids and frills found in new amateur equipment won't be available in the older gear. It would be inappropriate to recommend any item of new equipment in this article, but be prepared to pay as much as $1500 for a brand new transceiver these days! *QST* product reviews and ads contain prices and descriptions for current amateur products.

5) *Homemade Equipment:* To buy or to build? *That* is the question! Most beginners feel that their lack of experience as hams puts them at a disadvantage when it comes to assembling that first cw station. But, if you have a background in electronics, don't pass up the chance to build your own transmitter and receiver. There is a special feeling of pride and accomplishment that comes with building and operating homemade gear. There are many good circuits in *The ARRL Radio Amateur's Handbook*, *Understanding Amateur Radio* and *Solid State Design for the Radio Amateur*. The sometimes-negative factor concerning the use of home-built amateur equipment is *cost*. If all of the parts must be bought new, they may be costly and difficult to acquire — the cost of a given project might be greater than when buying comparable new or used gear!

6) *Antennas and Accessories:* Some serious "head scratching" will often accompany the beginner's decision to buy or avoid purchasing certain accessory items for the amateur station, and choosing that first antenna. Fortunately, not many accessory items are required for effective operation, although many of them serve as useful operating conveniences. Some suggestions about beginner's antennas were published earlier this year in *QST*.[1] So, let's skip the question of antennas and address those other items that we may or may not need in our first station.

a) *SWR indicator* — This device is handy for adjusting an antenna for the lowest attainable SWR when the antenna is first erected. Thereafter, it serves only as a monitor to keep tabs on the condition of the antenna system. If a Transmatch is used with a multiband wire antenna, an SWR indicator is essential for ensuring that the Transmatch is adjusted for an SWR of 1:1 in the band of interest. If a multiband trap or single-band 50-ohm antenna is used, however, an SWR meter should not be necessary.

b) *Transmatch* (antenna tuner, antenna coupler): A plethora of these devices exist on the commercial amateur market today, and a newcomer can easily get the false impression that it is impossible to operate without a Transmatch. If our station antennas present an SWR of less than, say, 2:1 in a 50-ohm system, we can forget about Transmatches. But, if we elect to use an end-fed wire or center-fed dipole for multiband operation (assuming that antenna traps aren't used), a Transmatch becomes a necessary tool. The Transmatch in that instance would be used to provide a matched condition between the antenna or its feed line and the transmitter. Some Transmatches (depending upon the circuit used) will attenuate harmonic emissions from the transmitter, thereby aiding in the reduction of TVI and other forms of interference. A manufactured Transmatch will sell for $75 to $1500, depending on its power capability and operating features. A homemade unit is easy to build and shouldn't cost more than $50 if surplus parts are used. Check the radio flea markets for inexpensive components.

c) *Keys, keyers and paddles* — There's a certain mystique connected with using a hand or straight key. If we have reasonable rhythm in our souls, we should be able to send good cw up to 20 wpm with a straight key. A new key can be purchased for less than $6, and a surplus one (military J-38) costs even less. A paddle (for use with an electronic keyer) can, on the other hand, cost as much as $50. Keyers are great for sending good, fast cw, but are only as good as the commands sent by the operator. Some of the most dreadful cw heard on the amateur bands today is being sent by means of poorly operated electronic keyers. Keyers vary in price from a few dollars to more than $200. Our best economic approach is to start out with a straight key.

The foregoing discussion is intended to draw a line between what's really needed in our first station, as opposed to the collection of unnecessary apparatus that some beginners end up with after spending absurd sums of money. The new, more-expensive equipment can come later (and it surely will!), after we've learned the fundamentals of operating and have gained knowledge and experience. Used ham gear can often be resold without losing a red cent, and sometimes we can actually sell it for more than we paid! Conversely, brand new equipment (like automobiles) loses its face value the moment we move it out of the store.

Laying out the Station

This part of our new adventure is anything but casual if we are to have a station that is safe and convenient to use. An awkward layout, or one that is too cramped, can cause operator fatigue in short order. The equipment needs to be placed strategically, and there should be plenty of room on the table or desk for our arms, pencils, paper and even a coffee cup!

Those of us who have basements are prone to setting up "studio B" in that part of the house, while others opt for a "studio A" (attic) location. A basement or first-floor ham shack is the best choice (assuming that the basement is dry and clean) because the distance to an earth ground is usually short (desirable). Also, a basement or first-floor spot is cooler than an attic in the summer and warmer than an attic in the winter. An effective earth ground is imperative in the interest of safety, reducing interference and keeping unwanted rf voltages off our radio equipment.

Assuming that we've chosen a clean, well-lighted site for the ham shack, what can we use for an operating table? Well, many amateurs buy used wooden office desks (the larger the better) at auction sales or through newspaper ads. A desk of this type provides plenty of surface area and has numerous drawers in which to store our station supplies (QSL cards, jumper cables, scratch pads and so on).

A good alternative to a desk is a pair of used, two-drawer file cabinets and a blank interior door from the lumber yard. I used this type of operating table during my first 20 years as a ham, and it was excellent. A file cabinet was placed two feet in from

[1] D. DeMaw, W1FB, "Which Antenna to Use?" *QST*, May 1981, p. 26.

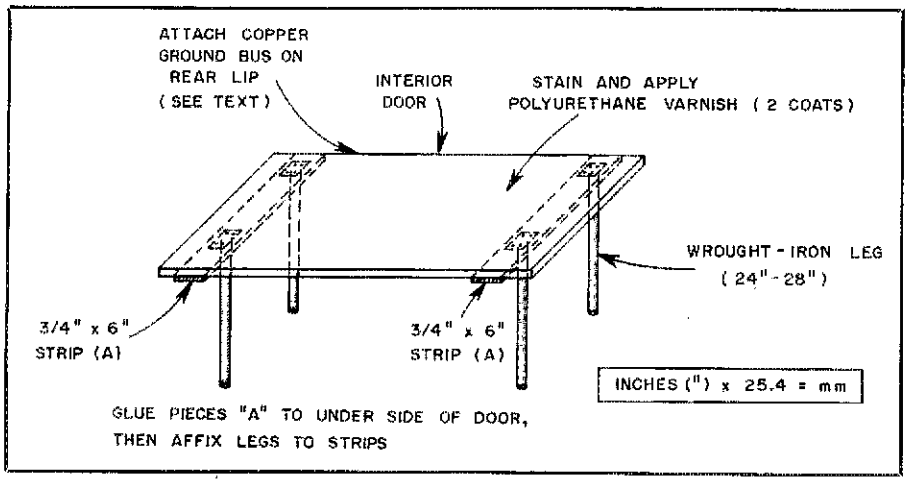


Fig. 1 — A blank interior door can be used to make a ham-shack table. File cabinets are suitable to support the table top, or wrought-iron legs can be attached as shown. See the text for information about wooden strips "A."

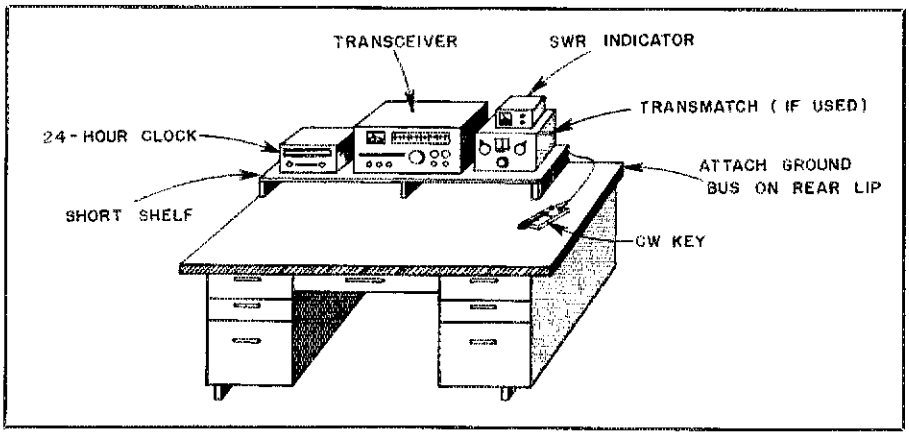


Fig. 2 — Suggested layout for a simple station that uses an office desk. The cw key is situated for minimum arm fatigue (see text).

each end of the door, and the door served as the desk top. Two coats of clear lacquer were applied to the surface of the door (after it was stained an oak color), thereby providing a smooth surface that could be cleaned easily. If file cabinets are too expensive or hard to find, we can use four wrought-iron legs to support the door. If this is done it will be wise to affix two pieces of 3/4 × 6-inch (mm = 25.4 × inches) pine board to the bottom of the door. This will ensure proper anchoring of the iron legs (see Fig. 1). Most interior doors are hollow and have thin sections of veneer for the outer surfaces. Therefore, sections "A" of Fig. 1 are necessary to ensure secure attachment of the iron legs.

Still another excellent operating platform is a used library table. Not only is this type of furniture rugged, it's large! Many library tables have one or more drawers in the front, providing storage space for paper, pencils, a logbook and what have you.

Placing the Equipment on the Table

Most transmitters, receivers and transceivers generate internal heat. Therefore, we should be careful to avoid blocking the vent holes in the cabinets by stacking one piece of gear atop another. Always allow room for the passage of air around the equipment.

The cw key should be far enough away from the front of the desk to permit the sending arm to lie flat on the desk top from elbow to finger tips. Most operators prefer to locate the key at an angle of 20 to 30 degrees from a line that is perpendicular to the front edge of the desk or table. These suggestions will greatly reduce arm tension, and will help ensure good cw sending.

Our receiver or transceiver should be located so that its digital or analog frequency-readout dial is approximately in line with our eyes. It can be lower if the equipment has an upward-tilt feature (inclination bar or front legs that are longer than the rear ones). Ideally, the main-tuning knob should be at a height above the table top that permits tuning while the arm is resting comfortably on the surface of the desk. Also, we should push the transceiver far enough back on the desk to prevent bumping the tuning knob accidentally (it does happen!) while we're transmitting. Fig. 2 illustrates how a modest ham station could be set up for operating ease and convenience.

Electrical Considerations

Safety first! Let's be certain to have an effective earth ground routed to the station. How do we accomplish this? It isn't too difficult with respect to ac and dc, but the task becomes a bit sticky when dealing with rf energy from the transmitter. I like to use as many grounds as I can locate, bonding them together electrically and bringing the connection point to the operating position. For example, my rig is located near the baseboard heat strip in my family room. Copper plumbing was used in my home when it was built 11 years ago, and all of the joints are soldered. So, even though I'm using a hot-water line (not recommended with older iron plumbing because of poor joints) for a ground, it is an effective one. I also use a 6-foot copper ground rod, which is driven into the soil just outside the ham-shack window. Additionally, I use the 16 buried radials I employ as a ground system for my 80-meter vertical.

Our lead wires from the various ground points to the shack should be a short as possible. Large-diameter conductors, such as the shield braid from RG-8/U coax cable, or wide strips of flashing copper, are recommended. The large conductor area and short lengths will aid in reducing unwanted inductances, which impede the passage of rf (radio-frequency) currents, thereby improving the quality of the ground system at rf. The leads between the common ground point in the shack and the various pieces of station gear should be similarly short and large in cross-sectional area.

I like to run a 1-inch-wide strip of flashing copper the length of my desk, behind the equipment. This serves nicely as a ground bus to which the cabinets of the gear are connected. A length of no. 8 copper wire would serve our needs equally well. All ac-operated equipment should be grounded to prevent shock hazard. This also helps prevent rf energy from wandering to areas in the shack where it is not wanted. Obtaining an effective ground system from a second floor or higher is nearly impossible. Fair warning!

In the interest of safety, all points that carry ac, dc or rf voltages should be accidental-contact free. That is, we should have cabinets around all of our equipment that contains dangerous levels of voltage. Frayed or brittle ac power cords should be replaced with new ones as soon as the condition is noted.

As a convenience and additional safety precaution, we should use an ac multiple-outlet strip at the operating position. It is unsightly and dangerous to use a single

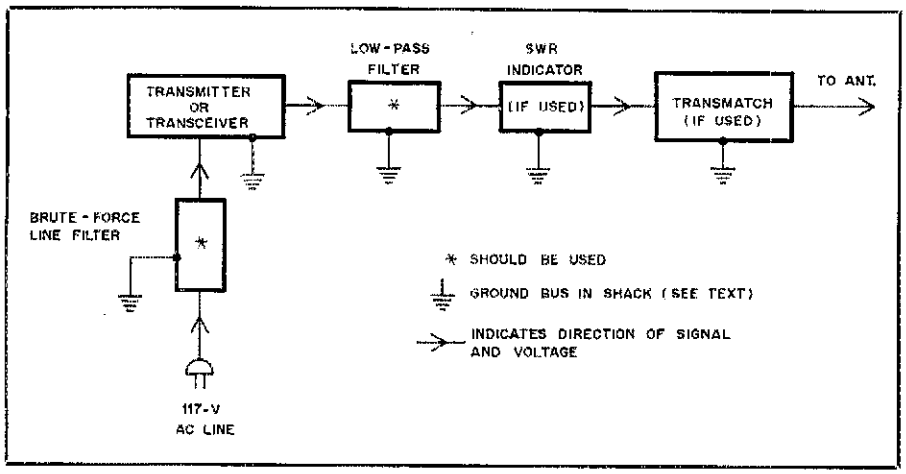


Fig. 3 — Block diagram that shows where to install a brute-force ac-line filter and a transmitter low-pass filter to reduce interference. Additional information is given in the text.

wall outlet for several pieces of gear, especially when it becomes necessary to stack two or more cube taps (3-way sockets) in the wall outlet. Most outlet strips can be screwed to the rear of our tables or desks to avoid an unattractive jungle of cords and plugs. All electrical connections should be tight and solid. The splices in wires and ground leads will be the most durable and effective when they are soldered. A few wire twists and a gob of electrical tape is not a prescribed technique (likewise with the joints in our antenna systems)!

TV and Radio Interference

There are two things that every ham shack should have: a brute-force ac-line filter and a transmitter low-pass filter. Both of these items are described in *The ARRL Radio Amateur's Handbook* and *Radio Frequency Interference* (an ARRL book). Each filter is easy and inexpensive to build — even by beginners.

The brute-force line filter is used between the transmitter power supply and the ac outlet in the wall, as shown in block-diagram form (Fig. 3). The case of the filter needs to be grounded, and it should be placed as close to the transmitter cabinet as possible, thereby preventing the ac cord from radiating rf energy before it enters the filter. This type of filter keeps rf energy out of the power line — an aid to the reduction of TVI and RFI.

The low-pass filter passes all rf energy up to approximately 40 MHz when used with a high-frequency (3.5 to 29 MHz) transmitter. Harmonic frequencies that fall into the TV and fm channels are greatly attenuated by the filter, preventing them from being radiated by the amateur antenna and feed line. This filter should be well grounded and mounted at the rf-output jack of the transmitter. Other techniques for curing and preventing TVI and RFI are detailed in *Radio Frequency Interference*. Low-pass filters can be purchased as manufactured units (see *QST* ads). Line and low-pass filters are listed in the J. W. Miller catalog (19070 Reyes Ave., Compton, CA 90224).

Loose or poorly soldered joints in the feed line and antenna system can also cause TVI and RFI. Make sure that all coax connectors are well soldered and screwed securely to their mating receptacles. Solder all antenna joints carefully to prevent rectifying connections (they generate harmonic energy and cause interference).

Closing Comments

Questions about that first station will come to your mind. We can't cover all possibilities in a single article. But, most of the details you need to know are provided in the League's book, *Understanding Amateur Radio* (sort of a junior *Handbook*). If all else fails, send your question to the ARRL Technical Information Specialist. Be sure to include a stamped, self-addressed return envelope.

Technical descriptions of the older amateur equipment you may want to buy on the used-gear market can be found in back issues of *QST*. Perhaps you have a neighbor or friend who will let you browse through his or her copies. Your public library may have a complete file of *QST*s, so check there also.

The name of our Amateur Radio game is, in part — fun! So let's make it safe as well as enjoyable by setting up that first station in a logical and orderly manner. I hope the suggestions in this article will reduce your head scratching to minor proportions. Good luck! QST

Reference

DeMaw, D., W1FB. "Simple Gain Antennas for the Beginner." *QST*, Aug. 1981.

Strays

TA PROFILE

☐ Putting up a new antenna? Need advice? I'm sure many of us would agree the answer is, definitely, "Yes!" Because of this, we were pleased when ARRL Technical Advisor Edward L. Kane, W6ONT, joined our official family in 1979. Ed is one of TA experts on design, development, testing, and analysis of antennas and antenna systems.

First licensed in 1956 as WN3GJU, Ed now has his Extra Class license. His primary interests in Amateur Radio are cw QSOs, building equipment and antennas. He also enjoys doing antenna measurements.

Residing in Cypress, California, Ed is a senior engineer for the Douglas Aircraft Company. He received his BSEE degree from Pennsylvania State University and his MSEE degree from California State University at Long Beach. He is a member of the ARRL, the Antenna Measurement Techniques Association, IEEE (with memberships in the Antennas and Propagation Society), and the Aerospace and Electronic Systems Group.

Although Ed spends a great deal of his leisure time in continuing his education, he does find time to enjoy sailing, sailboat racing, woodworking and teaching Celestial Navigation for the U.S. Power Squadrons. — *Marian Anderson, WB1FSB*

Meet ARRL Antenna TA Ed, W6ONT.

I would like to get in touch with . . .

☐ anyone interested in forming a computer-to-computer communications net. David J. Hait, WB2CRM, University of Pennsylvania ARC, Moore School of Engineering (Moore School Library), Philadelphia, PA 19104.

Product Review

Conducted By Paul K. Pagel,* N1FB

The Daiwa CNA-1001 Automatic Antenna Tuner

The antenna tuner or Transmatch has become a staple accessory in many ham shacks. Until recently, little has been done in Amateur Radio to automate the actual tuning process, but now the amateur operator can rely on electronic means for setting the tuner controls on the band of his or her choice. Daiwa's CNA-1001 represents an interesting new form of electronic Transmatch operation.

Theory of Operation

The CNA-1001 is comprised of an internal directional coupler and associated VSWR meter, the matching network, and the sensing circuitry that controls motorized tuning capacitors used in the matching network. Metering is accomplished with the Daiwa cross-needle design, which allows simultaneous observation of forward and reflected power and VSWR, the latter corresponding to the intersection of the meter needles. The sensing circuit samples the rectified rf voltage induced within the directional coupler. This voltage, whenever the VSWR is higher than 1.5 to 1, closes a solid-state switch that completes a 12-volt line to the capacitor drive motor. The motor is turned off when the VSWR drops below 1.5 to 1, and the switching circuitry is cut off.

A pi-network circuit is used. It incorporates an 8-position tapped inductance that is controlled manually from the front panel. Additional series capacitance is provided at the tuner output. The 250-pF parallel and series capacitors at the network output that make up the automatic feature of the CNA-1001 are motor driven. Smaller, 30-pF variables are wired in parallel with the motor-driven units; these are set manually from the front panel and are designed to touch up the match once the capacitor drive motor shuts off. The motorized capacitors are geared together in a 30:1 ratio, the series capacitor turning at the faster rate (such gearing appears to be a clever means of eliminating the need for separate drive motors). This arrangement permits the network to "scan" the mismatched condition until a proper match is obtained.

Method of Operation

The instructions provided with the CNA-1001 are brief, but adequate. It is hoped that future models of the tuner will be accompanied with a typeset manual that includes some discussion of the theory of operation — information that is missing in the typewritten instructions provided to this reviewer.

There are seven controls that must be preset before automatic operation may be commenced: The BAND and ANTENNA are selected — the user has the choice of either two antenna inputs on the rear apron, or an internal 10-watt dummy load for testing purposes. The two FINE TUNING controls on the front panel are set to midscale; the meter RANGE is set to read the 20-watt scale. A 200-watt scale is provided, but the tuner will not operate if that level is selected. The CONTROL INPUT LEVEL switch on the rear apron is set for either 1, 5 or 10 watts, sensitivity. The range selected determines the maximum power the sensing circuit may handle. The TUNER control, set ON, places the tuning network on line with the transmitter on transceiver while the OFF position provides a handy bypass should the user wish to take the tuner out of the transmision line. Power may then be applied up to the CONTROL INPUT level selected. An average of 15 to 30 seconds has been required to reach a matched condition from the time the OPERATE switch is depressed,

Daiwa CNA-1001 Automatic Antenna Tuner Serial No. D08023

Manufacturer's Claimed Specifications	*Measured in ARRL Lab*
Frequency range: 3.5-30 MHz, WARC bands included.	As specified.
Input/output impedance: 50 ohms.	
Meter scale: Fwd/ref 5:1.	
Meter range: Forward, 20/200 watts; reflected, 4/40 watts.	
SWR detection: 5 watts, min.	As specified for visible reading.
Power rating: 500 watts, PEP.	250 watts dc input.
Insertion loss: Not specified.	0.4 dB at 28 MHz.
Input power for automatic operation: 1-12 watts.	As specified.
Impedance matching range: 3.5 MHz, 15-250 ohms; 7-30 MHz, 10-250 ohms.	As specified
Automatic operation time frame: 45 seconds, maximum.	15 to 30 seconds.
Power requirement: 13.8 V dc at 0.2 A	As specified.
Dimensions HWD: 3-5/8 × 7-7/8 × 9-5/8 inches	
Weight: 8 lb.	
Cabinet materials: Steel and brushed aluminum.	
Color: Blue-gray.	
Output terminals: 2 antennas (SO-239 connectors) plus internal 10-watt dummy load.	As specified.

Note: mm = inches × 25.4, kg = pounds × 0.4536.

*Assistant Technical Editor

enabling the automatic operation. In several months of use at AC1Y, I have been able to approximate 5:1 conditions to check the matching range. In all cases, tuning has been accomplished in well under the 45 seconds maximum specified by the manufacturer. The claimed impedance-matching range of the Transmatch is between 15 and 250 ohms at 3.5 MHz, and between 10 and 250 ohms on the 7- to 28-MHz bands. Inductance settings for the new WARC bands at 10, 18 and 24 MHz are included in addition to the currently available ham bands. The 5:1 matching capability makes the CNA-1001 able to follow "QSYs" of some magnitude. This allows ease of operation and is especially useful with broadband, solid-state transceivers.

Operating Impressions

It would appear that much time is spent in presetting the CNA-1001 controls before use, making the name Automatic Antenna Tuner seem a misnomer. Once the sequence of operation is mastered, however, there is no time wasted in putting the unit through its paces. At AC1Y, where dipoles are used on 80 and 75 meters, the CNA-1001 has allowed me to QSY up and down, band edge to edge, with relative ease. The tuner requires a 13.8-volt, 0.2-A supply to power the sensing circuit and the capacitor drive motor, so any small power supply will suffice. In fact, the tuner would be a "natural" during portable battery operation for emergencies or, for instance, Field Day. Since the CNA-1001 is designed for use with unbalanced line only, it would be intriguing to use it for mobile hf operations.

The relative complexity of presetting the controls, however, would tend to make it a distraction while driving, despite its convenience. All controls are clearly marked. The only inconvenience is the location of the CONTROL INPUT LEVEL switch on the rear apron. Inattention to the proper setting of this control could lead to damage to the sensing circuit. It's possible to neglect the switch considering that it's not immediately visible. The switch should really be located on the front panel to afford maximum operator convenience.

All in all, the Daiwa CNA-1001 represents a convenient package. Its use definitely takes some of the drudgery away from operating a Transmatch under normal circumstances. No more hairline tweaking of capacitors; the automatic tuning feature sets up the tuner in little time and has provided better than a 1.5:1 match consistently, with little or no use of the FINE TUNING controls. The Daiwa CNA-1001 is imported and distributed by J. W. Miller Division, Bell Industries, 19070 Reyes Ave., Compton, CA 90224. Price class: $370. — *Sandy Gerli, AC1Y*

JAPAN RADIO COMPANY MODEL NRD-515 ALL-WAVE RECEIVER

☐ The NRD-515 is a high-performance communications receiver covering the range of 100 kHz to 30 MHz. Receiver features include digital PLL frequency control, an up-conversion heterodyning scheme and high dynamic range.

Tuning is accomplished by means of an optical interrupter dial coupled to the MHz control switch. The dial tuning rate is 10 kHz per revolution in 100-Hz steps. A momentary switch labeled UP/DOWN is used for changing frequency rapidly. The MHz portion of the operating frequency can be selected by the MHz control or by the main tuning dial. An optional memory unit, included with the review receiver, will store 24 spot frequencies in the receiver tuning range. The bandwidth switch has four positions (two of these being 6 kHz and 2.3 kHz) that are the standard filter bandwidths for the stock receiver. Optional filters in the review model provide cw bandwidths of 600 and 300 Hz. Other useful features are PASS-BAND TUNING, DELTA-F (same as RIT), built-in 10- and 20-dB rf attenuators, noise blanker, selectable age speed, and an adjustable BFO pitch when in the cw mode. Operating modes include a-m, upper and lower sideband, cw, and RTTY.

The heterodyning scheme in the receiver differs from most in that it uses a 70-MHz first i-f. Use of such a high first i-f ensures excellent image rejection. Frequency synthesis in the '515 is done in two stages. One loop controls the first i-f local oscillator frequency; the other sets the VFO frequency. This dual-loop system helps to eliminate many of the spurious responses found on many single-loop systems.

Operation

On-the-air operation with the receiver was a delight. The digital tuning took some getting

JRC Model NRD-515 Receiver Serial No. BR20156

Manufacturer's Claimed Specifications	*Measured in ARRL Lab*
Frequency coverage: 100 kHz-30 MHz.	As specified.
Modes of operation: Ssb/a-m/cw/RTTY.	As specified.
Frequency display: Six 7-segment LEDs.	Red, 0.5 inch.
Resolution: 100 Hz.	As specified.
kHz/turn of knob: 10.	As specified.
Backlash: Not specified.	Nil.
Agc auto/manual selection: Not specified.	Selection of slow, fast or manual.
Receiver attenuator: 0-10-20 dB.	As specified.
S-meter sensitivity (μV/S9): Not specified.	80 M—44 μV; 40 M—44 μV; 20 M—25 μV; 15 M—50 μV; 10 M—50 μV.
Receiver sensitivity: Less than 0.5 μV from 1.6 to 30 MHz.	80 M 20 M
Noise floor (MDS) dBm:	−136 −136
Blocking DR (dB):	136 136
Two-tone, third-order IMD DR (dB):	90 94
Audio power output (8-ohm load): 1 W (4 ohms).	1 W.
Audio quality: Not specified.	Excellent.
Power requirements: 117/220/240 Vac, 50/60 Hz, 50 W.	As specified.
Frequency stability: Less than 50 Hz/hour after warmup.	75 Hz from cold start to one hour later.
Size (HWD): 5.5 × 13.4 × 11.8 in.	
Weight: 16.5 lb.	
Color: Black and gray.	

Note: mm = inches × 25.4, kg = pounds × 0.4536.

used to (it results in somewhat "musical" audio). I was skeptical of the performance of a receiver using a digital synthesizer because some other synthesized receivers we tested have had spurious responses throughout the tuning range. Our review receiver was remarkably clean throughout its tuning range. The only objectional spurious signals were found at the extreme low end, just below the 100 kHz lower limit of coverage. Strong-signal performance of the receiver is the best this reviewer has seen in any communications receiver. Observed performance was confirmed by tests done in the ARRL lab. The noise blanker was effective in blanking both ac-line and ignition noise, although when the blanker is on, the dynamic range of the receiver is reduced somewhat. Age action is smooth, with no popping or lockup noted. Only once during the review period did I observe front-end overloading. A 160-meter dipole was connected to the receiver, and the presence of a 10-kW a-m broadcast station less than 3 miles[1] away was evident throughout the passband. With the 20-dB attenuator switched in, the overload problems disappeared, and the sensitivity was adequate for 160-meter operation. During a "multi-multi" contest operation, the '515 was used as a spotting receiver on 14 MHz and performed very well in the presence of five 1-kW transmitters.

Those amateurs interested in shortwave listening will appreciate the digital display and 6-kHz bandwidth position. A-m sounded quite realistic for such a narrow bandwidth. The af amplifier chain is very clean.

An interesting use for the memory unit is to place the various WWV frequencies into the memory and then quickly check them to see how the F2 layer MUF is changing. Also, net and DX pileups can be stored for future recall.

Shortly after acquiring the receiver I found an urge to open the covers and see what was "lurking" inside. The physical layout of the receiver is exceptionally clean. All pc boards are silk screened, clearly making service or adjustment an easy task. The optional filters mount on a pc edge card connector that I thought would degrade the ultimate attenuation of the filters, but this is not the case!

Observations

The manual for the receiver is quite comprehensive in operation procedures and theory of design explanations, although the English translation used in the manual in quite awkward, making some reading difficult. The NRD-515 represents state-of-the-art performance in communications receivers. JRC has shown that a digitally synthesized receiver can compare in performance to the best analog systems. The receiver is designed to be mated with the NSD-505 amateur transmitter, but may be used with any transmitter with a slight loss in versatility. Gilfer Associates, the U.S. importer of the NRD-515, supplies the receiver in two configurations. One of these is aimed at the shortwave-listener market and is equipped with i-f filters having bandwidths of 6.0, 3.0, 2.3 and 0.6 kHz. The other option replaces 3.0-kHz filter with a sharp 300-Hz filter for amateur and commercial uses. Gilfer's address is P.O. Box 239, Park Ridge, NJ 07656. Price class: $1490; memory unit, $290; optional 300-Hz filter, $70. — *Gerry Hull, VE1CER*

[1]km = miles × 1.609.

HEATH VF-7401 2-METER TRANSCEIVER

☐ My first thought on seeing the new Heath 2-meter digital scanning transceiver (VF-7401) was "Gee, that's pretty." (A preassembled rig was in the lab for advertising acceptance.) And pretty it is! It is not the traditional Heath green that I expected.

After opening the box, the first thing that must be done is to update the instruction manual. There are some additional paragraphs supplied to expand the original instructions, new diagrams and some pages to paste over others. The instruction book is well done; Heath does a magnificent job of preparing easy-to-follow instructions. Components are carefully numbered and labeled. Although this is not a beginner's kit, anyone with an interest and some kit-building background should be able to complete this project within 50 to 70 hours. Heath (and others) makes kits that are simpler, have fewer parts and are easier to assemble than this one. This one is not difficult, but takes some time — and patience!

Assembly

What's next? There are six circuit boards to assemble: readout, VCO, power amplifier, receiver, synthesizer and transmitter. These boards range in complexity from the readout board (which has three digital-display chips) to the transmitter and receiver boards, which are both rather intricate. I assembled the optional Micoder II microphone that includes a Touch-Tone pad. The builder has the option of wiring the Micoder to use an internal 9-V battery or to extract power from the rig. I chose the "power-from-the-rig" route.

I've learned (in my Heathkit assembling experiences) never to open a package unless the manual says "OPEN PACKAGE." The problems you could run into. . . . I use egg cartons to hold all the parts while the kit is being assembled, count out different values of resistors and capacitors, sort them, and store them in separate containers. The VF-7401 is a "four-carton kit." Of course, if you run into the built-in problems I have (a three-year old who wants to "help"), you might want to choose some other method!

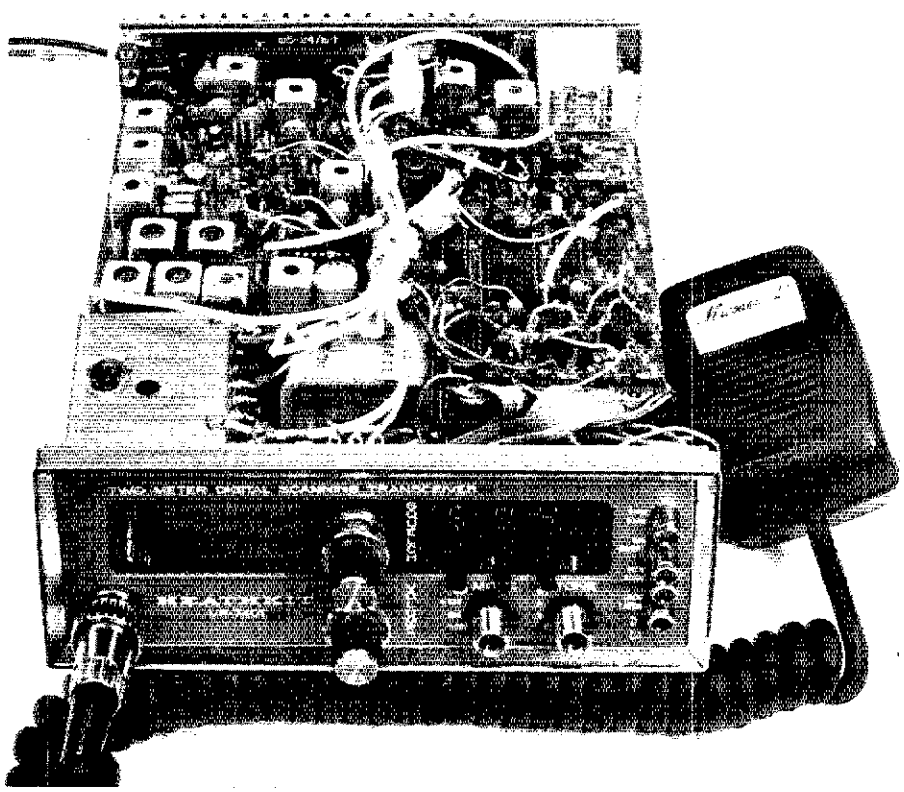
Heath provides very explicit soldering instructions, which is one of the prime factors in assembling any kit. I know what a good solder connection looks like. I know how the iron feels when holding some solder next to a connection along with a tip but . . . the one thing I couldn't understand was why the solder wasn't melting the way it should while I was assembling the VCO board. Afterward, I mentioned the problem to my husband, Pete. He wanted to know why I hadn't said something earlier. The iron was "on the fritz" — a burned out element! I had been using too little heat to melt the solder, but more than enough heat to cause component problems!

Alignment

I started through the alignment routine just like it said in the book. One of the coils didn't tune properly, and the meter readings weren't right. After "playing" for a week, we sent the rig back to the factory. It was back in a few days — fixed, aligned and ready to go. My soldering iron difficulty and one unsoldered connection had caused the problems we encountered.

Technical Description

The VCO is the heart of the transceiver. It



Heath VF-7401 2-Meter FM Transceiver Serial No. 0008

Manufacturer's Claimed Specifications	*Measured in ARRL Lab*
Frequency coverage: Any 4-MHz segment from 143.5 MHz to 148.5 MHz (within transmitter/receiver specifications; total coverage 140.000 MHz to 149.995 MHz).	As specified.
Mode of operation: Fm.	As specified.
Readout: Digital; 3-digit, LED (red) display.	3/8-inch digits.
S-meter sensitivity: Not specified.	2 μV/full-scale reading.
Receiver sensitivity: 0.5 μV/12 dB SINAD.	0.55 μV/20-dB quieting.
Squelch threshold: 0.3 μV or less.	Less than 0.1 μV.
Internally generated spurious signals: Below 1 μV equivalent.	As specified (none detected).
Audio output: 1.5 watts at less than 10% THD.	As specified.
Transmitter rf-power output: At least 15 watts, adjustable.	As specified.
Current consumption: 750 mA maximum, receive; 4 A maximum, transmit at 13.8 V dc.	700 mA maximum, receive; 3.2 A maximum, transmit at 13.8 V dc.
Size (HWD): 2-3/4 × 7-1/4 × 10-1/4 inches.	
Weight: 5 pounds.	
Color: Black/gray.	

Note: mm = inches × 25.4, kg = pounds × 0.4536.

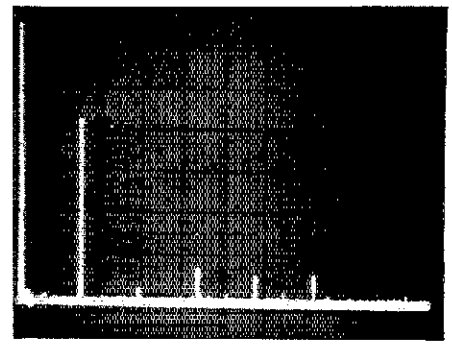


Fig. 2 — Spectral display of the VF-7401. Vertical divisions are each 19 dB; horizontal divisions are each 100 MHz. Output power is 15 W at a frequency of 146.94 MHz. The fundamental has been reduced in amplitude approximately 28 dB by means of notch cavities; this prevents analyzer overload. All spurious signals are at least 63 dB below peak fundamental output.

provides proper frequencies for transmitter and receiver injection. The incoming signal passes through a double-tuned circuit to an rf-amplifier stage where it is mixed with the sixth harmonic of the VCO. Low-sided injection is employed. The resultant 10.7-MHz signal passes through an 8-pole crystal band-pass filter and is amplified. A 10.245-MHz signal is mixed to produce the 455-kHz i-f. A monolithic quadrature-detector IC demodulates the signal and feeds the recovered audio to the audio-amplifier stage. The receiver has a noise-squelch system, which provides excellent squelch action. A green LED indicates an unsquelched condition. The associated voltage is also used to control the scanning functions.

On transmit, the audio passes from the high-impedance microphone through an amplifier stage and a preemphasis network that improves the signal-to-noise ratio. The pre-emphasized audio passes through another amplifier stage and a clipper stage that limits the deviation. A deviation-limit control is used to adjust the deviation level. An astable multivibrator generates the Continuous Tone Coded Squelch System (CTCSS) tones that are used to access some repeater systems. Audio voltage from the microphone and the tone generator is applied to the VCO, which produces the fm signal. The signal is tripled, doubled, amplified and applied to the power amplifier for final amplification to the 15-watt level. Output power is sampled and fed to the meter to give an indication of the output power level. Adequate filtering is provided to ensure that the output signal is clean.

Several safety features are built in. A diode provides reverse-polarity protection. High VSWR will not damage the transceiver. An out-of-lock detection circuit will cause the transmitter to be inhibited if the PLL looses lock. Scanning will cease automatically if the PTT line is keyed during scan.

Operation

The microphone is a high-impedance type. All operating controls are located on the front panels, including a meter that shows relative transmitted and received signal levels. A three-digit, red LED display shows the receive frequency (for instance, with the receiver set at 146.88 MHz, the display will show 688). The transmit frequency is not shown. The knobs on the VOLUME control (on/off switch) and SQUELCH control have a "good feel" and are large enough to be adjusted comfortably.

The mode switch contains four operating positions: −600, SIM (simplex), +600 and AUX (auxiliary). The AUX position is provided for an alternate (e.g., MARS, CAP and so on) frequency split. Owners may contact the Heath technical consultant department for information about wiring the transceiver for other desired offsets. One frequency pair (of interest to me) is 143.99/148.01 MHz, used by Army MARS repeaters. I found Heath's instructions for modifying the wiring very easy to follow.

The TONE switch permits the user to choose among three standard CTCSS (or PL in general amateur parlance) tones or no tone. CTCSS is in use by more and more repeaters these days. Heath should be commended for providing this as "standard."

The DIM/BRIGHT switch makes the display readable in bright light without "blinding" you at night. This feature is useful to the mobile operator. Three black push-button switches mounted beneath the corresponding digit are used to select the 1-MHz, 100-kHz and 10-kHz digits of the desired receive frequency. Touch the switch, and the display will scan up frequency until pressure is released.

When the MAN/SCAN switch is in, the transceiver operates in the manual mode. Any frequency may be selected by pushing any combination of the frequency-selector switches located below the LED display. When the MAN/SCAN switch is out, the transceiver scans upward continuously in the 10-kHz steps for the full range of a 1-MHz segment. At the "top" of the segment, it jumps back to the "bottom" of that same segment; e.g., 146.99 is followed by 146.00.

The LOCK/LATCH switch permits selection between two types of scanning action. With lock engaged, the VF-7401 scans until a signal opens the squelch. The receiver remains on this frequency until the LOCK switch is released. If LATCH is selected, the unit scans until a signal opens the squelch. The transceiver stays on this frequency until the signal disappears and the squelch closes. After an additional few seconds delay with the squelch closed, the VF-7401 resumes scanning.

One other feature that is most useful is the "power-up" function. Without this function, the VF-7401 could "come up on" any frequency between 140.00 and 149.99 MHz each time it is turned on. With this circuit operating, the VF-7401 always "powers up" on the same frequency. The user chooses this frequency by selecting and properly attaching wires on the synthesizer board. The Heath manual contains detailed information for setting the chosen frequency.

Operating Report

I use the VF-7401 fixed and mobile. Four adhesive-backed rubber feet were installed on the bottom of the radio case to prevent marring supporting surfaces. Heath provides a gimbal bracket that can be used to mount the transceiver under the dash of an automobile. The gimbal bracket comes with four predrilled mounting holes and matching self-tapping screws. The lip under our dash is large enough to mate with only two of the screws. I used a small hand drill to form two pilot holes for mounting the bracket. Thus far, the two screws are holding the bracket firmly in place, with no evidence of problems. The gimbal bracket may also be used as a supporting stand if mobile operation is not contemplated. In that case, Heath recommends that four adhesive-backed rubber feet be attached to the gimbal bracket.

A large screw is welded to each side of the case of the VF-7401. The screws slide into slots in the bracket when mounting. One-inch cork washers prevent the bracket from marring the side of the VF-7401 case. The transceiver is held firmly in place by means of two 1-1/4-inch thumbnuts. The first time I mounted the VF-7401 in our car, I did not tighten the thumbnuts sufficiently. The radio "swiveled" when we hit bumps in the road — we were traveling in New York and Heaven knows that New York has a lot of bumps in the road! After that first experience I remembered to tighten the nuts firmly when installing the radio in the bracket. No further problems were noticed. This system makes it quite convenient to remove or install the radio when desired.

I have not encountered any problems when using the rig either mobile or as a base station. The scanner function is great while driving. Right now, the rig is set up in the dining room instead of the shack. I told you it was pretty. — *Sally O'Dell, KB1O*

Hints and Kinks

Conducted By Stuart Leland,* W1JEC

SSB OVERDRIVE INDICATOR

☐ The lead photo, Fig. 1 and the diagram in Fig. 2 show an ssb overdrive indicator that I built. It was inspired by the March 1981 *QST* article, "A Peak-Reading Bar-Graph Meter for SSB Transmitters," by Eric Kirchner, VE3CTP.

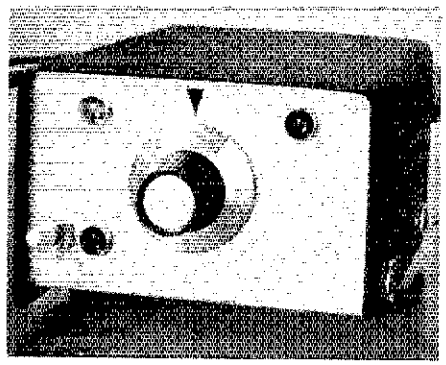
Conventional panel instruments are simply incapable of telling you what is happening in the ssb mode. With this device, if things are normal, the green LED on the left winks at you as you speak. But if you overdrive the transmitter, the red LED (DS2) on the right flashes as if to say, "Lower your voice or turn the microphone gain down; you are distorting and splattering!" The circuit is simple, and the components are easily obtainable and inexpensive. Most of them would be in any junk box worthy of its name. It's an easy weekend project! I find it quite useful at my station.

An rf voltage sample is taken from the transmission line by means of a rear panel SO-239 connector with an M-358 T fitting attached. The variable voltage divider, rectifier and filter are essentially the same as described by Kirchner. The green LED (DS1) will be illuminated whenever an appreciable voltage is present. The unijunction transistor (UJT) is biased by the 9-V battery. Conduction between E and B_1 starts when the dc voltage at E rises to a critical level, around 3 V. When this occurs, the red LED, DS2, is illuminated.

Setting the indicator is easy. Flip the switch on, illuminating the pilot LED (DS3). The potentiometer should be in the zero position (fully counterclockwise). Tune the rig in the cw mode, following the usual procedure. Send a series of dots while advancing the potentiometer to the point where the red LED just starts flashing. Switch the rig to the ssb mode. To maintain a good average power level, I adjust the microphone gain so that I see an occasional red flash on an exceptionally high voice peak. The resulting minimal distortion should not be objectionable.

Conduction through the UJT starts abruptly and decisively when the potential rises to the critical 3 V. As the voltage drops below the critical level, however, the UJT does not stop conducting in the same abrupt way. The voltage must drop to 2.8 before conduction finally stops. This latching effect is the reason the potentiometer should be set while sending a series of dots rather than with the rig keydown. This effect is of no concern when the rig is in the ssb mode, as voice peaks are of short duration and unlatching happens naturally. — *Joe Kennicott, W4OVO, Lexington, Tennessee*

*Assistant Technical Editor



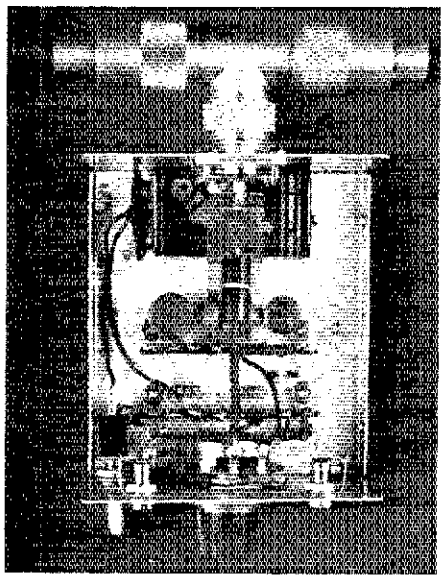


Fig. 1 — This photograph shows the tidy arrangement of the W4OVO ssb overdrive indicator components. A coaxial cable T placed in the transmission line brings a sample of the rf to the indicator. A 9-V battery that energizes the unit is mounted conveniently just below the coaxial connector at the rear of the enclosure.

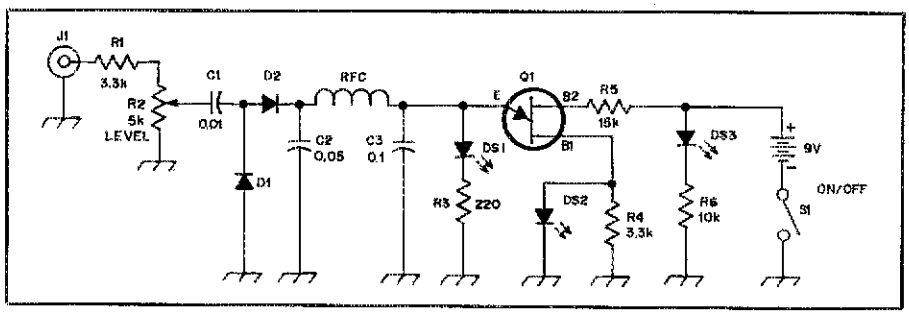


Fig. 2 — The simple circuit for the W4OVO overdrive indicator. Most parts may be found in a well-stocked junk box or may be obtained at electronic supply stores, such as Radio Shack.

C1 — 0.01 μF disc, 500 V.
C2 — 0.05 μF disc, 50 V.
C3 — 0.1 μF disc, 50 V.
D1, D2 — 1N914 or equiv. switching diode.
DS1 — T-1-3/4 LED, green.
DS2 — T-1-3/4 LED, red.
DS3 — LED, pilot, color optional.
Q1 — Unijunction transistor, 2N2646 or equiv.
R1 — 3300 Ω, 2 W.
R2 — Linear potentiometer, 5 kΩ.
R3 — 220 Ω, 1/4 W.
R4 — 3300 Ω, 1/4 W.
R5 — 15 kΩ, 1/4 W.
R6 — 10 kΩ, 1/4 W.
RFC — 1 mH.

CORRECTING INTERMITTENT DISPLAY ON TS-830S

☐ After several months of perfect operation, my TS-830S exhibited an intermittently erroneous and fluctuating digital display over a portion of the VFO range. The improper display frequency was always lower than that indicated on the analog dial. This occurred regardless of the band selected. When my remote VFO-230 memory was used to "read" and then "write" the internal VFO frequency, the remote VFO display agreed with the main analog dial. Also, the audio of the received frequencies agreed when comparing the two VFOs. The internal display also read correctly and would not fluctuate when the remote VFO was selected.

The problem was traced to low VFO output (which measured 150 mV in my case). This was sufficient to operate the rig, but marginal for driving the counter. The output level of the VFO should be 200 mV, which is set by adjusting VFO capacitor TC2. Access is gained to this capacitor by removing the four allen-head screws from the corners of the VFO and then sliding the VFO forward. Refer to the TS-830S service manual for suitable measurement points and test-equipment recommendations. — *Steve Lawrence, WB6RSE, Los Angeles, California*

TEMPORARY TIE WRAPPING

☐ Most common plastic and nylon tie-wrapping devices use corrugations or teeth on one side of the band. When threaded correctly through the locking device, a ratchet prevents the band from being withdrawn. Each time I would install a wrap, thinking I was through, it wasn't long before I thought of another wire that should also be harnessed, or perhaps I would decide to reroute a wire another way to make it shorter or to correct circuit instability. I often ended up wasting several wraps because they had to be cut needlessly.

Temporary tie wrapping can be a big help until things are really nailed down and the project finished. To use them without permanently locking the straps in place, thread the strap through the locking device with the smooth side toward the ratchet. In this way, the ratchet still provides sufficient friction to hold the wrap in place, but does not interfere with unwrapping a wire that must be changed or when the wrap must be moved elsewhere. When the project is complete, the wraps can be redone so that the ratchets engage, and the lid can be put on before another brainstorm occurs. — *Robert G. Weaton, W5XW/VP1XW/XE2XW, San Antonio, Texas*

CUTTING CIRCUIT-BOARD MATERIAL

☐ Use a plastic cutter to cut circuit-board material. Scribe a deep line on each side of the circuit board. This will provide a clean break. The tool can also be used to make the ARRL universal board in a few minutes. I use a Fletcher no. HPC-22 to do the work. This tool is available at hardware stores. — *Richard B. Stevens, W1QWJ, Ashuelot, New Hampshire*

USING AN EXTERNAL AMPLIFIER WITH THE FT-707

☐ I read Doug DeMaw's review of the Yaesu FT-707 transceiver in June 1981 *QST*. Being a proud owner of one of those rigs, I was especially interested in his comments about the equipment not having a direct control line for activating an external amplifier. Such a provision does exist, but not in the conventional format. That is, there is no internal relay or solid-state switch that is intended for triggering a linear amplifier. There is, however, a +12-V connection available at pin 6 of accessory socket J7. See Fig. 3. When the transmitter is keyed, +12-V dc appears on pin 6. This can be used as a control voltage for an external 12-V dc relay, thereby providing the actuating mechanism for an outboard amplifier.

Another tip concerns the use of an external VFO. For those who aren't aware of this interesting condition, I want to mention that when a VFO is plugged into the appropriate J6 socket, the internal VFO becomes inoperative. Switching diodes remove the operating voltage from the built-in VFO when an external one is plugged into J6. — *Jesse Conn, W7SOD, Seattle, Washington*

FT-301 KEY CLICKS SOLVED

☐ Your March 1980 Hints and Kinks article concerning improved keying for the FT-7B inspired me to do something about the keying for my FT-301 (a second cousin to the FT-7B). A nearby ham reported that I was wiping out his reception with key clicks. His oscilloscope observations indicated that my FT-301 had almost instantaneous rise time and a decay time of 10 ms. Also, the rig had always keyed lightly. I reasoned that if I were to reduce the total overall resistance to the base of Q106 and reproportion resistors R135 and R136, I could improve the keying wave form, aside from making the keying a little heavier. See Fig. 4.

The replacement resistors came from my junk box, but they did the job. It was unnecessary to change C127. My neighbor tells me that the wave-form rise and decay times are about 5 ms. He now enjoys copying DX within 1 kHz of my signals while I run a string of continuous dots through my 1/2-kW linear amplifier and beam my TA-33 directly at his QTH. My solution may help other FT-301 owners. — *Jack L. West, W6VD, Sacramento, California*

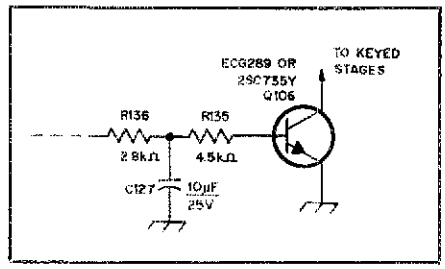


Fig. 4 — A key-click problem concerning the FT-301 at W6VD was cured by reducing the overall resistance to the base of Q106. The values shown above were substituted for the original values. This change resulted in rise and decay times of 5 ms.

AN OLD TIMER'S WAY OF PROTECTING MOBILE RELAYS

☐ Old voltage regulator boxes make excellent relay enclosures for mobile applications. The boxes are weather-tight, are easy to mount, and usually have a hole or two in the bottom for bringing leads in or out of the box. Discarded voltage regulators can probably be obtained at local garages. — *Rathbun B. Griffin, W1VON, Granby, Connecticut*

TRANSISTOR REPLACES RELAY IN LITTLE JIMMY KEYER

☐ I built the Little Jimmy Keyer, described by Richard Rose in September 1979 *QST*. After being unable to make it operate (no smoke evident!), I gave my problem to Al Davis, WA2URT. He found an insufficient current in the power supply (I tried a 9-V battery). In the process he replaced the reed relay with a transistor, making the whole unit solid-state. The changes in the circuit are shown in Fig. 5. — *Harvey Horn, WB2NMN, Stony Brook, New York*

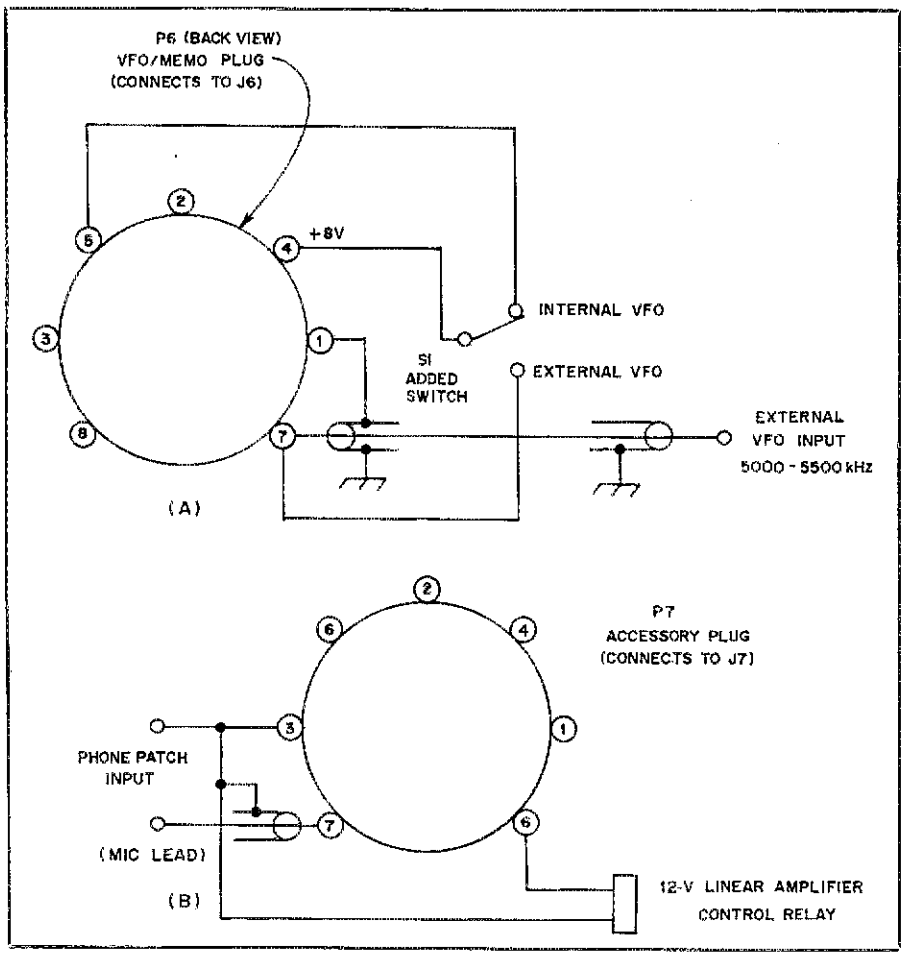


Fig. 3 — Connections made to P6 and P7 (respectively) as shown will enable the owner of a Yaesu FT-707 to use an external VFO and to have a relay control circuit for operating a linear amplifier with the '707.

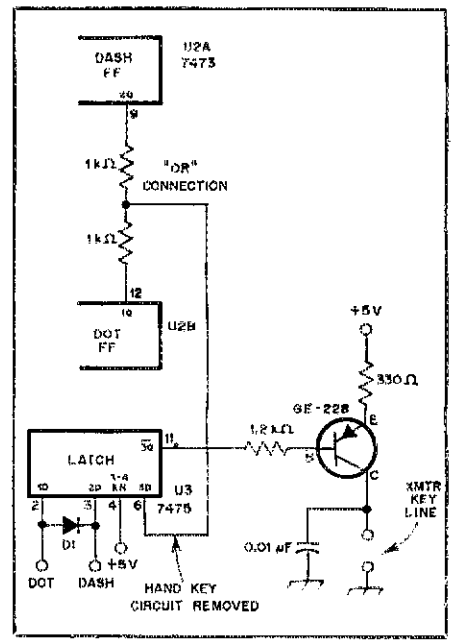


Fig. 5 — The Little Jimmy Keyer, described in September 1979 *QST*, becomes all solid-state with the modification shown that eliminates the reed relay of the original circuit. With this configuration $\overline{3Q}$ and 3D provide a simple buffer. The GE-228 is wired for grid-block keying.

Technical Correspondence

Conducted By
Gerald L. Hall,* K1TD

WAVE TRAPS WITH THREE COMPONENTS

☐ Wave traps are simple circuits used to obtain a low impedance at resonance, Fig. 1A, or a high impedance at anti-resonance (parallel resonance), Fig. 1B. These circuits are effective, but (sometimes unfortunately) they show definite reactive impedances at all other frequencies.

By definition, a wave trap opposes signals near one frequency (or wavelength) while not hindering some other signals. The addition of a single capacitor or inductor will provide a trap that is resonant at one frequency and anti-resonant at another. See Fig. 2. Resonance occurs below the anti-resonant frequency in the circuit with the added capacitor (Fig. 2A), and above the anti-resonant frequency using the added inductor (Fig. 2B).

The general design procedure (Fig. 2C) is to select values for X and X1 to give resonance.

*Associate Technical Editor

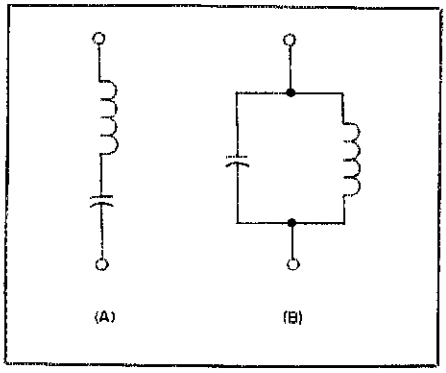


Fig. 1 — At A, a resonant wave trap to be shunted across a high-impedance source. At B, an anti-resonant (parallel resonant) wave trap to be used in series with a low-impedance load.

Scale these values to the anti-resonant frequency and add. Select X2 to have the negative of this value at anti-resonance. For example, to design a wave trap that is resonant at 4 MHz and anti-resonant at 8 MHz, Fig. 2A is applicable:

Let C1 = 1000 pF
X1 = −40 ohms at 4 MHz, −20 ohms at 8 MHz
X = 40 ohms at 4 MHz, 80 ohms at 8 MHz
X2 = −(80 − 20) = −60 ohms at 8 MHz

From this:
C2 = 333 pF and L = 1.6 μH

As another example, Fig. 2B applies for a wave trap that is resonant at 8 MHz and anti-resonant at 4 MHz:

Let X = −80 ohms at 8 MHz, −160 ohms at 4 MHz
X1 = 80 ohms at 8 MHz, 40 ohms at 4 MHz
X2 = −(40 − 160) = 120 ohms at 4 MHz
In this example C = 250 pF, L1 = 1.6 μH and L2 = 4.8 μH.

There is a small inaccuracy in the estimation of anti-resonance. This tends to vanish as the inductor Q rises toward 100. Depending on the application, some care must be taken in the selection of the initial values of X and X1 to obtain the desired results with practical values of Q. — *David T. Geiser, WA2ANU, ARRL TA, RR 2, Box 787, Snowden Hill Rd., New Hartford, NY 13413*

WAVE REFLECTIONS IN ATTENUATORS, FILTERS AND MATCHING NETWORKS

☐ Network-type filters and attenuators have one thing in common — they both attenuate energy. However, this is just about the extent of their similarity; they operate on quite different principles and should not be confused with one another. Network-type filters attenuate harmonic and/or subharmonic energy.

Network-type attenuators usually comprise resistive elements to absorb and dissipate power equally at *all* frequencies. See Fig. 3 as an example of this type of network. The elements are well matched to the system impedance so as not to reflect any power back to the source. Filters, on the other hand, comprise low-loss reactive elements so as to absorb or dissipate a minimum of power, thereby conserving power at the frequencies to be passed through the filter. (An ideal filter would have lossless elements and thus dissipate no power.) The reactive elements in the filter are arranged so that it is well matched for minimum reflection at the pass frequencies, but mismatched for maximum reflection at all frequencies to be rejected. The rejection is accomplished by selectively reflecting back to the source all the power appearing at the unwanted frequencies, where, on return, the reflected power causes the source to be mismatched to the line at *only* the unwanted frequencies. This selective mismatch prevents the source from delivering further power at the unwanted frequencies. Thus, attenuators attenuate all frequencies by absorption and dissipation, while filters attenuate only the *unwanted* frequencies by *selective reflection.*

The primary purpose of the matching network is to couple circuits that have different impedance levels, such as a power source and a load, so that the source will make its maximum power available to the load at the fundamental frequency. Low-loss reactive elements, as in the filter, are used to perform the matching function.[1] See Figs. 4 and 5. The distributed elements of transmission-line transformer and stub configurations may be used instead of lumped reactances, but the principles are the same.

The elements of the network are arranged so that when the network is terminated in a resistance, R, equal to the optimum load impedance of the source, Zc, the network will produce a mismatch at the fundamental frequency that is *complementary* to the mismatch that would arise if the source and the load were connected together directly without the matching network. Complementary mismatches pro-

[1]G. Grammer, "Simplified Design of Impedance-Matching Networks," in three parts, *QST* for March, April and May, 1957.

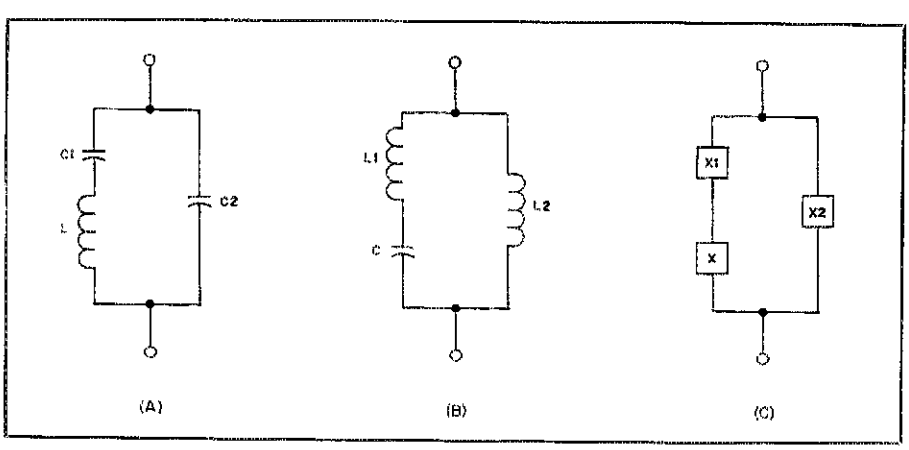


Fig. 2 — A circuit with anti-resonance below the resonant frequency is shown at A. At B, a circuit with anti-resonance above the resonant frequency. At C is the generic circuit used in design calculations. The relative positions of the components as drawn in C are the same as in A or B, whichever is applicable. The use of high-Q components is assumed.

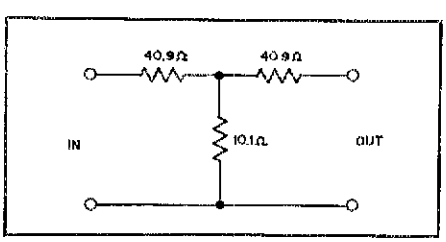


Fig. 3 — A network type of attenuator. The values indicated provide 20 dB of attenuation in a 50-Ω system. When terminated in 50 Ω, the input impedance of the network is 50 + j0, and the output energy is attenuated by 20 dB from that at the input no matter what the input frequency, assuming the resistors have no reactance. Networks such as this may also be designed for unequal input and output impedances.

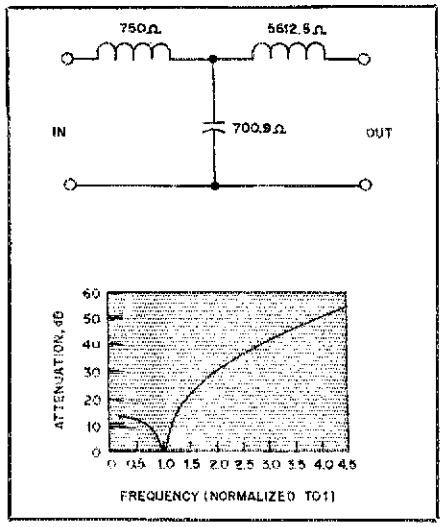


Fig. 4 — A T-network matching circuit of L and C elements, and a curve showing its attenuation versus frequency. The component reactances shown here provide a match for a 5000-Ω load to a 50-Ω source, with an unloaded input-section Q of 15. The attenuation curve is calculated for a 5000-Ω load of pure resistance at all frequencies, but the impedance of loads such as antenna systems are seldom if ever constant across such a frequency range. The input impedance versus frequency for the fixed 5000-Ω load is presented in Table 1. By changing the Q and component reactances in the circuit, many other combinations will provide the same 5000- to 50-Ω match, but the attenuation curve will assume a different shape.

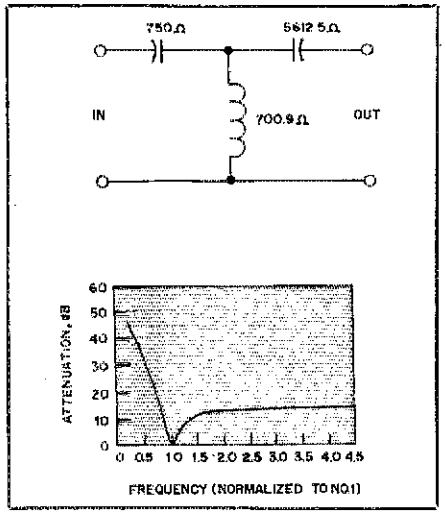


Fig. 5 — Another T-network matching circuit of L and C elements and its attenuation curve. The circuit is identical to that of Fig. 4 except that inductances have replaced capacitances and vice versa; the reactance values remain the same for similar locations in the circuit. This network, too, will match a 5000-Ω load to a 50-Ω source. The input impedance versus frequency for a fixed 5000-Ω load is given in Table 2.

duce complementary reflections, each mismatch producing a reflected voltage (and current) that is equal in magnitude, but of opposite phase, to that produced by the other.

When the matching network is inserted between the source and load of different impedances, complementary mismatches are produced, one between the source and the network, and its complement between the network and the load. The reflected voltages (and currents) of equal magnitude and opposite phase resulting from the mismatches combine in the network to produce a resultant voltage (and current) of zero phase relative to the voltage (and current) of the source wave. Thus the resultants of the reflected voltages and currents add in phase to those of the source wave. These in-phase additions to the source wave have the effect of re-reflecting the reflected voltages and currents into the forward direction, resulting in the cancellation of all rearward-traveling waves. Thus a 1:1 conjugate match is formed, and since the source now has its desired or optimum impedance for a load, it makes its maximum power available to the actual load of different impedance. Keep in mind that the "load" now seen by the source is the combination of the actual Zc-mismatched load and the matching network. Although it may seem difficult to appreciate that an additional mismatch is deliberately introduced to obtain a match (such as with a stub on a line), the mismatches described above must exist as Zc mismatches to produce the controlled complementary reflections that are required to develop the conjugate match. However, no power is lost from the reflections, and, except for the small I^2R and E^2/R losses in the low-loss elements of the matching network, the maximum available source power is transferred to the Zc-mismatched, but conjugate-matched, load.

As stated earlier, the principles of network and stub matching are identical. To emphasize the general concept that all conjugate matching is achieved by canceling one mismatch reflection with another, a few words concerning stub matching will be helpful. In stub matching, the stub introduces the deliberate mismatch, and thereby produces the complementary reflections that accomplish the conjugate match on the line. The stub is of the correct length and impedance to produce amplitudes of reflected voltage and current equal to those reflected by the load mismatch. The stub is placed on the line where the voltages (and currents) reflected by the load mismatch are of opposite phase to those produced by the stub. The line is thus matched (no reflections) between the stub point and the source. By comparison, the network generates the same complementary-mismatch reflection as the stub, and simultaneously adjusts the effective electrical distance from the mismatched load, so that its complementary reflection is placed at the same electrical position on the line as a correctly placed stub.

Turning now to the harmonic rejection capability of matching networks, the key to the rejection is *mismatch*. As we know, the percentage of power the source will make available to a load is proportional to the quality of the impedance match to the load. Conversely, and crucial to harmonic rejection, the amount of power the source will *withhold*, relative to its maximum available power at a given frequency (such as a harmonic), is proportional to the impedance mismatch at that frequency. Single-frequency matching networks are designed to provide only *one* complementary mismatch, compensating for the load mismatch appearing at the fundamental frequency. Thus, the beauty of the network is that it inherently fails to provide complementary mismatches to compensate for the mismatches presented by the load at the harmonic frequencies. Consequently, as in the filters described earlier, the source remains mismatched at the undesired subharmonic and/or harmonic frequencies, and delivers reduced power at these frequencies in the amount that the degree of match (or mismatch) dictates. Tables 1 and 2 indicate this effect by showing the input impedances for the networks of Figs. 4 and 5, respectively, for a range of frequencies and a fixed load. Only at the fundamental does a match occur.

The most common amateur usage of a matching network is the so-called antenna

Table 1

Frequency Vs. Network Input Impedance for the Circuit of Fig. 4

A fixed load of 5000 Ω and lossless circuit elements are assumed for all frequencies. The frequency is normalized to 1 for the fundamental.

Frequency	*Input Z, Ohms*
0.4	1.8 – j1589.6
0.6	8.4 – j814.4
0.8	23.6 – j346.4
1.0	50.0 + j0.0
1.2	89.1 + j284.4
1.4	140.9 + j530.8
1.6	204.9 + j750.4
1.8	279.8 + j948.8
2.0	364.3 + j1129.1
2.2	456.9 + j1293.3
2.4	556.3 + j1442.7
2.6	661.2 + j1578.3
2.8	770.2 + j1701.1
3.0	882.3 + j1811.7
3.2	996.5 + j1911.0
3.4	1111.9 + j1999.8
3.6	1227.6 + j2078.1
3.8	1343.1 + j2147.3
4.0	1457.6 + j2207.8
4.2	1570.8 + j2260.2
4.4	1682.1 + j2305.1
4.6	1791.2 + j2343.1
4.8	1897.9 + j2374.8
5.0	2001.9 + j2400.8
5.2	2103.0 + j2421.4
5.4	2201.2 + j2437.2

Table 2

Frequency Vs. Network Input Impedance for the Circuit of Fig. 5

A fixed load of 5000 Ω and lossless circuit elements are assumed for all frequencies. The frequency is normalized to 1 for the fundamental.

Frequency	*Input Z, Ohms*
0.4	608.1 – j1512.1
0.6	228.7 – j818.7
0.8	100.8 – j349.0
1.0	50.0 + j0.0
1.2	27.1 + j282.5
1.4	15.8 + j526.1
1.6	9.8 + j745.2
1.8	6.4 + j948.3
2.0	4.3 + j1140.2
2.2	3.0 + j1324.2
2.4	2.1 + j1502.3
2.6	1.6 + j1675.9
2.8	1.2 + j1846.0
3.0	0.9 + j2013.4
3.2	0.7 + j2178.5
3.4	0.6 + j2341.8
3.6	0.4 + j2503.5
3.8	0.4 + j2664.0
4.0	0.3 + j2823.5
4.2	0.2 + j2982.0
4.4	0.2 + j3139.7
4.6	0.2 + j3296.8
4.8	0.1 + j3453.2
5.0	0.1 + j3609.1
5.2	0.1 + j3764.6
5.4	0.1 + j3919.7

tuner. [*QST* uses the word Transmatch to denote any such circuit. — Ed.] The network increases operating flexbility by providing the conjugate match to compensate for the mismatch between the feed line and the antenna that arises when a coax-fed antenna is operated off resonance or when the antenna is fed with open-wire line. In these cases the load terminating the matching network is the impedance appearing at the input terminals of the feed line. As we know, when the antenna impedance is mismatched to the Zc impedance of the feed line, reflections from the mismatch cause the line input impedance to change from its resistive characteristic value Zc (usually 50 or 75 ohms) to some new complex value determined by the antenna impedance and the length of the feed line.[2] It is this new line-input impedance (which changes as we change frequency) that we match to the source with the Transmatch at only the fundamental frequency.

Obviously the antenna presents a drastically different impedance to the feed line at harmonic frequencies compared with that of the fundamental, and consequently the imput impedances to the feed line are vastly different at the harmonic frequencies than what the matching network sees as a load at the fundamental frequency. These load-impedance changes with frequency, as well as the effects described earlier in the paragraph on filter principles, create reflections from the uncompensated mismatches at the harmonic frequencies that are responsible for the harmonic rejection of the matching network.

There are many arrangements and configurations of reactance elements that can be used equally well to generate a complementary mismatch for obtaining a conjugate match. However, there are vast differences among these various configurations concerning the severity of their *noncomplementary* mismatches that are required to reject harmonics and other unwanted frequencies. Figs. 4 and 5 illustrate this simply. Note that both circuits are T networks having identical reactance values in similar positions of the circuits; only the type of reactance differs, capacitive vs. inductive. Both circuits will match a 5000-Ω load to a 50-Ω line at the fundamental frequency. The circuit of Fig. 4 is commonly called a high-pass configuration, and that of Fig. 5 a low-pass configuration. Either circuit may attenuate frequencies both lower and higher than the fundamental, however, as shown by the frequency-response curves. Of course, since the frequencies of the harmonic energy are higher than the fundamental, a matching network of the low-pass configuration would be the most desirable, a circuit with series inductance and shunt capacitance arms.

For a more detailed explanation of the role played by reflections in the science of impedance matching and harmonic rejection, may I refer you to two of my previous *QST* articles.[3,4]

As a parting thought concerning the operational adjustment of Transmatches, the amateur should be aware of the trade-off between optimum efficiency (minimum power lost in the network) and optimum harmonic rejection. There are usually several settings of the network that will yield a 50-Ω impedance at the Transmatch. As far as the transmitter is concerned, all such settings are equivalent — the same as if you were feeding a 50-Ω dummy load. However, the 50-Ω input obtained with the lowest loaded Q has the optimum efficiency. At the other extreme, the 50-Ω inputs obtained with the higher loaded Qs offer increased rejection of unwanted frequencies, but with some increase in insertion loss. In either case, the loss is usually small and is well worth the improved operating flexibility afforded by the Transmatch. In the circuits of Figs. 4 and 5, higher Qs are obtained with greater reactances in the series-input arms (lower input capacitance in Fig. 4, higher input inductance in Fig. 5).

In conclusion I would further point out that those Transmatch settings that yield a 50-Ω input impedance do not mean the *SWR* is 1:1. It means only that a 1:1 SWR would exist on a 50-ohm line preceding the Transmatch. You have not "brought the SWR down" on the antenna feed line by adjusting the matching network; you simply have a 50-Ω impedance looking into the input. — *Walt Maxwell, W2DU, ARRL TA, 243 N. Cranor Ave., DeLand, FL 32720*

TRAP ANTENNAS

☐ Probably the simplest coax-fed multiband antenna we amateurs use is one with traps. For purposes of this discussion a trap vertical and a trap dipole, both shown in Fig. 6, can be considered as essentially the same type of antenna. (The vertical antenna operates against an identical image portion in the earth, which might be thought of as the "missing" half of a dipole.) The feed-point impedance of the vertical is approximately half that of its horizontal counterpart, but disregarding earth losses and the possibility of current flowing outside the shield of the coax in the dipole case, the two are otherwise electrically identical.

Even though a trap-antenna arrangement is a simple one, an explanation of how a trap antenna works eludes most of us. For some designs we find traps that are resonated in our amateur bands, and for others (especially commercially made antennas) we find the traps are resonant far outside any amateur band. Can both work?

A trap in an antenna system can perform either of two functions, depending on whether or not it is resonant at the operating frequency. A familiar case is where the trap *is* resonant. For the moment, let us assume that dimension A in Fig. 6 is 33 feet (10 meters) and that each L/C combination is resonant in the 40-meter band. Because of its resonance, the trap presents a high impedance at that point in the antenna system. The electrical effect on 40 meters is that the trap behaves as an insulator. It serves to divorce the outside ends, the B sections, from the antenna. The result is easy to visualize — we have an antenna system that is resonant in the 40-meter band. Each 33-ft section (labeled A in the drawing) represents a quarter wave, and the trap behaves as an insulator. We therefore have a full-size 40-meter antenna.

The second function of a trap, obtained when the frequency of operation is *not* the resonant frequency of the trap, is one of electrical loading. If the operating frequency is below that of trap resonance, the trap behaves as an inductor; if above, as a capacitor. Inductive loading will electrically lengthen the antenna, and capacitive loading will electrically shorten the antenna.

Let's carry our assumption a bit further and try using the antenna we just considered on 80 meters. With the traps resonant in the 40-meter band, they will behave as inductors when operation takes place on 80 meters, electrically lengthening the antenna. This means that the total length of sections A and B (plus the length of the inductor) may be something less than a physical quarter wavelength for resonance on 80 meters. Thus, we have a two-band antenna that is shorter than full size on the lower frequency band. The total antenna length (or height) needed for resonance in the 80-meter band will depend on the L/C ratio of the trap elements.

The key to trap operation off resonance is its L/C ratio, the ratio of the value of L to the value of C. At resonance, however, within practical limitations the L/C ratio is immaterial as far as electrical operation goes. For example, in the antenna we've been discussing, it would make no difference for 40-meter operation whether the inductor were 1 μH and the capacitor were 500 pF (the reactances would be just below 45 ohms at 7.1 MHz), or whether the inductor were 5 μH and the capacitor 100 pF (reactances of approximately 224 ohms at 7.1 MHz). But the choice of these values will make a significant difference in the antenna size for resonance at 80 meters. In the

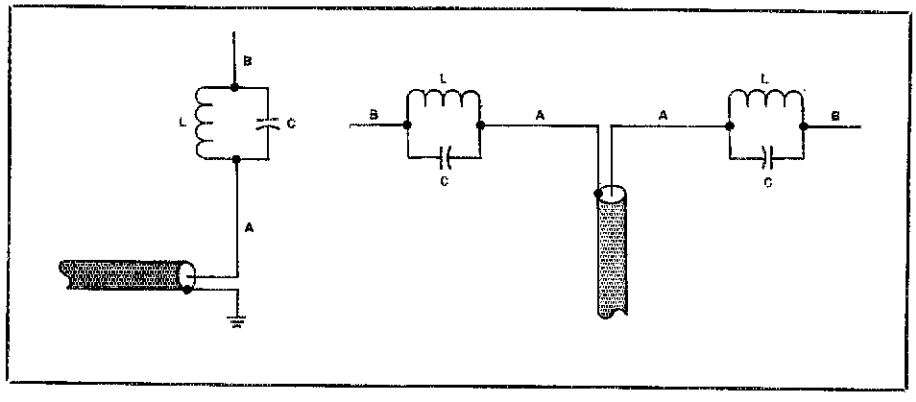


Fig. 6 — A trap vertical and a trap dipole antenna. Either type may be fed with 50-ohm coaxial line. Depending on the L/C ratio of the trap elements and the lengths chosen for dimensions A and B, the traps may be resonant either in an amateur band or at a frequency far removed from an amateur band for proper two-band antenna operation.

[2] M. W. Maxwell, "Another Look at Reflections," Part 7, *QST*, Aug. 1976. See pages 16 through 19.
[3] M. W. Maxwell, "Another Look at Reflections," Part III, *QST*, Aug. 1973. See Fig. 4, p. 39.
[4] M. W. Maxwell, "Another Look at Reflections," Part IV, *QST*, Oct. 1973, p. 22.

first case, where the L/C ratio is 2000, the necessary length of section B of the antenna for resonance at 3.75 MHz would be approximately 28.25 ft (m = ft × 0.3048). In the second case, where the L/C ratio is 50,000, this length need be only 24.0 ft, a difference of more than 15%.

The above example concerns a two-band antenna with trap resonance at one of the two frequencies of operation. On each of the two bands, the vertical (or half of the dipole) operates as an electrical quarter wave. However, the same band coverage can be obtained with a trap resonant at, say, 5 MHz, a frequency quite removed from either amateur band. With proper selection of the L/C ratio and the dimensions for A and B, the trap will act to shorten the antenna electrically at 40 meters and lengthen it electrically at 80 meters. Thus, an antenna that is intermediate in physical length between being full size on 80 meters and full size on 40 meters can cover both bands, even though the trap is not resonant at either frequency. Again, the antenna operates with electrical quarter-wave sections.

Additional traps may be added in an antenna section to cover three or more bands. Or a judicious choice of dimensions and the L/C ratio may permit operation on three or more bands with just one trap (a pair of identical traps in the dipole). Design information for two-band trap antennas has appeared in *QST*,[1] but the calculations for the more complicated multiband designs are beyond the means of most amateurs.

Lest the significance of information in a previous statement become lost, let me rewind it and play it back again: *If the operating frequency is below that of trap resonance, the trap behaves as an inductor; if above, as a capacitor.* Now we all know that inductive reactance is directly proportional to frequency, and capacitive reactance is inversely proportional. Let's now choose trap L and C components, which each have a reactance of 20 ohms at 40 meters. When we shift operation to the 80-meter band, the inductive reactance becomes 10 ohms, and the capacitive reactance becomes 40 ohms, right? Right! How can the trap become inductive at 80 meters with a higher capacitive reactance? Doesn't the extra capacitive reactance make the antenna electrically shorter yet? Fortunately, the answer to this last question is no. You see, the inductor and the capacitor are connected in parallel *with each other,* but the *series equivalent* of this parallel combination is what affects the electrical operation of the antenna. The series equivalent of unlike reactances in parallel may be determined from the equation

$$Z = \frac{-jX_L X_C}{X_L - X_C}$$

where j indicates a reactive impedance component, rather than resistive. A positive result indicates inductive reactance, and a negative result indicates capacitive. In this 80-meter case, with 40 ohms of capacitive reactance and 10 ohms of inductive, the equivalent series reactance is 13.3 ohms inductive. At 20 meters, where X_L = 40 ohms and X_C = 10 ohms, the result is 13.3 ohms capacitive. At 40-meter resonance, X_L equals X_C, and the theoretical series equivalent is infinity, the insulator effect. — *Gerald L. Hall, K1TD, ARRL Hq.*

[1]W. Hayward, "Designing Trap Antennas," Technical Correspondence, *QST*, Aug. 1976, p. 38.

Feedback

☐ N1ATB points out correctly that there is an error in the truth table in Fig. 8 for "The NOR Gate Break-in" from May 1980 *QST*. The R and S at the upper left of the table should be transposed.

☐ In "A Basic Approach to Calculating Cascaded Intercept Points and Noise Figure," October 1981 *QST*, Eq. 1, the radical sign was extended too far to the right. The + D portion of the equation does not belong under the radical sign.

☐ In "A Universal MOSFET I-F Amplifier," August 1981 *QST*, the source resistor for Q1 of Fig. 1 should be 2200 ohms rather than 220 ohms.

☐ Thanks to the sharp eyes of W. H. Bollinger of Pittsburgh, Pennsylvania, we point out that the 470-μF capacitor in Fig. 5 of "Experimenting for the Beginner," September 1981 *QST*, should be connected to terminal "Y" rather than terminal "X." When connected to "X," it will degrade the keying wave shape during operation on 160 through 15 meters.

☐ W2DQA mentions an error in the pc-board pattern for "The L Meter," January 1981 *QST*, Fig. 2. The drain and source leads for Q1 and Q2 need to be transposed in accordance with the leads of the MPF102s.

☐ The schematic diagram in Lewallen's "An Ash-Proof Keyer Paddle — Something New for CW Operators!" (Fig. 1, p. 31 of August 1981 *QST*), contains two errors. U7A should be labeled U1A, and the unidentified output pin of U2B is pin 7. Also, the correct replacement number for U1 is ECG4093B, and not ECG4082B (listed incorrectly in the Sylvania master replacement guide).

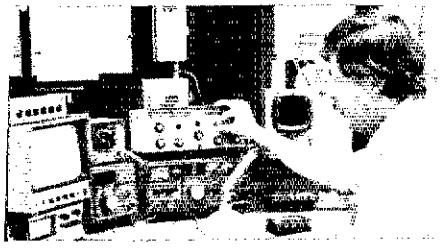
☐ Wayne Sandford, Jr., K3EQ, author of "A Modest 45-Foot DX Vertical for 160, 80, 40 and 30 Meters," September 1981 *QST*, advises that the ground-loss reference in the first column on p. 30 should be 2 dB on 80 meters, rather than 2 dB on 40 meters.

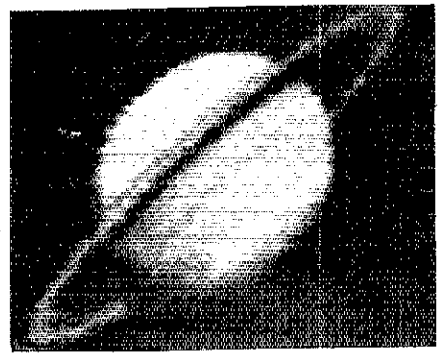
☐ Bob Heil, K9EID, of Marissa, Illinois, calls attention to a misnomer in his article, "Experience 10-Meter FM Operation," in August 1981 *QST*. The third paragraph makes reference to a system that allows the operator to access a 10-meter fm station with a 2-meter signal. He called this a "remote base." It should have been called a "cross-band repeater," because it is a part of the WD9GOE repeater system. The difference is one of semantics. Unfortunately, stated one way it is legal; the other way, it is not.

☐ The Preformed Line Products Company has informed us that GUY-GRIP® is a registered trademark of that company. In the July article "The Ups and Downs of Towers," we failed to note this fact. The correct reference for this product is GUY-GRIP® dead-end.

☐ As described in the Stray on UoSAT, Amateur Radio's newest satellite (this issue, page 105), the beacon antennas will have left-hand circular polarization. "The New Frontier" (October *QST*, page 78) stated that right-hand circular polarization would be used.

Strays





Bernard Glassmeyer, W9KDR, ARRL OSCAR Program Manager, adjusts Hq. lab station W1INF for peak reception of last month's SSTV pictures from the Voyager II Flyby of Saturn. Amateur Radio was used to retransmit the photos worldwide from the Jet Propulsion Laboratory in Pasadena, California. At right is one of the computer-enhanced pictures, including a view of the mysterious spindle shapes in some of Saturn's rings. *(photos courtesy Andrew Tripp)*

BEARING AND DISTANCE PROGRAM

☐ I've trimmed down a TI Programmable 59 Calculator program to determine the true bearing and distance (in kilometers, miles or nautical miles) to a distant station so that the program can also be used on the TI 58. My program, which uses Morse code prompts and entry instructions, is based on the "Direction and Distance by Trigonometry" article in the *ARRL Antenna Book*. I'll send a copy of the program to anyone who will send me an s.a.s.e. The program is written for my /4X QTH, but I'll send a copy of a program with proper coordinates to anyone sending me their coordinates and a blank mag card along with an s.a.s.e. Geary G. Blankenship, KA2MBS, c/o Negev Airbase Constructors, Group: Communications, APO New York, NY 09674.

Steps to the Future

The ARRL Board of Directors begins walking the path traced by its Long-Range Planning Committee

By Perry Williams,* W1UED

The office cynic swears that, never (well, hardly ever!) in the history of the Republic has a governing body ever paid any attention to the report of a planning committee. The tomes are presented, he says, accepted with applause for the perpetrators, and assigned the job of collecting dust on a shelf somewhere, to emerge only if and when another study is ordered. The new committee blows off the dust, reexamines the bones and reinters them with its own work on another shelf.

Perhaps this scenario is true most of the time. But the ARRL Board of Directors, at its Second 1981 meeting at the Sheraton-Hartford Hotel on September 10-11, made a good start in following the road to tomorrow outlined by the Phase II Report of the Long-Range Planning Committee. Formal acceptance of the report came first, at Minute 48, followed by a far-reaching proposal at Minute 55, which, if carried to fruition, would bring the ARRL closer to its members. The present post of Section Communications Manager, today charged primarily with emergency and traffic responsibilities, would be replaced by the post of Section Manager with broader responsibility for the administration of the League's volunteer structure. (A detailed report outlining the proposal and other recommendations of the LRPC will be in *QST* at a later date.) Advisory Committees would have their membership enlarged to 16, each member being appointed by the division director to be his or her advisor on the subject matter of the committee and to represent the division on the national committee level. Advisory committee members, assistant directors and section managers in each division would comprise a steering committee to assist the director in arriving at policy decisions.

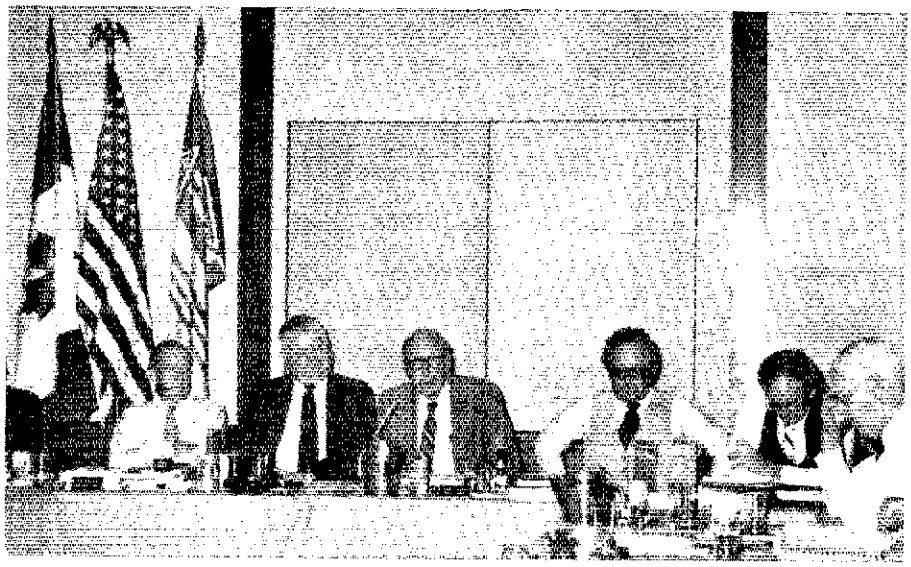
Amateurs could get more closely involved in ARRL affairs through voluntary local club participation in a special affiliation program that would recognize specific achievement, another LRPC suggestion adopted at Minute 77.

The LRPC report saw a need to get amateurs, particularly new amateurs, more involved in the technical side of radio. Minute 54 directs development of a series of "simple but engaging" technical projects for *QST*, suitable for use as club projects as well as individual effort, and Minute 70 asks for more articles on trouble-shooting and maintaining commercially built amateur equipment. In anticipation, a series for *QST* is already in preparation on the "fix-it-yourself" theme.

Emergency communications work by amateurs has traditionally been the principal means of proving that amateurs operate in the "Public Interest, Convenience or Necessity," a phrase from the Communications Act used so frequently that it customarily is abbreviated to "PICON." The LRPC placed expansion of public service activities high on its list of priorities; the Board responded with Minute 83, leading to a voluntary certification program for training, qualification and formal recognition of amateur achievement in emergency communications, and Minute 60, to assist local groups that are asked to provide public-service communications.

Finally, the LRPC recognized the effectiveness of ARRL's current Washington liaison efforts — a *QST* article on this work appears elsewhere in this issue — but wants to ensure uninterrupted attention to developments affecting Amateur Radio, beginning in their earliest phases. Accordingly, the Board adopted Minute 71 to explore and develop practical options for establishing a more continuous Washington presence. LRPC's own existence was extended in its present form by Minute 90 through the next meeting of the Board, now scheduled for March 18-19, 1982.

Turning to regulatory matters, the ARRL will ask the FCC to expand the frequency allocation of General class amateurs in the 75-meter phone bands to read 3860-4000 instead of the present 3890-4000 kHz (Minute 18). The League also will seek a rules change permitting automatic control of beacon stations operating in accordance with recognized band plans (Minute 85).



At the microphone, Long-Range Planning Committee Chairman W4KFC presents the Phase 2 report of LRPC. At his right are ARRL President W2HD and ARRL General Counsel W3PS, while to his left are Washington Coordinator W1UED, Assistant General Manager K1ZZ and International Affairs Vice President VE3CJ. *(photos courtesy W1FB)*

*Washington Area Coordinator, ARRL

FCC Docket 80-135 offers the proposal by Del Norte Technology, Inc. that nongovernment radiolocation devices (which already share 420-450 MHz on the basis of no interference to government radiolocation and amateurs) be permitted to operate inland and to use spread-spectrum techniques. ARRL will file comments insisting on certain conditions: that only the spread-spectrum mode using powers in the 50-100 watt range be permitted; that the operation be confined to the bottom third of the band; that there be a means of identifying the signals at least by class and of locating the operators thereof through FCC monitoring offices; and that promotional literature warn that other services must be protected from interference. We would want assurances that the use of spread spectrum by radiolocation stations would not bar future amateur use of that mode (Minute 86 and Directors Letter 1776).

The central theme of the League filing on the RFI Docket, 78-369 is "That the right of radio amateurs to operate stations of good engineering design shall not be infringed because of the interception of amateur signals by home entertainment equipment," as set forth in Minute 92. Minute 78 seeks clear written declarations of policy from government agencies that effective, reliable operation by amateur stations is in the public interest. In Minute 82 the Board orders continuation of efforts to have FCC examinations conducted at hamfests and conventions. And lastly, the Directors have withdrawn, at Minute 19, the proposal for a voice DX window at 7075-7100 kHz for Extra Class amateurs.

Going on to organizational and fraternal matters, the Board awarded the ARRL Pewter Cup for Technical Excellence to David Geiser, WA2ANU, for his July 1980 article, "The Impedance Match Indicator." Honorable mentions went to Roy Lewallen, W7EL, for "Optimized QRP Transceiver," in the August 1980 issue and to "The Magnetospheric Echo Box," October 1980, written by O. G. Villard, W6QYT, D. B. Muldrew and F. W. Wexham, Jr., K7DS (Minute 27). The Directors praised the work of Harold Richman, W4CIZ, in serving as Technical Advisor for the ARRL RFI Task Group and in particular for assembling the RFI Assistance Lists used in both ARRL and FCC literature to help people having problems with home-entertainment equipment. A plaque is to accompany the sentiments (Minute 36). The members of the Committee on Biological Effects of Radio Frequency Energy who are otherwise qualified were made Technical Advisors by Minute 37 in recognition of their work in a complicated field. Praise was also visited on the DX Advisory Committee for its efforts in combatting unethical operating and QSL practices, which reflect poorly on the Amateur Radio Service (Minute 91). The Board urged that continued attention be paid to these problems in the work of DXAC and in the pages of *QST*. Minute 100 called attention to good staff work on the "Handbook for Local Interference Committees," especially commending the coordinator, Harold Steinman, K1FHN. A new plaque is established for those who have been members of the ARRL for a total of 60 years (Minute 24), and there will be large ARES decals for transfer to T-shirts and emblems for windbreaker jackets (Minute 26).

In the world of operating, new guidelines will go into effect, at a date to be picked, governing single-mode DXCC awards (Minute 41). Again at a future date, certificates will be awarded for Five-Band DXCC and Five-Band WAS Awards (Minute 53); plaques will be provided at cost to applicants desiring them. The 160-meter band plan proposed in August *QST*, page 54, modified in response to membership comments, was adopted by the Board at Minute 68. Voluntary adherence by all amateurs will be encouraged; participants in League-sponsored activities will be required to follow it during those events. The ARRL 2-meter band plan was extended to address the 144.5-145.5 MHz segment to provide channel spacing of 20 kHz on the odd-numbered frequencies (e.g., 144.51, 144.53 MHz and so on); a maximum modulation deviation of 5 kHz for 2-meter operation is now specified (Minute 45). The problem at the high end of the band, however, seems to be much more resistant to consensus: The Plans and Programs Committee will continue its study of 15-kHz splinter channels in 146-148 MHz (Minute 46).

Finally, two hard-to-classify items: Transceivers are still being distributed for use by amateurs in developing countries under Project Goodwill; Minute 72 calls for a report at the March 1982 meeting. And the volunteers of the Intruder Watch who devote so many hours monitoring the amateur bands against intruders will receive special information from time to time, as provided in Minute 75.

This is, of course, just a once-over: Members are invited to read the full minutes of the September 10-11 meeting, which follow this article.

Assignments for the Future

Much of the League's work takes place in Standing Committees between sessions of the full Board. Some upcoming projects include: *Management and Finance* — bumper stickers, Minute 28; liability insurance for clubs, Minute 29; student/disabled member rate, Minute 57. *Membership Affairs* — ARRL emblem jewelry, Minute 61; awards credits and operating activities in the 10-MHz band, Minute 65; a central incoming QSL bureau, Minute 69; recognition of service to ARRL, Minute 101. *Plans and Programs* — (with Membership Affairs) a beginner-level periodical, Minute 76; occasional omission of propagation charts from *QST* to allow room for other DX material, Minute 95.

Moved and Seconded

MINUTES OF THE 1981 SECOND MEETING OF THE BOARD OF DIRECTORS THE AMERICAN RADIO RELAY LEAGUE, INC. September 10-11, 1981

1) Pursuant to due notice, the Board of Directors of the American Radio Relay League, Inc., met in second session at the Sheraton Hartford Hotel, Hartford, Connecticut, on September 10, 1981. The meeting was called to order at 9 A.M. with President Harry J. Dannals, W2HD, in the Chair, and the following directors present: Garfield A. Anderson, KØGA, Dakota Division; Jesse Bieberman, W3KT, Atlantic Division; Frank M. Butler, Jr., W4RH, Southeastern Divison; Lys J. Carey, KØPGM, Rocky Mountain Division; Paul Grauer, WØFIR, Midwest Division; Jay A. Holladay, W6EJJ, Southwestern Division; Mary E. Lewis, W7QGP, Northwestern Division; Edmond A. Metzger, W9PRN, Central Division; Gay E. Milius, Jr., W4UG, Roanoke Division; Leonard M. Nathanson, W8RC, Great Lakes Division; Lionel A. Oubre, K5DPG, Delta Division; A. Mitchell Powell, VE3OT, Canadian Division; William J. Stevens, W6ZM, Pacific Division; John C. Sullivan, W1HHR, New England Division; Raymond B. Wangler, W5EDZ, West Gulf Division; Stan Zak, K2SJO, Hudson Division. Also in attendance, as members of the Board without vote, were Carl L. Smith, WØBWJ, 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 nonparticipating observers, were the following vice directors: Kenneth A. Ebneter, K9EN, Central Division; Linda S. Ferdinand, N2YL, Hudson Division; Ross W. Forbes, WB6GFJ, Pacific Division; Evelyn Gauzens, W4WYR, Southeastern Division; John C. Kanode, N4MM, Roanoke Division; O.D. Keaton, WA4GLS, Delta Division; Peter F. Matthews, WB6UIA, Southwestern Division; and Hugh A. Turnbull, W3ABC, Atlantic Division. There were also present Honorary Vice Presidents Robert York Chapman, W1QV, and Victor C. Clark, W4KFC; General Counsel Robert M. Booth, Jr., W3PS; Canadian Counsel B. Robert Benson, QC, VE2VW; Chris Imlay, N3AKD, Assistant to General Counsel Booth; Assistant General Manager David Sumner, K1ZZ; Technical Department Manager Doug DeMaw, W1FB; and Washington Area Coordinator Perry F. Williams, W1UED.

2) The Assembly observed a moment of silence in recollection of Honorary Vice President and Past Treasurer David H. Houghton and Past Vice Director Donald B. Morris, W8JM, and other ARRL members who had become Silent Keys since the March meeting of the Board.

3) The Chair welcomed new Vice Director Ross W. Forbes, WB6GFJ, to the meeting.

4) Without dissent the agenda was adopted as proposed.

5) On motion of Mr. Sullivan, seconded by Mr. Zak, it was unanimously VOTED that the Minutes of the 1981 Annual Meeting of the Board of Directors are approved in the form in which they were issued by the Secretary. During the course of the above, Counsel Bruce Lutsk joined the meeting at 9:10 A.M.

6) The President submitted a report covering activities since the March Board of Directors meeting including the ongoing discussions re 1980 Central Division election; his attendance at the IARU Region 1 Conference in Brighton, England; participation as an ex officio member of the Long-Range Planning Committee; Plain Language rewrite of the FCC amateur rules; and significant changes in commissioners and staff at FCC. In oral comment, the President mentioned that a forthcoming meeting with Chairman Fowler had been postponed from September 16 to a date in October. He observed that relations with the government seemed to be looking up. There was a need for more public-relations activity, especially as concerns hamfests and conventions. The new computer is on the line at Headquarters; eventually it will help identify members making service requests.

7) First Vice President Smith highlighted his written report, covering membership contact travel; the July 8-11 Region 2 IARU Executive Committee Meeting in Bermuda; work with the Plans and Programs Committee, the Executive Committee and the Interference Task Force (ITF) and its new interference manual; and a proposal for a new form of recognition of past service to ARRL at a level below that of honorary vice president. Mr. Smith called upon Honorary Vice President Clark, who also serves as President of IARU Region 2, for additional comments concerning IARU affairs in the Western Hemisphere.

8) Vice President Price presented a brief written report covering attendance at a hamfest in Little Rock, his work on the Long-Range Planning Committee and the importance of careful consideration of the Phase II Long-Range Planning Committee Report during the Board meeting.

9) Vice President Arnold presented a brief oral report covering his work with the Management and Finance Committee and attendance at a hamfest in Kingsport, Tennessee.

10) International Affairs Vice President Eaton, who also serves as President of IARU, dealt with the affairs of the world body in his written report. The Region 1 Conference in Brighton, England, was covered in considerable detail including its discussions on restructuring of IARU, future use of 10.1 MHz and amateur emergency work in Europe. A further meeting on the latter subject is being held in Sicily concurrent with the Board of Directors Meeting; Communications Manager John Lindholm, W1XX, is representing ARRL and IARU Headquarters at that meeting. IARU societies in Andorra and San Marino have been admitted to Union membership; societies in Djibouti and Bangladesh have applied for membership. Principal ITU activity since March was a meeting of a working group that examined the question of a fourth world region covering the continent of Africa. The Mobile WARC scheduled for the spring of 1982 has been postponed at least until the spring of 1983. Arrival of a new IARU assistant at Headquarters, Nao Akiyama, JH1VRQ, has been delayed by immigration "red tape."

11) General Manager Baldwin presented an oral report covering the financial outlook for the remainder of 1981 for ARRL; IARU and ITU affairs including CCIR meetings, IARU restructuring and international emergency communications; membership, with sub-topics on the effects of the dues increase, heavy influx of term members just before it, the new senior citizens membership and the need for study of a youth membership rate; the Central Division problem; possible division of legal counsel responsibilities with one attorney covering communications, another covering corporate affairs; and publications matters focusing on technical staffing at Headquarters, the forthcoming experimenters newsletter to be called *QEX*, and the new edition of *Tune in the World*. The Board was in recess from 10:35 until 10:54 A.M.

12) The Treasurer's report, in the absence of Mr. McCobb because of work commitments, was received and placed on file. Primarily it covered investment strategies currently in force for ARRL's surplus funds.

13) General Counsel Booth presented a report covering changes in the Federal Communications Commission; work of his office in support of Senate Bill 929 and House Bill 2203; the frequency and scope of contact with key members of FCC staff; legal problems related to the Articles of Association and By-Laws; local antenna cases; and preparation of a draft legal kit presented to the Executive Committee for comment at its meeting the day previous.

14) Associate Counsel Benson reported that his work involved the filing of comments on behalf of the Canadian Radio Relay League in proceedings of the Department of Communications; tower cases; an attempt to broaden the exemption of Amateur Radio equipment from Canadian tariff; and the successful appeal in the Forbes case wherein an amateur had been convicted of violating an anti-noise ordinance.

15) Robert York Chapman, W1QV, as President, reported on the ARRL Foundation, summarizing its activities since the March meeting and noting that a check for some $56,000 had been presented by Treasurer George duPont, WA1SVY, to the Radio Amateur Satellite Corporation (AMSAT) for construction of Phase III-B.

16) The Assembly was in recess for luncheon from 12:30 to 1:35 P.M., reassembling in the same place with all persons hereinbefore mentioned present.

17) Canadian Radio Relay League President Powell covered proposals for expanded privileges on the 160-meter band, similar to those in the U.S.; problems with the new syllabus developed by the Department of Communications; repeaters being newly allowed on 29 MHz in Canada; the future availability of privileges in 10.1-10.15 MHz; a new reciprocal operating agreement with Australia; problems with the Canadian Government interpretation of standards for reciprocal operating; and services to Canadian members being offered by volunteers in the London, Ontario, area.

18) Mr. Bieberman, as Chairman, presented the report of the Plans and Programs Committee. On motion of Mr. Milius, seconded by Mr. Grauer, after discussion, unanimously VOTED that ARRL petition FCC to expand the frequency allocation for General class operators in the 75-meter phone band to read 3860-4000 kHz. Mr. Powell abstained.

Lys Carey, KØPGM, ponders a document that someone has just handed him during a break in the meeting.

19) On motion of Mr. Bieberman, seconded by Mr. Grauer, unanimously VOTED that the Board withdraw entirely its previously passed motion to petition FCC to open 7075-7100 kHz to Extra Class phone operation. Mr. Powell abstained.

20) Mr. Sullivan, as Chairman, presented the report of the Membership Affairs Committee. On motion of Mr. Price, seconded by Mr. Sullivan, after extended discussion, VOTED that the General Manager establish separate price schedules for ARRL publications (excepting the *Handbook*) when such publications are purchased from League Headquarters by League members, this policy to be effective not later than January 1, 1983.

21) Moved by Mr. Nathanson, seconded by Mr. Sullivan, that effective July 1, 1982, purchases of all membership identification material, i.e., pins, patches, decals, flags, etc., be restricted to League members and affiliated clubs. But the motion was defeated, 7 votes in favor to 9 opposed.

22) Moved, by Mr. Sullivan, seconded by Mr. Nathanson, that material presently available to all amateurs such as operating aids, contest logs, net directories, etc., be made available, effective July 1, 1982, only to ARRL members with no additional costs other than postage. Nonmembers may obtain such materials from ARRL for an additional charge plus postage, such charge to be determined by the General Manager. Moved, by Mr. Stevens, seconded by Mr. Milius, that the matter is laid on the table. A tie vote was found to exist, which was broken by the President voting in favor of tabling.

23) On motion of Mrs. Lewis, seconded by Mr. Nathanson, unanimously VOTED that the General Manager accept and display a plaque from the Clark County Amateur Radio Club of Vancouver, Washington, that commemorates amateurs, selected by the club, who have lost their lives in public service. The General Manager shall confer with the Clark County Club about size and display location prior to acceptance.

24) On motion of Mr. Carey, seconded by Mr. Sullivan, unanimously VOTED that the General Manager provide a plaque, similar to the 50-year award, to those having been a member of the ARRL for 60 years.

25) Mr. Sullivan distributed, on behalf of the Membership Affairs Committee, a questionnaire concerning the future of the "Hall of Fame." The Board was in recess from 3:15 to 3:30 P.M.

26) On motion of Mrs. Lewis, seconded by Mr. Sullivan, unanimously VOTED that the General Manager supply for sale to members a large ARES emblem suitable for application to a jacket and another for application to "T shirts."

27) On motion of Mr. Sullivan, seconded by Mr. Bieberman, it was unanimously VOTED that the ARRL Pewter Cup Technical Excellence Award for the best *QST* article of 1980 be awarded to David Geiser, WA2ANU, for his July 1980 article, "The Impedance Match Indicator." And further that Honorable Mention be given to the remaining candidates for their *QST* articles. They are Roy Lewallen, W7EL, for his August 1980 "Optimized QRP Transceiver," and authors O. G. Villard, Jr., W6QYT, D. B. Muldrew, and F. W. Waxham, Jr., K7DS, for their October 1980 article, "The Magnetospheric Echo Box."

28) Mr. Wangler, as Chairman, presented the report of the Management and Finance Committee. The Committee had discussed sales of bumper stickers to set up a legal defense fund, but the proposal was kept in committee pending development of a suitable slogan.

29) Moved, by Mr. Grauer, seconded by Mr. Carey, that ARRL offer liability insurance to ARRL affiliated clubs with up to $1 million coverage. After extended discussion, on motion of Mr. Sullivan, seconded by Mr. Metzger, the motion was recommitted to the Management and Finance Committee.

30) Moved, by Mr. Metzger, seconded by Mr. Wangler, that in order to avoid possible tax problems for both individual clubs and the League, and to avoid any requirement that the League suitably register to do business in each of the 50 states, the League continue to market its publications not only by direct mail but also through the network of Amateur Radio dealers and book sellers who act as independent businesses. After extended discussion, on motion of Mr. Anderson, seconded by Mrs. Lewis, VOTED that the matter is laid on the table.

31) Moved, by Mr. Arnold, seconded by Mr. Zak, that the provisions for the issuance of Life Memberships authorized in By-Laws 1(c) and 1(d) be suspended, effective December 31, 1981, until further notice, provided that valid applications for Life Membership received on or before that date will be honored, and that all of the rights, privileges and benefits to existing Life Members will continue as before. After extended discussion, a roll-call vote being required, the question was decided in the negative, with Messrs. Metzger, Wangler and Zak voting in favor and all other directors voting opposed. So the motion was LOST.

32) Moved, by Mr. Grauer, seconded by Mr. Wangler, that the Board establish two offices of legal counsel in the U.S. — the one to serve as communications counsel and provide the League with the specialized counsel that it requires in the field of communications law, and the other to serve as corporate counsel and provide the League with the legal counsel required in all areas other than the specialized field of communications law. After discussion, on motion of Mr. Nathanson, seconded by Mr. Sullivan, VOTED, 10 votes in favor to 6 opposed that the matter is laid on the table. During the course of the above, Mrs. Gauzens substituted briefly for Mr. Butler.

33) On motion of Mr. Butler, seconded by Mr. Wangler, it was unanimously VOTED that the General Manager investigate procedures to be utilized in the future for standing committee meetings in order to reduce costs. This investigation should include (a) picture phone meeting service, (b) joint meetings between two or more committees when members serve on both committees and (c) geographical location, taking into account special or reduced housing and airline rates. Recommendations shall be presented to the Board at its annual meeting in 1982. During the course of the above, Mr. Forbes substituted briefly for Mr. Stevens.

34) Mr. Clark, as Chairman, presented the report of

Left to right, Canadian Director VE3OT and K1ZZ listen to WB6UIA making a point.

the Long-Range Planning Committee, supplementing with brief oral remarks the extensive Phase II written report that had been previously distributed to members of the Board.

35) Mr. Holladay, as Chairman, presented the report of the Amateur Satellite Service Council covering the expected launch on September 20 of the UoSAT Experimental Amateur Satellite and the planned Phase III-B launch in 1982 as part of an Ariane mission.

36) Mr. Turnbull, as liaison, presented the report of the RFI Task Group. On motion of Mr. Bieberman, seconded by Mr. Milius, the following resolution was unanimously ADOPTED:

WHEREAS, Harold Richman, W4CIZ, has served as technical advisor to the ARRL RFI Task Group since its inception, and

WHEREAS, he has dedicated countless hours of personal time in communication with manufacturers of home entertainment equipment to produce the RFI assistance lists, and

WHEREAS, these lists have been a significant help to amateurs and the public, now therefore

BE IT RESOLVED, that the Board of Directors heartily commends Harold Richman, W4CIZ, for his untiring efforts and further orders that a plaque commemorating this action be prepared and be presented to him at a suitable meeting in the Washington area.

37) Mr. Wangler, as Chairman, presented the report of the Committee on the Biological Effects of Radio Frequency Energy. On motion of Mr. Wangler, seconded by Mr. Anderson, unanimously VOTED that the ARRL Technical Advisor Program be extended to include those qualified members of the Biological Effects of Radio Frequency Energy Committee and that they be accorded the same rank and privileges as our present TA's.

38) The Board was in recess for dinner at 5:40 P.M., reassembling a 8:11 P.M., with all persons hereinbefore mentioned in attendance.

39) Mr. Butler, as Liaison, spoke briefly for the VHF Repeater Advisory Committee.

40) In the absence of Vice Director Olson, Liaison, the report of the Contest Advisory Committee was received and placed on file. The report shows that the committee did not accept a proposal to change scoring in the IARU Radiosport Contest; showed a small preference for allowing 30 hours operation by multi-operator stations in the November Sweepstakes while noting problems this change might cause clubs; endorsed a proposal to provide at cost a certificate of participation in contests; defeated a proposal to change scoring of the 10-meter contest; and accepted two proposals for status quo in Field Day.

41) Mr. Kanode, as Liaison, presented the report of the DX Advisory Committee. Moved, by Mr. Milius, seconded by Mr. Sullivan, that, in accordance with the recommendation of the DX Advisory Committee, and on a future date to be established by the ARRL Awards Committee, the DXCC awards shall be made subject to the following guidelines: (A) Valid contacts for all single-mode DXCC awards shall require that the applicant both transmit and receive in the same mode with the confirming station. (b) QSL cards must indicate the mode for which credit is being claimed; those indicating a cross-mode contact will not be acceptable. After discussion, moved by Mr. Bieberman, seconded by Mr. Holladay, that the matter is laid on the table, but the motion to table was rejected, 5 votes in favor to 11 opposed. After further discussion, a roll call vote being requested, the question was decided in the AFFIRMATIVE, with 9 votes in favor, 4 opposed, and 3 abstentions. Messrs. Butler, Grauer, Milius, Nathanson, Oubre, Powell, Sullivan, Wangler and Zak, voted Aye; Messrs. Anderson, Bieberman, Holladay and Stevens, voted Nay; and Messrs. Carey and Metzger, and Mrs. Lewis, abstained.

42) Mr. Sullivan, as Liaison, spoke briefly for the Emergency Communications Advisory Committee, reporting that the Committee did not support a proposal to establish an emergency fund at Headquarters. Revision of the EC Workbook is proceeding very slowly without much input from the field.

43) Mr. Holladay, as Liaison, spoke briefly for the VHF/UHF Advisory Committee, which feels a band plan is necessary for 23 cm but has not yet produced one for that band or for 50 MHz as requested at earlier meetings.

44) Mr. Zak, as Liaison, presented the report of the Public Relations Advisory Committee. The Committee presented results of a survey and recommended that it be used as the basis for revitalization of field public relations work. The Committee further recommended development of a display booth, easily portable, which would promote Amateur Radio on the community level. Finally, the Advisory Committee recommended establishment of public relations networks on the air.

45) Moved, by Mr. Oubre, seconded by Mr. Butler, that the Board adopts the following changes to the 2-meter band plan: (1) On the 144.5-145.5 MHz repeater sub-band, a channel spacing of 20 KHz on the odd numbered frequencies (e.g. 144.51, 144.53, etc.) is adopted. (2) To assure minimum adjacent channel interference on the 2-meter repeater sub-bands, a maximum modulation deviation of 5 kHz is adopted. After discussion, moved, by Mr. Zak, seconded by Mr. Sullivan, that the matter be referred to the VHF Repeater Advisory Committee, but the motion was LOST. Whereupon, the question being on the main motion, the same was ADOPTED.

46) On further motion of Mr. Oubre, seconded by Mr. Butler, VOTED that the Plans and Programs Committee in conjunction with the Headquarters staff continue the study of the 15-kHz splinter channel problem. Mrs. Lewis requested to be recorded as voting no.

47) Moved, by Mr. Nathanson, seconded by Mr. Price, that there be created a class of membership to be designated as "Student Membership," at a rate of $15 per year; that this membership shall be renewable until the amateur reaches the age of 18 years; the student member shall have full privileges except the "Student Member" shall not be eligible to be elected to office. On motion of Mr. Holladay, seconded by Mr. Sullivan, VOTED that the matter is laid on the table.

48) On motion of Mr. Zak, seconded by Mr. Powell, unanimously VOTED that the Board of Directors accepts with appreciation the Phase II Report of the ARRL Long-Range Planning Committee and compliments the members of the Committee for their diligence and thoroughness in carrying out a difficult assignment.

49) On motion of Mr. Grauer, seconded by Mr. Butler, after discussion unanimously VOTED that the General Manager cannot spend more than $25,000 on capital improvements if not in the budget, without the approval of the Management and Finance Committee.

50) On motion of Mr. Sullivan, seconded by Mr. Zak, VOTED, at 9:48 P.M. that the Board resolve itself into a Committee of the Whole, for the purpose of discussing the Executive Committee actions in the Central Division election problem. The Committee rose and reported to the Board at 10:35 P.M. At this point, the Board recessed for the night, reconvening on September 11 at 8:36 A.M., at the same place with all persons hereinbefore mentioned present.

51) Moved by Mrs. Lewis, seconded by Mr. Zak, that the General Manager is directed to apply increased staff attention to the Intruder Watch Program, with the specific objectives of establishing clear program goals, reporting procedures and organization, employing the assistance of volunteer members of the Intruder Watch Program. Further, that the General Manager is requested to provide each director with a current list of IW program volunteers, their functions and the guidelines under which the program now operates. After discussion on motion of Mr. Grauer, seconded by Mr. Sullivan, VOTED that the matter is laid on the table, Mrs. Lewis requested to be recorded as voting opposed to tabling.

52) On motion of Mr. Stevens, seconded by Mr. Powell, VOTED that the General Manager investigate the possibility of providing, during the ARRL Board of Directors Meeting, an excellent quality overhead projector and necessary supplies for making overhead projections of directors' motions as proposed during the meeting. These acetate projections of motions would be displayed on a screen during the period of their discussion and voting procedure.

53) On motion of Mr. Milius, seconded by Mr. Nathanson, VOTED that, effective on a date to be determined by the Communications Manager, suitable certificates be awarded to those qualifying for the five-band DXCC and five-band WAS awards, and that plaques for these awards be provided at cost to the applicants should they desire them.

54) On motion of Mr. Butler, seconded by Mr. Oubre, unanimously VOTED that the General Manager is directed to develop (1) a program for encouraging preparation, from sources within the membership, of a greater number of articles describing simple but engaging technical projects and (2) a procedure for their subsequent refinement and publication in a form facilitating effective distribution to clubs and individuals, with a report describing this process to be made to the Board of Directors at its first 1982 meeting.

55) On motion of Mr. Holladay, seconded by Mr. Zak, after discussion, VOTED that the ARRL Board of Directors endorses in principle the program recommended by the Long-Range Planning Committee in its Phase II Report to improve the efficiency and effectiveness of the ARRL organizational structure through creation of the post of Section Manager for each of the 73 ARRL sections, creation of division steering committees and redesign of the Advisory Committees to provide for one member from each ARRL division; further, the Board of Directors instructs the General Manager, with the assistance of the Membership Affairs Committee and the Long-Range Planning Committee, to proceed with development of specific plans, cost information and timetables for implementation of this improvement program, with the objective of making a full report and appropriate recommendations for action to the Board of Directors at its first 1982 meeting.

56) Moved by Mr. Wangler, seconded by Mr. Grauer, that the Board of Directors adopt a policy that all future motions containing changes and/or modifications to the Articles of Association and By-Laws of the American Radio Relay League must be submitted for review of all members of the Board of Directors not later than 30 days prior to the Board meeting at which the motion is to be considered for action. This is felt to be a minimum time allowable for the Board members and the legal counsel representing the ARRL to carefully review and study the proposed revision of the Articles of Association and By-Laws. This action to become effective at the close of this Board Meeting, September 11, 1981. After discussion, moved by Mr. Carey, seconded by Mr. Bieberman, to amend the motion by substituting "15 days" for "30 days." But, after discussion, on motion of Mr. Nathanson, seconded by Mr. Zak, VOTED that the matter is laid on the table.

57) On motion of Mr. Bieberman, seconded by Mr. Holladay, unanimously VOTED that the Management and Finance Committee study the possibility of instituting a reduced-cost membership for students and disabled persons with limited incomes, similar to that now in effect for members over 65 years of age, and to report on this at the next Board meeting.

58) Moved by Mr. Powell, seconded by Mr. Nathanson, to remove from the table Mr. Nathanson's motion concerning student membership. But, a roll call vote being requested, the motion was LOST, with 7 votes in favor and 9 opposed. Messrs. Anderson, Milius, Nathanson, Oubre, Powell and Stevens, and Mrs. Lewis, voted in favor of removing the earlier motion from the table; all other directors voted opposed.

59) Moved by Mr. Metzger, seconded by Mr. Sullivan, that By-Law 20 be amended by striking the text and substituting therefor the following: "20. In accordance with the provisions of Article 7 of the Articles of Association, members of a territorial division may petition for recall of the director of their division for malfeasance or misfeasance in office. The recall petition shall state the reasons for recall in detail and be presented to the Secretary not later than June 1st of the second year of the term of office. A valid petition shall contain the signatures of not less than 10 percent of the number of Full members voting in the election at which the director was elected or not less than 10 percent of the Full members resident in the division on the preceeding December 31st if the director was elected without membership balloting. Upon certification by the Executive Committee that the petition states valid and appropriate grounds for recall and contains the required number of members' signatures, the Secretary shall prepare a ballot asking the single question, "Shall the Director be recalled, yes or no." If a majority of the Full members of the Division cast their votes in favor of recall, then the office of director shall be declared vacant. No director shall be subject to more than one recall during a single term of office." But, after discussion, on motion of Mr. Holladay, seconded by Mr. Oubre, VOTED that the matter is laid on the table.

60) On motion of Mr. Oubre, seconded by Mr. Nathanson, unanimously VOTED that the General Manager is instructed to proceed with development of procedural material containing guidelines for use by local clubs and other amateur groups in providing public service communications at local events such as walkathons, fairs, parades, motor car rallies and boat races, including activities that are permissible to radio

amateurs, safeguards that should be observed, and acquiring proper publicity; further, that this material should be assembled, insofar as possible, employing input from sources within the membership, with proper credit being given to contributors.

61) On motion of Mr. Nathanson, seconded by Mr. Oubre, unanimously VOTED that there be referred to the Membership Affairs Committee the task of investigating the feasibility of creating a line of jewelry containing the League Diamond which will be suitable for female members and spouses.

62) Moved by Mr. Zak, seconded by Mr. Nathanson, that a Ways and Means Committee is established. This Committee shall assign directors' motions to the appropriate Committee for recommendation and action to the Board at the beginning of each Board meeting session. The Ways and Means Committee shall be comprised of the Chairperson of each of the Board Standing Committees and chaired by the President of the League. The procedures shall be established as follows: (1) At the beginning of each Board meeting, on the first day, after the reports of the officers and committees are provided, all directors' motions shall be provided to the Ways and Means Committee. (2) The Board shall recess while the Committee delegates the motions to the appropriate committees. (3) The Board shall reconvene, and the President shall assign the motions to the various Board Committees as recommended by the Ways and Means Committee. (4) The Board shall again recess for the first day, and the appropriate Committees shall discuss the motions and consider recommendations to the Board. (5) On the second day the Board shall reconvene to consider the recommendations of the Committees. (6) Once submitted to the Committee, the motions become a Committee motion and shall be introduced as, e.g., "The Plans and Programs Committee moves that the. . . ." After discussion, on motion of Mr. Nathanson, seconded by Mr. Grauer, unanimously VOTED that the matter is referred to an appropriate committee for study. During the course of the above, the Board was in recess from 9:51 to 10:10 A.M.

63) On motion of Mr. Sullivan, seconded by Mr. Grauer, VOTED that the General Manager instruct the Communications Department to reassess the usefulness of the present RST system of cw signal reporting, with specific attention to be given the possibility of discontinuing the ineffectual tone report in the interest of conservation of transmission time and frequencies.

64) On motion of Mr. Stevens, seconded by Mr. Zak, unanimously VOTED that the General Manager investigate and report to the Board of Directors within 90 days the cost and practicability of renting or purchasing a portable sound system with a mixer system for 6 to 10 microphones and extension speakers. This system would be used at future meetings by the members of the Board of Directors and Officers while seated at their regular places at the Boardroom table.

65) On motion of Mr. Milius, seconded by Mrs. Lewis, VOTED that the Membership Affairs Committee is instructed to review, in cooperation with the General Manager, the question of awards credits to be offered and operating activities to be encouraged in connection with the new 10-MHz band.

66) The Board was in recess from 10:28 to 10:46 A.M.

67) Moved by Mr. Carey, seconded by Mr. Milius, that the Board now resolve itself into a Committee of the Whole to discuss By-Law 20. On motion of Mr. Metzger, seconded by Mr. Nathanson, VOTED that the matter is laid on the table.

68) On motion of Mr. Holladay, seconded by Mr. Oubre, after discussion, unanimously VOTED that, in order to encourage harmonious use of the band, the band plan for 160 meters proposed in August *QST* is adopted with the following clarifications: (1) Cw stations are urged to operate below 1825 kHz and phone stations above 1855 kHz, with the segment 1830-1850 kHz to be used only when other available frequencies are occupied. In such circumstances, cw occupancy would begin at the bottom of the segment, and phone at the top. Nets and other regularly scheduled activity should avoid this segment. (2) Phone stations are urged to maintain a minimum of 3-kHz separation between their carrier frequency and the edge of any DX window. (3) The plan is subject to review when the FCC acts on its proposal in Docket 80-739 concerning 1900-2000 kHz. Effective December 1, 1981, participants in ARRL contests and other League-sponsored operating activities will be required to adhere to this plan. At all times, voluntary adherence by all amateurs will be strongly encouraged.

69) On motion of Mr. Wangler, seconded by Mr. Nathanson, unanimously VOTED that the Membership Affairs Committee study the feasibility of establishing a central incoming QSL bureau at ARRL Headquarters for the purpose of receiving QSL cards from overseas QSL bureaus and individual foreign amateurs for forwarding to the domestic volunteer operated call area QSL bureaus.

70) On motion of Mr. Bieberman, seconded by Mr. Holladay, unanimously VOTED that the General Manager is instructed to seek, from sources within the membership, contribution of a greater number of articles focusing upon home maintenance and repair techniques, as well as modification for improved performance of commercially available Amateur Radio equipment, offering appropriate incentives to authors of such articles.

71) On motion of Mr. Metzger, seconded by Mr. Holladay, unanimously VOTED that the Management and Finance Committee, employing all available resources, explore and develop practical options for establishing a more continuous Washington presence for ARRL, with a report and recommendations to be made to the Board of Directors at its second 1982 meeting.

72) On motion of Mr. Nathanson, seconded by Mr. Oubre, unanimously VOTED that the General Manager is directed to continue the report on Project Goodwill and to present the Board with the report at the first meeting of 1982.

73) Moved by Mr. Zak, seconded by Mr. Grauer, that the General Manager is directed to appoint a Headquarters liaison to work with each National Convention Committee. The Headquarters liaison shall attend at least one organizational meeting of the Convention Committee, at an early stage of planning, to insure the Committee understands and will conform to the League's rules for the convention and to provide advice and guidance when requested. Further, that the Convention Committee Chairman shall provide periodic reports on the progress of the convention to the director of the division and the Executive Committee of the League. After discussion, on motion of Mrs. Lewis, seconded by Mr. Sullivan, VOTED that the matter is laid on the table.

74) Moved by Mr. Sullivan, seconded by Mr. Grauer, to amend Article 6 concerning the Executive Committee by adding the sentence, "The term of office shall be for one year or until their successors are elected," after the first sentence. A roll call vote being required, the motion was ADOPTED, with 15 directors voting in favor and 1 opposed. Mr. Anderson voted opposed; all other directors voted in favor.

75) On motion of Mrs. Lewis, seconded by Mr. Stevens, VOTED to remove the earlier motion concerning the Intruder Watch from the table. On further motion of Mrs. Lewis, seconded by Mr. Holladay, unanimously VOTED to amend the motion by striking the text and substituting therefor the following: Moved that, in order to provide additional encouragement to those many dedicated individuals who devote so many hours of volunteer time in monitoring the amateur bands for those unauthorized intruders who cause harmful interference, the General Manager is directed to periodically share amongst the Intruder Watchers, with copies to directors, such current information as will enhance the operation of the Intruder Watch. The question then being on the motion as amended, the same was unanimously ADOPTED.

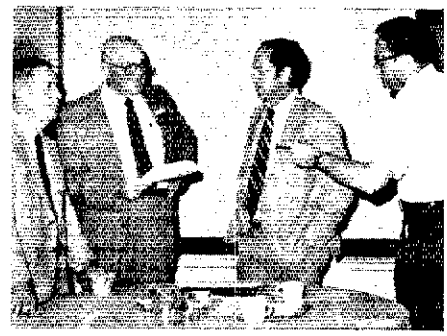
76) On motion of Mr. Milius, seconded by Mr. Nathanson, VOTED that the General Manager is instructed to study, in cooperation with the Membership Affairs Committee and the Plans and Programs Committee, the feasibility of publishing a new periodical devoted to beginners and Novice-level amateurs, and to make appropriate recommendations to the Board of Directors at its first 1982 meeting.

77) On motion of Mr. Wangler, seconded by Mr. Milius, unanimously VOTED that the Board of Directors instructs the General Manager, employing assistance from the Long-Range Planning Committee, to proceed with development of detailed plans for possible future creation of a higher class of affiliation for those clubs meeting prescribed standards for the maintenance of effective programs to protect, promote and advance Amateur Radio; further, that this program follow the general guidelines set forth in the Phase II report of the LRPC, and that the timetable and details of the implementation of this program be routinely coordinated with the Membership Affairs Committee.

78) On motion of Mr. Bieberman, seconded by Mr. Butler, unanimously VOTED that the General Manager, General Counsel and Washington Area Coordinator are instructed to seek from the Congress, the Federal Communications Commission and other federal agencies, clear written declarations of policy expressing a Federal governmental interest in the effective, reliable operation of Amateur Radio stations, in the public interest.

79) On motion of Mr. Nathanson, seconded by Mr. Grauer, at 12:08 P.M., unanimously VOTED that the Board is now in recess. The meeting resumed after luncheon at 1:42 P.M., with all persons hereinbefore mentioned present. At this point, Membership Services Manager Harold M. Steinman, K1FHN, joined the meeting.

80) Moved by Mr. Nathanson, seconded by Mr. Butler, that By-Law 15 be amended to read: "In any election, no candidate who has been certified to be placed on the ballot may be removed as a candidate until the ballots have been counted." After discussion, on motion of Mr. Anderson, seconded by Mr. Nathanson, unanimously VOTED that the matter is referred to an appropriate committee for study.



Canadian Counsel VE2VW points a finger while listening. From the left are Atlantic Vice Director W3ABC, Dakota Director KØGA and Corporate Counsel Lutsk.

81) On motion of Mr. Zak, seconded by Mr. Grauer, VOTED that the DX Advisory Committee study the viability of existing organized international operating activities and whether changes in structure or emphasis may be required.

82) On motion of Mr. Grauer, seconded by Mr. Sullivan, unanimously VOTED that the President continue to take all appropriate steps to urge the FCC to conduct amateur exams at hamfests and conventions.

83) On motion of Mr. Stevens, seconded by Mr. Sullivan, unanimously VOTED that the General Manager guide a study to develop a volunteer certification program providing for training, qualification and formal recognition of amateur achievement in the field of emergency communications; this program would be implemented through the local clubs and volunteer amateurs with the continuing support of ARRL Headquarters, and to be in accordance with recommendations outlined in the Phase II report of the Long-Range Planning Committee.

84) On motion of Mr. Smith, seconded by Mr. Carey, it was unanimously VOTED that the language of existing Standing Order No. 95, relative to the selection of Honorary Vice Presidents, be replaced by the following:

"Distinguished members of the League may be elected as Honorary Vice Presidents of the League in order to recognize their outstanding contribution to ARRL and Amateur Radio. Candidates may be nominated in accordance with the following criteria.

Service Eligibility: (a) Volunteers: Not less than 20 years of service as an official of the League, elected either by the Board or the membership. (b) Staff: Not less than 30 years of service to the League, which could include prior or subsequent service as an elected official, similar to (a) above.

Achievement Eligibility: (a) Volunteers: Must have made an exceptionably notable contribution to the health and strength of ARRL which is clearly and demonstrably above and beyond the call of duty. Must have demonstrated leadership among leaders. (b) Staff: Must have contributed significantly, above and beyond the call of duty, to the efficiency and unity of League affairs.

General Considerations: (a) There shall be an upper limit of 10 Honorary Vice Presidents. (b) Not less than 60 days before the election of Honorary Vice Presidents, which will take place only at those Annual meetings in which other officers of the League are elected, the officer or director making a nomination must supply a written biographical sketch to the Executive Committee. This sketch shall fully substantiate the candidate's term of qualifying service and shall spell out in detail the candidate's extraordinary accomplishments that justify election as an honorary vice president. The Executive Committee shall screen the nominations and forward to the entire Board only those nominations that the committee feels strictly meet the criteria. (c) No nominations will be accepted by the Executive Committee if there is no current vacancy. (d) No elected official of the League or member of the staff may serve simultaneously as an Honorary Vice President."

85) On motion of Mr. Butler, seconded by Mr. Holladay, unanimously VOTED that the General Manager is requested to petition the FCC to permit

"automatic control" of beacon stations operating in accordance with recognized band plans.

86) On motion of Mr. Holladay, seconded by Mr. Butler, unanimously VOTED that the General Manager is directed to file comments with FCC in the Further Notice of Proposed Rulemaking in General Docket 80-135 (inland nongovernment radiolocation) in accordance with staff recommendations contained in Directors' Letter No. 1776 of August 18, 1981.

87) On motion of Mr. Arnold, seconded by Mr. Zak, unanimously VOTED, at 2:38 P.M., that the Board resolve itself into a Committee of the Whole for the purpose of discussing procedural matters relating to membership balloting. The Committee arose and reported to the Board at 4:20 P.M. During the course of the above, the Committee was in recess from 3:17 to 3:37 P.M., at which point Mr. Williams departed from the meeting. Moved by Mr. Arnold, seconded by Mr. Holladay, that the report of the Committee of the Whole is adopted. A roll call vote being requested, there were 11 votes in favor, 4 opposed, and 1 abstention; so the report was ADOPTED. Messrs. Milius, Nathanson and Stevens, and Mrs. Lewis, voted opposed; Mr. Metzger abstained. All other directors voted in favor. At this point Mr. Dannals relinquished the Chair to First Vice President Smith.

88) On motion of Mr. Milius, seconded by Mr. Butler, unanimously VOTED that the Management and Finance Committee study the feasibility of extending the installment or time payments for Life Membership to 3 years to lessen financial burden on the applicants.

89) On motion of Mr. Butler, seconded by Mr. Grauer, unanimously VOTED that the General Manager is requested to promulgate, through the pages of *QST* and other appropriate publications, guidelines regarding phone-patch activities adopted by the IARU Region 2 organization in October 1980. Further, that frequencies recommended by the IARU Region 2 organization for phone-patch operations be promulgated at intervals in League publications.

90) On motion of Mr. Holladay, seconded by Mr. Wangler, VOTED that the tenure of the Long-Range Planning Committee be extended to the end of the month in which the first Board Meeting of 1982 is held, and that the sum of $4000 is authorized to cover committee operating expenses during the calendar year 1982.

91) On motion of Mr. Wangler, seconded by Mr. Holladay, unanimously VOTED that the Board expresses its appreciation to the DX Advisory Committee for its efforts in combatting unethical operating and QSL practices that reflect poorly on the Amateur Radio Service, and urges continued attention be paid to these problems in the work of the Committee and in the pages of *QST*.

92) On motion of Mr. Bieberman, seconded by Mr. Wangler, unanimously VOTED that the General Manager is instructed to file comments in the Further Notice of Inquiry, General Docket 78-369, concerning Radio Frequency Interference. The comments shall express the League's view that the right of radio amateurs to operate stations of good engineering design shall not be infringed because of the interception of amateur signals by home entertainment equipment, or other equipment not intended to receive Amateur Radio signals, that is insufficiently filtered or shielded, or otherwise lacking in the necessary selectivity to operate as intended.

93) On motion of Mr. Powell, seconded by Mr. Nathanson, unanimously VOTED that, upon the request of any director, there shall be furnished to each director a written copy of any motion prior to a vote on that motion.

94) Moved by Mr. Nathanson, seconded by Mrs. Lewis, adoption of the following resolution:

WHEREAS the Executive Committee has directed a statement by the League to be included in the envelope with the recall ballot for the recall of the Central Division Director;

MOVED that the said statement of the League shall be solely procedural, and no comments shall be included as to merits.

But, after discussion, a roll call vote being requested, the motion was DEFEATED with 6 votes in favor and 10 opposed, Messrs. Bieberman, Carey, Milius, Nathanson and Stevens, and Mrs. Lewis, voted in favor; all other directors voted opposed.

95) Moved by Mr. Butler, seconded by Mr. Oubre, that on occasion, the propagation charts carried in *QST* be deleted to make space available for other DX column material. When not carried in *QST*, charts will be available from Hq. for an s.a.s.e. After discussion, on motion of Mr. Oubre, seconded by Mr. Zak, unanimously VOTED that the matter is referred to the Plans and Programs Committee and to the staff for study.

96) On motion of Mr. Holladay, seconded by Mr. Oubre, unanimously VOTED that, notwithstanding Rule 5 of the Rules and Regulations Concerning Advisory Committees, in view of possible changes to the procedures for appointing advisory committee members, as proposed by the Long-Range Planning Committee, the President continue in effect the current committee appointments until the first 1982 Board Meeting or until a date to be set at that Board Meeting.

97) At this point, Mr. Dannals resumed the Chair. The Board was in recess from 5:37 to 8:48 P.M. for dinner, reconvening with all persons hereinbefore mentioned present except Messrs. Lutsk and Williams.

98) Vice Directors Ferdinand, Forbes, Gauzens, Kanode and Turnbull substituted for their respective directors at the table.

99) On motion of Mr. Holladay, seconded by Mr. Oubre, unanimously VOTED that the Plans and Programs Committee, working with the VHF-UHF Advisory Committee and the VHF Repeater Advisory Committee, is directed to: (a) Complete the 6-meter band plan requested at Minute 19 of the 1980 Annual Board Meeting. (b) Recommend a band plan for the 23-cm amateur band as originally requested at Minute 50 of the 1977 Annual Board Meeting. Both band plans are requested to be available for presentation at the 1982 Annual Meeting of the Board.

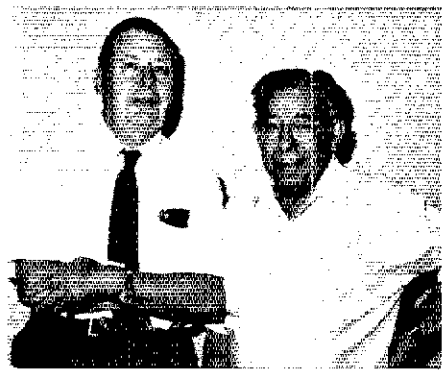
100) On motion of Mr. Anderson, seconded by Mrs. Lewis, unanimously VOTED that appreciation and thanks be extended to the League staff, and Mr. Hal Steinman as coordinator, for their fine efforts on behalf of the Interference Task Force and the production of the "Handbook for Local Interference Committees." Hopefully this will be helpful in the alleviation of interference within the amateur bands. Mr. Ebneter came to the table to substitute for Mr. Metzger.

101) On motion of Mr. Smith, seconded by Mr. Anderson, unanimously VOTED that the Membership Affairs Committee study a new category of recognition for loyal service to the League above the accepted level of obligation. Recognition of selected officials should be in the form of a certificate, suitable for framing, citing the number of years of notable service and the offices held. The report of the Committee to be made to the Board at the Annual Meeting of 1982.

102) All those present were invited to make informal remarks at the close of the meeting. There being no further business, the Board adjourned, *sine die*, at 10:23 P.M. Total time in session as a Board: 15 hours, 21 minutes; as a Committee of the Whole: 2 hours, 9 minutes; total direct authorizations: $4000.

Respectfully submitted:

Richard L. Baldwin, W1RU
Secretary



The stalwarts of the Atlantic Division — Vice Director W3ABC and Director W3KT.

The ever-popular W4WYR, Southeastern Vice Director.

MINUTES OF EXECUTIVE COMMITTEE MEETING No. 391
September 12, 1981

Pursuant to due notice, the Executive Committee of the American Radio Relay League, Inc., met at 8:59 A.M., EDST, Saturday, September 12, at the Headquarters offices of the League in Newington, Connecticut. Present were President Harry J. Dannals, W2HD, in the Chair; First Vice President Carl L. Smith, WØBWJ; Directors Gar Anderson, KØGA, Mitch Powell, VE3OT, William J. Stevens, W6ZM, and Stan Zak, K2SJO; and General Manager Richard L. Baldwin, W1RU. Also present as observers were Directors Jesse Bieberman, W3KT, Frank M. Butler Jr., W4RH, Lys Carey, KØPGM, Lionel A. Oubre, K5DPG, and Mary E. Lewis, W7QGP; International Affairs Vice President Noel B. Eaton, VE3CJ; Vice Directors Ross W. Forbes, WB6GFJ, Peter F. Matthews, WB6UIA, Linda S. Ferdinand, N2YL, and Hugh A. Turnbull, W3ABC; General Counsel Robert M. Booth, Jr., W3PS, and Chris Imlay, N3AKD, of his office; Canadian Associate Counsel B. Robert Benson, Q.C., VE2VW; Bruce Lutsk of Reid & Riege, P.C.; and Donna L. Frechette, Administrative Assistant to the General Manager.

The Committee proceeded at once to examine nominations in the director elections, with careful attention to the application of the eligibility rules concerning membership and conflict of interest. During the course of the above, the Committee was in recess from 9:42 A.M. until 10:02 A.M. while a telephone call was made to one candidate to clarify details of employment. The Committee made findings and ordered actions as detailed below, all by unanimous action of those present:

Atlantic Division — For Director: Jesse Bieberman, W3KT, was found lawfully nominated and eligible. Being the only eligible nominee he was thereupon declared, pursuant to the By-Laws, to be duly elected as Director from the Atlantic Division for the 1982-1983 term without membership balloting. For Vice Director: Alan H. Komenski, AC2K, and Hugh A. Turnbull, W3ABC, were found lawfully nominated and eligible, and their names ordered listed on ballots to be sent to Full Members of the Division.

Canadian Division — For Director: Mitchell A. Powell, VE3OT, was found lawfully nominated and eligible. Being the only eligible nominee he was thereupon declared, pursuant to the By-Laws, to be duly elected as Director from the Canadian Division for the 1982-1983 term without membership balloting. For Vice Director: Thomas B.J. Atkins, VE3CDM, was found lawfully nominated and eligible. Being the only eligible nominee he was thereupon declared, pursuant to the By-Laws, to be duly elected as Vice Director from the Canadian Division for the 1982-1983 term without membership balloting.

Dakota Division — For Director: Garfield A. Anderson, KØGA, was found lawfully nominated and eligible. Being the only eligible nominee he was thereupon declared, pursuant to the By-Laws, to be duly elected as Director from the Dakota Division for the 1982-1983 term without membership balloting. For Vice Director: Theodore A. Olson, KØTO, was found lawfully nominated and eligible. Being the only eligible nominee he was thereupon declared, pursuant to the By-Laws, to be duly elected as Vice Director from the Dakota Division for the 1982-1983 term without membership balloting.

Delta Division — For Director: Clyde O. Hurlbert, W5CH, O. D. Keaton, WA4GLS, and Lionel A. Oubre, K5DPG, were found lawfully nominated and eligible, and their names ordered listed on ballots to be sent to Full Members of the Division. (A petition was received after the September 1 deadline date nominating Malcolm Keown, W5XX, as candidate for Director from the Delta Division.) For Vice Director: Edward W. Dunn, W4NZW, was found lawfully nominated and eligible. Being the only eligible nominee he was thereupon declared, pursuant to the By-Laws, to be duly elected as Vice Director from the Delta Division for the 1982-1983 term without membership balloting.

Great Lakes Division — For Director: Joseph E. Miller, K4DZM, and Leonard M. Nathanson, W8RC,

were found lawfully nominated and eligible, and their names ordered listed on ballots to be sent to Full Members of the Division. For Vice Director: Atlee S. Hart, W8VR, was found lawfully nominated. The Committee was in receipt of a mailgram from Mr. Hart withdrawing his name as a candidate. George S. Wilson, III, W4OYI, was found lawfully nominated and eligible. Being the only eligible nominee, he was thereupon declared, purusant to the By-Laws, to be duly elected as the Vice Director from the Great Lakes Division for the 1982-1983 term without membership balloting.

Midwest Division — For Director: Paul Grauer, WØFIR, and Robert S. MCaffrey, KØCY, were found lawfully nominated and eligible, and their names ordered listed on ballots to be sent to Full Members of the Division. For Vice Director: Claire R. Dyas, WØJCP, was found lawfully nominated and eligible. Being the only eligible nominee he was thereupon declared, pursuant to the By-Laws, to be duly elected as Vice Director from the Midwest Division for the 1982-1983 term without membership balloting.

Pacific Division — For Director: Michael W. Delich, WA6PYN, and William J. Stevens, W6ZM, were found lawfully nominated and eligible, and their names ordered listed on ballots to be sent to Full Members of the Division. For Vice Director: Ross W. Forbes, WB6GFJ, and Jettie B. Hill, W6RFF, were found lawfully nominated and eligible, and their names ordered listed on ballots to be sent to Full Members of the Division.

Southeastern Division — For Director: Frank M. Butler, Jr., W4RH, and Stewart H. Woodward, K4SMX, were found lawfully nominated and eligible, and their names ordered listed on ballots to be sent to Full Members of the Division. For Vice Director: Evelyn D. Gauzens, W4WYR, was found lawfully nominated and eligible. Being the only eligible nominee she was thereupon declared, pursuant to the By-Laws, to be duly elected as Vice Director from the Southeastern Division for the 1982-1983 term without membership balloting.

The Committee designated Messrs. Zak (chairman), Eaton and Powell as a Committee of Tellers at the November 20th ballot counting, with Mr. Huntoon as alternate.

The date of Saturday, November 21, was designated for the next meeting of the Executive Committee.

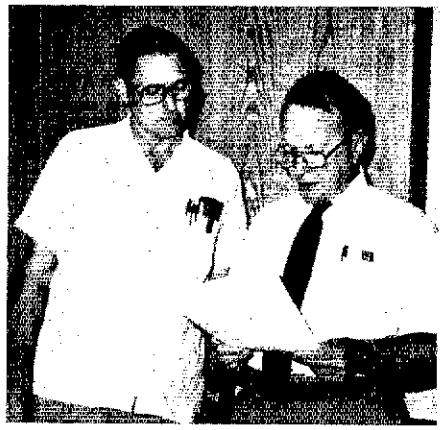
On motion of Mr. Powell, the Committee approved the affiliation of the Stark RTTY Group Amateur Radio Club, Inc., of Massillon, Ohio.

After discussion, the Committee reaffirmed the position taken by the League in its petition of January 16, 1979 (designated by the Commission as RM-3314) requesting that the FCC authorize Novice operation on the frequencies 220-225 MHz using A1, A2, A3 and F3 privileges with a maximum input power of 50 watts, and directed the staff, with the assistance of the General Counsel, to support FCC action on this petition.

The Committee then undertook an extensive review of the conditions under which the recall balloting in the Central Division would be conducted. The General Manager was instructed to advise each of the parties which would be including a statement with the ballot (ARRL itself, the incumbent director and the Indiana Radio Club Council) that each statement should be provided to the League Hq. in camera-ready form, on not more than four 8-1/2 × 11 sheets, that no statement should contain any derogatory statements concerning any person or entity, and that any statements meeting these qualifications would be published without editing by the Hq. staff. Furthermore, in the interests of fairness to all parties, the League statement was to be prepared forthwith, with a copy to be deposited with Price Waterhouse prior to receipt of statements by the incumbent director and the IRCC, and that no editing or rewriting of the ARRL statement would subsequently be undertaken. The General Manager was further directed to develop a production schedule which would permit mailing of the recall ballots to the members of the Central Division as close to the first of October as possible, so that members would have the same amount of time available for returning their ballots as is the case in the regular director elections, and so that the recall ballots could be counted on November 20th.

After discussion, and upon motion of Mr. Powell, the General Manager was directed to pay $1031.65 (in Canadian funds) to the attorney representing Robert Forbes, Mississauga, Ontario, as partial compensation of fees and costs for successful appeal of Mr. Forbes' conviction under the Mississauga Noise By-Law.

During the course of the meeting the Committee discussed, without formal action, the problems caused by failure of director candidates to promptly return their ballot information questionnaires, the closing date for the receipt of nominations in CRRL elections, possible locations for the March meeting of the Board and how the General Manager would handle director election statements that exceeded the 300-word limit.



West Gulf Director W5EDZ and GM W1RU check the language of a soon-to-be-debated motion.

There being no further business, the meeting was adjourned at 11:40 A.M.

Respectfully submitted,
Richard L. Baldwin, W1RU
Secretary

MINUTES OF EXECUTIVE COMMITTEE MEETING No. 390
September 9, 1981

Pursuant to due notice, the Executive Committee of the American Radio Relay League, Inc., met at 1:02 P.M. EDST, Wednesday, September 9, 1981, at the Headquarters offices of the League, in Newington, Connecticut. Present were President Harry J. Dannals, W2HD, in the Chair; First Vice President Carl L. Smith, WØBWJ; Directors Gar Anderson, KØGA, Mitch Powell, VE3OT; William J. Stevens, W6ZM; and Stan Zak, K2SJO; and General Manager Richard L. Baldwin, W1RU. Also present as observers were Vice Presidents Larry E. Price, W4RA, Max Arnold, W4WHN, and Noel B. Eaton, VE3CJ; Directors Jesse Bieberman, W3KT, Frank M. Butler, W4RH, Lys J. Carey, KØPGM, Paul Grauer, WØFIR, Jay A. Holladay, W6EJJ, Mary E. Lewis, W7QGP, Edmond A. Metzger, W9PRN, Gay E. Milius, Jr., W4UG, Leonard M. Nathanson, W8RC, Lionel A. Oubre, K5DPG, John C. Sullivan, W1HHR, and Raymond B. Wangler, W5EDZ; Vice Directors Kenneth A. Ebneter, K9EN, Linda S. Ferdinand, N2YL, Ross W. Forbes, WB6GFJ, Evelyn Gauzens, W4WYR, John C. Kanode, N4MM, O.D. Keaton, WA4GLS, Peter F. Matthews, WB6UIA, and Hugh A. Turnbull, W3ABC; General Counsel Robert M. Booth, Jr., W3PS, and Chris Imlay, N3AKD, of the General Counsel's office, and Bruce Lutsk of Reid and Riege, P.C.; and W. Dale Clift, WA3NLO, Deputy Manager of the Hq. Membership Services Department.

As the first order of business, by agreement of the members of the Executive Committee, Bruce Lutsk of the legal firm Reid and Riege was invited to participate in the work of the meeting.

On motion of Mr. Stevens, the Committee recognized the names of 183 members who had recently been elected to Life Membership, and directed the General Manager to list their names in *QST*.

On motion of Mr. Anderson, the affiliation of the following clubs was approved: Blue Ridge Amateur Radio Club, Flat Rock, North Carolina; Boston Center Amateur Assn., Nashua, New Hampshire; California Trade Technical School (CTTS), Long Beach, California; Cape Kennedy Area ARC, Kennedy Space Center, Florida; Chehalis Valley ARS, Chehalis, Washington; Comanche Remote Amateur Base Society, Inc., El Paso, Texas; Elmore County ARC, Mountain Home, Idaho; Green Fox Amateur Radio Club, Markesan, Wisconsin; Kendall Amateur Radio Society (KARS), San Antonio, Texas; Lester Pearson College ARC, Victoria, British Columbia; Muncie Area Amateur Radio Club, Muncie, Indiana; Port Lavaca Amateur Radio Club, Port Lavaca, Texas; Sitka Amateur Radio Club, Sitka, Arkansas; Tucson IBM Amateur Radio Club, Tucson, Arizona; West Texas Repeater Association, El Paso, Texas; Wythe Amateur Radio Club, Max Meadows, Virginia. (With the above action, the League now has 1982 Category I affiliated clubs, 9 Category II clubs, and 368 Category III clubs.)

On motion of Mr. Zak, approval was granted for the holding of the following ARRL conventions: Ohio State, February 27-28, 1982, Cincinnati, Ohio; Missouri State, April 3-4, 1982, Kansas City, Missouri; Atlantic Division/New York State, May 14-15, 1982, Rochester, New York; Kansas State, June 19-20, 1982, Salina, Kansas; Rocky Mountain/Northwestern, August 6-8, 1982, West Yellowstone, Montana; Hudson Division, October 29-31, 1982, McAfee, New Jersey.

The Committee noted that the date of the Delta Division Convention in Knoxville, Tennessee, had been changed from May 29-30, 1982, to May 22-23, 1982.

On motion of Mr. Stevens, the Committee voted approval of an additional 1981 Management and Finance Committee allocation of $3000.

On motion of Mr. Zak, the Committee voted approval of an additional 1981 Canadian Division allocation of $4000.

After review and discussion of the guidelines for the selection of Honorary Vice Presidents which were contained in the General Manager's letter of July 13, 1981, addressed to the Executive Committee, those guidelines were approved with minor language changes, and their adoption as a replacement for Standing Order No. 95 was referred to the Board for action.

The Committee then proceeded to a discussion of the matter of the petition for recall of the Central Division Director. The General Manager reviewed the sequence of events that had taken place beginning with the director elections in the fall of 1980. The General Counsel reviewed the various legal ramifications of the several actions that have already taken place. The options outlined in the General Manager's letter of August 27, 1981, were reviewed. After extended discussion, on motion of Mr. Anderson, the Committee voted 3-0, with Mr. Zak recorded as abstaining, to certify the recall petition as valid and to mail recall ballots to all Full members of the Central Division, with the mailing to include position statements by ARRL and by the Indiana Radio Club Council.

During the above discussion the Committee was in recess from 2:33 P.M. until 2:50 P.M.

By informal agreement, the Committee determined that on the morrow Mr. Bruce Lutsk, of Reid and Riege, would attend the meeting of the Board as an observer.

The Committee then proceeded to a discussion of funding for amateurs who are involved in legal cases relating to antenna and zoning problems and restrictive covenants. Mention was made of the necessity for avoiding any involvement which would benefit only a single amateur, because of the implications to our tax-exempt status, and to the guidelines for such funding previously established by the Board. General Counsel Booth mentioned particularly the difficulties involved with restrictive covenants.

W. Dale Clift, WA3NLO, of the staff reviewed in detail the requests by several amateurs for funding assistance in their legal problems with, in every case, particular attention paid to the precedent-setting value of the case, or lack thereof — that is, whether the particular case would benefit only a single amateur or whether it would become a part of the body of law, which would benefit amateurs in general.

After discussion, upon motion of Mr. Anderson, the Committee reaffirmed its previous decision not to provide funding for the case involving James Stitt, WA8ONQ, and his violation of antenna-height restrictions.

After discussion of the case involving a restrictive covenant and Kenneth Gianino, WBØQNA, on motion of Mr. Anderson the Committee VOTED unanimously to deny funding.

After discussion of the case involving a cooperative apartment and William C. Pritchett, K2QXS, on motion of Mr. Stevens the Committee VOTED unanimously to deny funding.

After discussion of the case involving Charles M. Guschke, N5SW, and his violation of a 35-foot height limitation, on motion of Mr. Anderson the Committee VOTED unanimously to deny funding at this time.

Mr. Imlay of the General Counsel's office presented the draft of a pamphlet which would provide guidance for attorneys in these various areas, and members of the Committee were asked to review this draft and submit their comments to Mr. Imlay.

President Dannals reported on the newly reviewed possibility of en banc meetings of the FCC.

Mr. Dannals further reminded the members of the Executive Committee that it would meet on Saturday morning, September 12, to review the qualifications of candidates in the fall director elections.

There being no further business, the meeting was adjourned at 4:29 P.M.

Respectfully submitted,
Richard L. Baldwin, W1RU
Secretary

Our Man in Washington

photos courtesy Julian Freret

Yes, Virginia, there is an Amateur Radio lobbyist in Washington. "Our job," says Perry Williams, W1UED, "is to keep finding ways to be useful and to let those in power know what we stand for."

By Carol Colvin,* AJ2I

Commuting 400 miles to work could get to be a drag. But so far, in nearly two years as ARRL's Washington Area Coordinator, Perry Williams, W1UED, has seemed to prosper at it. Normally there for a couple of days each week, his mission is to keep Amateur Radio in the foreground in influential Washington circles. Describing his job as one of "an orchestra leader, not a solo violin," Perry tells Washington about ham radio, and puts it in a flattering light. In endless rounds of telephone calls and personal visits, he maintains contact with Washington-area volunteers who are in a position to promote Amateur Radio; coordinates ARRL staff efforts involving Washington; provides an interface between Hq. and the League's Office of the General Counsel; and keeps close and continuing contact with the FCC, Congress, and government and private officials who could further our interests.

What are those interests? Perry contends that the most pressing items now on the Amateur Radio horizon are HR-2203 and S-929,[1] two bills presently before Congress. HR-2203 would allow the FCC to use volunteers to prepare and administer amateur license examinations, and would also allow amateurs to assist in monitoring violations in the amateur bands. S-929, among other sweeping proposals, would tackle RFI — one of the biggest thorns in ham radio's side — by giving the FCC authority to establish minimum RFI standards for electronic equipment. It would also allow the FCC to regulate or prohibit the sale or delivery of transmitting equipment to unlicensed persons, would exempt Amateur Radio transmissions from the secrecy provisions of the Communications Act and would change the amateur license term from five years to 10.

The League was a prime impetus behind S-929. In fact, the Amateur Radio sections were written by the League. When Senator Goldwater introduced S-929, Perry found out that all the members of the Senator's Subcommittee on Communications, with only one exception, had cosponsored the bill. Perry called an active amateur in the holdout's home town, personal contact was made, and the senator added his name to the bill.

Successes aren't always so easy. Though his high school peers once voted him "class optimist," Williams reminds us that 95% of all bills introduced in Congress fail. Despite those odds, he feels that both bills stand a better chance this year than in any previous year. He further urges League members to write their senators and representatives in support of HR-2203 and S-929, and to send copies of their letters to Hq.

Amateur Radio's National Advocate

As one of the League's two registered lobbyists (the other is General Manager Richard Baldwin, W1RU), Perry keeps current on pertinent legislation and other matters of concern to ham radio operators. In fact, the League's lobbyists are the only lobbyists for Amateur Radio interests in Washington. "Like snakes," Perry says, "lobbyists come in two varieties — poisonous and nonpoisonous. I'm the nonpoisonous variety." He sees his lobbying activities simply as an exten-

*Editorial Assistant, *QST*

[1]See Happenings," *QST*, June 1981, p. 53, and April 1981, p. 69, and "League Lines," this issue, page 10.

sion of the individual citizen's right to petition the government for redress of grievances. "An individual amateur cannot simply go to Washington and say, for example, that he or she wants the Communications Act changed; but as a group, we can hire someone to do that."

Working closely with General Counsel Robert M. Booth, Jr., W3PS, and Chris Imlay, N3AKD (an associate in the general counsel's firm), Williams keeps a special lookout for new programs in any bureau — for any place and any way Amateur Radio can be useful. He reasons: "It's enlightened self-interest. When ham radio stops being useful, we're going to disappear. We can provide a valuable resource. Our job is to keep finding ways to be useful and to let those in power know what we stand for."

ARRL Washington representation has existed since the second decade of this century. Until his death in 1936, ARRL Vice President Charles Stewart, W3FS, was the League's principal agent in Washington; later, the ARRL staff became more involved. At various times there has been sentiment in favor of a full-time, resident League representative in Washington. The 1978 Board of Directors decided that a commuting Headquarters staff member could accomplish as much and would be more cost effective, too. Harold Steinman, K1FHN, served as the first Washington Area Coordinator until 1980, when Perry took over the job.

Usually spending two days a week in Washington and the rest in Newington, Perry feels that he gets the best of both worlds — an insider's view of the Washington scene and input from the local levels of Amateur Radio, including clubs and individual ARRL members.

No 9 to 5 Routine

W1UED's typical work week begins in his Newington office on Monday by unstuffing the "in" box and his brief case, distributing materials he has brought from Washington, reporting on special tasks for League staffers, reading the *Federal Register* and electronics industry magazines, and cleaning up old business. Tuesdays are spent writing reports, making telephone calls and getting ready for the next trip to DC.

Wednesdays bring an early-morning (4:45 A.M.) start, so he can leave on the 7:00 flight to Washington, arrive there around 8:10, take the subway downtown, check into a hotel and be ready to work by 9. The rest of the day includes meetings with organizations having interests in common with ours. He recently took part in a round-table discussion, for example, with the Pan American Health Organization, which is trying to set up a pilot emergency back-up system between Washington and one of their regional headquarters in Lima, Peru. To cap off the day, he usually makes a trip to Capitol Hill to check on the status of pending legislation.

On most Thursdays he'll take in the FCC open-agenda meeting, where the Commission makes its decisions known. Further errands in FCC offices (five buildings spread around Washington) and meetings with various FCC chiefs comprise the rest of the day.

Williams deals with the mundane as well as the vital issues facing Amateur Radio. Some of the more common problems involve license modifications. A nun, for example, recently wanted the address on her license to reflect her new convent name. The FCC somehow got the application hung up, so Perry tracked it down and followed through on its progress, with success. Another case centered on a potential Novice who had taken the exam but never received his license. Perry discovered that the candidate had, unfortunately, caused some problem on the 11-meter band, so the FCC had put a flag on his application while deciding what to do with him.

An ongoing problem is duplicate KA1 call signs. One set has been assigned by the Armed Forces in Japan and the other to the First U.S. Call District. The FCC "owns" all U.S. call signs and releases selected blocks to the military. Although the FCC has never released KA1 calls to the military, they have been issuing them since 1962, resulting in some confusion.

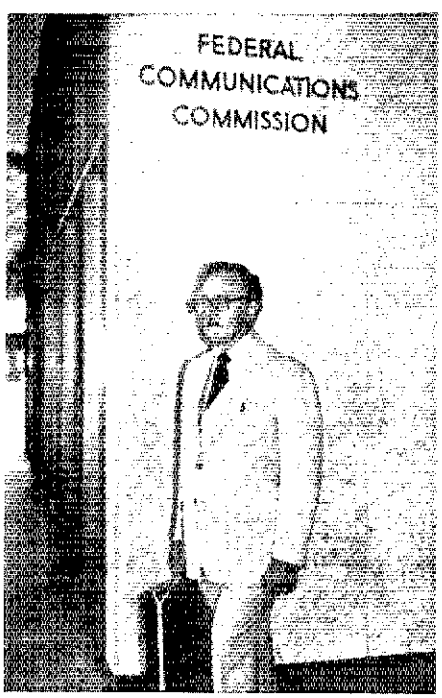
Perry also goes over various malicious interference cases with the FCC. The process is frustratingly slow: FCC investigators have to gather evidence carefully, to make sure it will stand up in court. Valuable information from amateurs via Perry has helped expedite this process, though, as cases reported in *QST* demonstrate. Helping to untangle snarls like these is a basic part of Williams's job. Not surprisingly, he spends a large part of his commuting time, about 87,000 air miles so far, attacking crossword puzzles.

Changes in the Wind?

When front-page headlines all over the country are filled with news of inflation, tax cuts and spending cuts, what is the atmosphere in the capital, and how will it affect Amateur Radio? Perry describes the current mood there as a "tornado mentality — one of people pulling together harmoniously and even whistling while they work." Everyone's budget has been cut, but morale is actually better now than before — there's less bickering and more cooperation. "It even seems that people are walking with a quicker step these days. Attitudes have definitely changed — maybe less is better," he observes. Congress certainly got off to a quicker start than usual, with many bills on telecommunications alone awaiting consideration.

The trend is definitely toward deregulation, in general a good sign for the Amateur Radio Service, with its long tradition of self-policing. But we'll also feel the pinch of FCC budget and personnel cuts in the form of fewer license examination dates and sites, for example.

An attorney/staffer on Senator Goldwater's subcommittee, Chris Coursen, listens to Perry's views on S-929 tactics.



That famous address, 1919 M St., NW, occupies perhaps the largest single block of Perry's time.

FCC staffers Jim Brown, W5DRP (left), and Lex Felker, N4LF (right), discuss the merits of an FCC report on deregulating private radio. (That's W1UED in the middle.)

Amateurs also fear that deregulation could undermine some of the foundations of our hobby, such as the code requirement.

The recent ARRL survey showed that most amateurs believe that Morse code is a necessity for all licensed amateurs. Williams agrees, commenting: "Code is bottom-line communications; any time you have an on-and-off state, you can send code. Also, the code requirement serves as a 'sincerity filter.' If amateur privileges came too cheaply, they would be used too cheaply. Some people can take written tests successfully, but to succeed at Morse code, you have to spend time on it — there's no other way."

Some at the FCC, it seems, don't understand this. "A lot of people at the commission think of it as an obsolete means of communication," Perry observes, "although that attitude may be changing. The military is again teaching code because they realize that someone could zap their beautiful satellites out of the sky, then where would that leave their communications? They had put all their eggs in one basket; the Army had even come to rely on satellites for company-to-division communications. Now they realize they must also get back to basics, back to hf radio and Morse code."

What Next?

Long-term, continuing goals, as Perry sees it, are to help people in authority develop favorable attitudes about Amateur Radio so that there will always be an amateur service. "We have to keep growing, because not to grow is to start falling apart," he emphasizes. "We have fairly adequate frequency allocations space; we're just not using it all, especially some of our vhf and uhf bands. We need to do more experimenting and communicating there. Williams' enthusiasm about the future of Amateur Radio is contagious. "We have a privilege, not a right," he says, "and we must keep finding new ways of being useful." From the vantage point of 27 years with League Hq., he challenges: "Members have a part to play, too. They have to get more involved!"

An Image Problem? Some Solutions!

One of Amateur Radio's longstanding problems is that portions of the public simply don't know about us. What can an ARRL member do to help?

☐ Write or call your government officials and tell them about your public-service events, emergency-communications efforts, and any and all activities in which Amateur Radio has been helpful to your community. Legislators usually figure that one letter represents 10 other constituents with the same viewpoint.

☐ Set up a publicity committee in your club to let the community know who you are and what you do. Tell local newspapers, and radio and television stations. Be sure to share all events with local, state and federal officials.

☐ Let your representatives know how you feel about various issues affecting Amateur Radio, e.g. HR-2203 and S-929. Tell your ARRL Directors and Hq. what you think about FCC proposals described in "League Lines" and "Happenings."

☐ In short, get involved. *You* can help determine the direction of Amateur Radio and whether the amateur service remains a vital, growing force.

Strays

"HAMFEST CALENDAR" RULES AND REGS

☐ *QST* will list your hamfest in its monthly "Hamfest Calendar," free of charge. There are certain guidelines, however.

Hamfests will be listed only once. Sponsors may specify the issue in which the announcement should appear. Normally, if the event will occur before the 10th of the month, we recommend listing it in the previous month's issue. The deadline for *receipt* of hamfest information is the 15th of the second month preceding publication. In other words, if an event is December 5, the announcement should be in Newington by the 15th of September at the very latest. For a December 19 event, the sponsor could choose either the December issue with the September 15 deadline, or the January issue with an October 15 deadline.

We will acknowledge all information received at Hq. for "Hamfest Calendar" with a postcard stating the date of publication. If you do not receive an acknowledgment within two weeks, your letter may not have reached us, so send a duplicate copy.

Oh, yes. "Hamfest Calendar" is separate from the hamfest section of Ham Ads. See the first page of the Ham Ads section in this issue for more information. — *Marge Tenney, WB1FSN*

WIRED FOR DISASTER?

☐ Don Selwyn, W2GFR, of Pompton Lakes, New Jersey, warns mobile HT users to watch their cables. His set-up had one cable leading to an outside antenna and another to the car's cigarette lighter. Unfortunately, a front-seat passenger tripped on the power cable as he was disembarking, fell on the pavement and injured his kneecap. W2GFR was subsequently sued, and though the case was settled out of court, he warns others to take heed and to take care with their HT cables.

Attention apartment dwellers. Hank Goldman, WA2OVG, of Riverdale, New York, reveals the "double grounding system" for his vertical antenna. Hank suggests that, for higher power, three or four flower pots might provide a better ground. *(photo courtesy WA2OVG)*

STRAY HINTS

☐ "Strays" are those interesting fillers used when space allows in *QST*. Think you have an item with Stray potential? Here are some hints to help your submission become one. (1) Be sure the information will be of interest to most readers of *QST*. (2) Submit your material before deadline — the 8th of the second month preceding desired publication (i.e. arrive at Hq. before November 8 for January *QST*). (3) Any photographs you send 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 that doesn't necessarily mean that your Stray will be appearing in *QST*. We receive far more material than we can find room for. If you want your material returned, please include a statement to that effect and an s.a.s.e.

Follow the above hints and maybe your Stray will find a home in *QST*. — *Carol L. Colvin, AJ2I*

I would like to get in touch with . . .

☐ anyone who has modified the Drake 2-B receiver in any way. Cecil R. Weinstein, KAØGBS, Box 52, Golden City, MO 64748.

League Comments in Plain Language: "No Thanks!"

". . . ARRL objects to the wholesale rewriting of long established and clearly understood rules which have withstood the test of time."

By Richard Palm,* K1CE

So begins ARRL's formal comments in response to the FCC's significant and often controversial "plain language" proceeding in PR Docket 80-729. The League has requested that the Commission abandon "plain language" rules by withdrawing the Notice of Proposed Rulemaking (NPRM) at an early date. The sentiments of the membership weighed heavily in the preparation of and final determination in the filing submitted August 21. Although the League *does* support the concept of deregulation, simplification and clarification of rules initiated by the Commission several years ago, "plain language" is not the appropriate vehicle for accomplishing these objectives. In presenting its recommendations for the retention of existing Part 97, ARRL said:

> The present rules for the Amateur Radio Service (Part 97) were adopted over a period of many years, usually by rulemaking proceedings and always by appropriate reports and orders which have built up a large body of legislative history. Interpretations and applications of the present rules are reported in the official *Reports of the Federal Communications Commission* and in the recognized service of *Pike & Fischer Radio Regulations*, and are summarized in digests of those services by rule number and title . . . A wholesale rewriting of the rules such as proposed by the instant NPRM will require extensive cross-referencing and will severely limit the usefulness of past orders and decisions and the summaries in the digest.

The comments identified several problem areas beyond the above basic concern, and in some cases made specific recommendations in the event that the Commission decides to move forward with its "plain language" concept.

History

The Commission's effort to simplify its rules began in December 1976 when it reorganized Part 95 governing the personal radio services into four subparts: the General Mobile Radio Service, the Radio Control (R/C) Radio Service, the Citizens Band Radio Service and Technical Standards. In March 1978 it issued a "plain language" version of the CB rules.

On December 19, 1980, the Commission released the NPRM in PR Docket 80-729 proposing the rewrite of Part 97, the amateur service rules, into "plain language." It indicated its feeling that the existing rules are "unnecessarily complex and difficult to understand." The Commission outlined its goals of reducing the complexity and fostering greater understanding of the rules by eliminating some and rewriting others in simpler language. Although the Commission's purpose was to retain the substance of the rules, a few changes were intended. For example, all logging requirements would be eliminated, and a new rule requiring amateurs to keep a current copy of the rules at their stations would be effected.

The original deadline for comments, June 19, was extended to August 21 when the FCC granted requests from amateurs for more time to study the proposal. Many were finding an increasing number of problems in the text of the new rules. Others felt that the format was inappropriate for a disciplined service such as Amateur Radio.

We Need a "Bill of Rights" more than "Plain Language"

In its opening remarks, the League said, "The most serious problem confronting Amateur Radio in the United States is the proliferation of highly restrictive zoning ordinances, building codes and restrictive covenants in deeds which so severely restrict amateur antennas that effective operations are all but impossible. What the Amateur Radio Service needs more than a wholesale rewriting of the rules," the League continued, "is a *Bill of Rights* — a concise statement to assist local governments in recognizing the importance of Amateur Radio, the importance of the transmitting antenna, and the necessity that any zoning ordinances and building codes which may be adopted be realistic and not unreasonably restrictive." ARRL said that if the FCC's proposals (AR Rules 25 and 30) concerning antennas were adopted, they would be seized upon by local governments to support the enactment of highly restrictive zoning ordinances and building codes. The ARRL indicated that the question-and-answer format in the two proposed rules gives the impression that the Commission "specifies antenna heights when, in fact, the Commission has no such rules and exercises no such control. Instead of stating in simple, concise words that its only concern is with the height of amateur antennas in close proximity to an airport, the Commission proposes a rewrite of existing Section 97.45, which now is essentially identical to Section 17.7 of Part 17

"The most serious problem confronting Amateur Radio in the United States is the proliferation of highly restrictive zoning ordinances . . ."

*Assistant Manager, Membership Services, ARRL

of the Commission's rules, *Construction, Marking, and Lighting of Antenna Structures.*" Pointing out that few amateurs have towers of over 200 feet in height, and that Part 17 covers much of the same regulation as Section 97.45, the League proposed an alternative rule:

Revised Section 97.45: *Limitations on Antenna Structures*

Any amateur planning an antenna structure 200 or more feet above ground, extending the height of an existing non-amateur antenna by more than 20 feet, or operating on either a fixed or portable basis (see definitions in Section 97.3) within three miles of an airport or heliport should first refer to Part 17 of the Commission's Rules, *Construction, Marking, and Lighting of Antenna Structures*, and comply with any applicable requirements, particularly Section 17.7. A copy of Part 17 may be obtained from the FCC or the Government Printing Office.

The League also recommended deletion of Sections 97.42 (c) and (d) to be replaced by a simple cautionary statement concerning site changes, increases in antenna heights, licenses for new stations and location near an FCC Monitoring Station:

Section 97.42: *Application For Station License*

(a) One form (FCC Form 610) is used to apply for either or both an operator and station license. If the application is only for a new or modified station license, it should be filed with the Commission's Gettysburg, Pennsylvania, office. (For applications for an operator license, refer to Section 97.11).

(b) Applications for renewal or modification of a club or military recreation station license shall be made on FCC Form 610-B and filed with the Commission's Gettysburg, Pennsylvania, office. Applications for new stations will not be accepted.

(c) Any amateur planning to operate on either a fixed or portable basis in an officially designated wilderness area, wildlife preserve, or historical area should refer to Sections 1.1301 through 1.1319 of Part 1 of the Commission's rules. A copy of Part 1 may be obtained from the FCC or the Government Printing Office.

(d) Any amateur planning to operate on either a fixed or portable basis within one mile of a monitoring station of this Commission shall consult with the engineer-in-charge of the monitoring station before commencing operation and shall adhere to any restrictions which may be imposed.

In specifying its reasons for the proposed revision, the League said that present Section 97.42(c) is inapplicable to amateurs except when an antenna might be erected on a permanent basis in an officially designated wilderness area, wildlife preserve or historical area. Present Section 97.42(d) is also inapplicable as it was apparent from the Report and Order in General Docket 78-365 that the Commission was concerned with signal strengths far higher than radiated by amateur stations, the League stated.

Basis and Purpose Must Stay in the Rules

Almost without exception, members were concerned with the Commission's proposed redefinition of the Amateur Radio Service in §97.1 (AR Rule 1):

What is the Amateur Radio (AR) Service?
The AR Service is for persons interested in the technical side of radio communications. They use the service only for their own personal satisfaction and get no financial benefit from its use. They learn about radio, communicate with other operators around the world, and find better ways to communicate by radio.

"Section 97.1, Basis and Purpose, must remain unchanged," the League said. Citing the value of the present Basis and Purpose in the continuation and growth of Amateur Radio, the League said that the Commission proposal would do irreparable harm to tens of thousands of amateurs in particular and the Service in general. The section has been cited in many court cases which have led to the striking down of restrictive antenna ordinances, ARRL said. The League also remarked that the section "contributed immeasurably to the widespread and almost unanimous support of expansion of the amateur frequency assignments by the 1979 WARC."

A Matter of Priorities

Noting the recent cutbacks in availability of amateur exams and the need for more enforcement in cases of malicious interference, ARRL said "many amateurs firmly believe the Commission, in devoting so much time and money to drafting the proposed 'plain language' rules, failed to effectively and efficiently utilize its limited resources."

Concerning the FCC's proposed change of name for the Amateur Radio Service to "Amateur Telecommunications Services," the League urged retention of the existing name, noting that "Amateur Radio Service" is universal and understood by national administrations throughout the world. " 'Radio' denotes the transmission of intelligence by Hertzian waves, i.e. electromagnetic radiation. 'Telecommunications,' on the other hand, encompasses many other techniques for exchanging intelligence including wires, cables, optic fibers and lasers."

The League urged retention of the existing name noting that "Amateur Radio Service" is universal and understood by national administrations throughout the world.

In the matter of external rf power amplifiers, the League referred to proposed Section 97.29 (AR Rule 29), *What transmitter or amplifier may I use at my AR station?*, and voiced its continuing opposition to the "unfair and unrealistic restrictions imposed upon the Amateur Radio Service by the external radio frequency (rf) power amplifier rule adopted by the Commission in a futile attempt to prevent unlawful high power operation by licensed Citizens Band operators and by unlicensed 'bootleggers' on frequencies between 25 and 28 MHz . . ."

The League also disagreed with the Commission's proposal to revise the power limitations in terms of PEP input. The ARRL urged retention of the existing rules, which provide for measurement of direct carrier input power. It also urged that the Commission take up the power limitation issue in a future proceeding. "Ultimately, it may be in the best engineering interest to state the limitations in terms of output power as do the rules for the broadcast services."

Concerning the proposal to require stations to have on hand a current copy of the rules, ARRL indicated its feeling that because the rules are changed from time to time; service provided by the Government Printing Office is often slow, outdated and relatively expensive; and rule changes are published in almost all amateur journals, "it is unrealistic to require, by rule, that each amateur have in his possession an accurate, up-to-date copy of the rules." However, amateurs should continue to remain abreast of the rules and modifications to the rules.

In other areas, ARRL submitted editorial changes to bring specific proposals into consonance with existing rules in the event the Commission proceeds with "plain language." An alternative "Moderate Language" counterproposal was also submitted as a contingency. One of the basic concerns in the text of the FCC proposals was the condescending flavor of the question-and-answer format. Another was the choice of words used in some rules. Many amateurs felt that these words were overly simplistic. The "Moderate Language" counterproposal attached to the comments as Appendix A attempts to present rules in a simpler manner than the existing rules, but in a way that is more consistent with the needs of the average amateur.

ARRL-FCC Meeting

In its conclusions, ARRL reiterated its concern in the matter of restrictive zoning ordinances and building codes that severely limit amateur antennas. The League called for an early meeting with Commission staff to discuss and "review the most serious problems confronting the Amateur Radio Service and to explore ways in which the Commission may assist in the development of practical solutions."

In its closing remarks, ARRL repeated its request for early withdrawal of the NPRM and the abandonment of "plain language" rules. For a complete copy of the Notice of Proposed Rulemaking and/or ARRL comments, send $1 to ARRL — KICE, 225 Main St., Newington, CT 06111. Watch for news of developments in "Happenings." QST

Your Place in Your League

Part 3: The ARRL Communications Department is as old as the League itself. Think this means it's old-fashioned? Think again!

By David Sumner,* K1ZZ

Ever wonder how things *really* happen in the American Radio Relay League? No, we don't mean the fictitious accounts you see elsewhere; we mean the *real* story. Who's the power behind the ARRL diamond? Who benefits most from the League's existence? What unseen force pulls the strings?

If you read the first two parts of this series, you know the answer is the same to all three questions. It's the *membership*! In the League, as in any legitimate membership association, it's the members who call the shots. Not only that, they also do most of the work!

This is the third and final installment of a three-part series describing the role of volunteers in the League's organizational structure.[1] Part 1 provided an overview, tried to put things into historical perspective and explained how the authority (and responsibility!) for decisions made in the name of the League ultimately rests in the hands of the members. Part 2 described a number of important jobs that are done by ARRL volunteers. Now we're ready for the final leg of our journey through the organization chart: a look at the oldest and best organized of the League's volunteers, the Field Organization of the Communications Department.

The ARRL Communications Department is as old as the League itself. The very first League publication, predating *QST*, was a list of "relay stations." Forerunners of today's Official Relay Stations, their operators agreed to observe high standards in their operating and message handling. In 1916 the League organized Trunk Lines, under the direction of volunteer Trunk Line managers, so messages could be relayed rapidly from coast to coast. The Trunk Line managers were superseded by Division Managers in 1917, but the ink was hardly dry on the *QST* announcement of the change before war put all amateurs off the air. When *QST* resumed publishing in 1919 it announced the formation of an ARRL Operating Department, but there was little activity to report until year end because of the government's hesitance to lift the wartime transmitting ban. The Operating Department grew quickly, was renamed the Traffic Department in 1924 and was reorganized as the Communications Department in 1926. Although countless changes were made as the Communications Department evolved over the years, many of the features of the CD of that time are discernible in today's organization.

After a tornado caused $100 million damage in Bossier, Louisiana, a few years ago, 300 local amateurs provided emergency communications. This type of Amateur Radio public service, a significant part of our *raison d'etre*, is coordinated by the ARRL Communications Department. *(photo courtesy WA5ARJ)*

The Communications Department Today

Section organization: The basic unit of the CD organization is the ARRL *section*. There are 73 sections in the ARRL Field Organization; you'll find a list on page 8 of this (and every) *QST*. Most of the sections are simply U.S. states or Canadian provinces, although in some cases a section covers more territory than that, and six of the larger states are divided into two or more sections. When you join the League you are automatically assigned to an ARRL section based on your mailing address. The average section has about 2000 ARRL members, although this may vary from as few as 300 to more than 7000.

Every two years, the Full Members in a section are given the opportunity to elect a *Section Communications Manager,* or SCM. The duties of the SCM are listed in Table 1. The eligibility requirements are simple: A candidate for SCM must have been an ARRL Full Member for at least two years and the holder of an amateur General class or higher license (Canadian Advanced Amateur Certificate) immediately prior to receipt of the nominating petition at Headquarters, and if elected must, of course, maintain membership in the League throughout the

[1]See QST, Feb. 1981, p. 52, and April 1981, p. 57.

*Assistant General Manager, ARRL

Table 1

Duties of the ARRL Section Communications Manager (SCM)

1) Build and maintain the section organization in the name of ARRL and devise means through Amateur Radio operating of promoting high general interest and esprit de corps.

2) Foster the creation and maintenance of section network activities in all bands and modes available, with special attention to emergency preparedness and other activities in the public interest.

3) Render a monthly report or activity summary to the ARRL Communications Manager, to be published in *QST*, outlining the activities of the section's clubs and amateur stations, whether ARRL members or not.

4) Make official individual and station appointments to qualified ARRL members only, and maintain accurate records of such appointments made, endorsed and canceled, including notification of Headquarters.

5) Appoint, at his option, a Section Emergency Coordinator, a Section Traffic Manager and as many Net Managers as there are official section nets. These appointees serve as his assistants in the specialized fields of emergency preparedness and traffic handling.

6) Issue section net certificates to amateurs in ARRL-sponsored or recognized nets at section level. Issue BPL certificates to those members whose traffic count meets the requirements each month.

7) Conduct correspondence, on-the-air contact and personal contact with amateurs and clubs in the section with the general aim of fostering a high state of activity. Reimbursement is provided for postage, certain stationery expenses and certain travel.

8) Perform whatever paperwork is necessary to keep the section records accurate and up-to-date.

9) If he so chooses, engage in public relations programs and promotions, dissemination of public information, recruitment and training of new amateurs and ARRL members, dissemination of information to the general public or to clubs, appointees and members within the section, and participation in convention and hamfest planning, organization and promotion.

term of office. There is no minimum age requirement. To be valid, the nominating petition must be signed by at least five Full Members of the section. Election notices appearing regularly in the "Operating News" section of *QST* set forth the timetable for the nomination and election process. There is no limit to the number of candidates who may be nominated, and if there is more than one eligible nominee an election will be held by mail ballot. There is no limit to the number of terms an SCM may serve.

At this point, some long-time League members are probably wondering why they have never received a ballot in an SCM election. Unfortunately, in a majority of SCM elections there is but one candidate. For example, during 1980 there were 42 elections held, but only 14 required balloting. Part of the reason for this is that the SCM post is a demanding one, requiring many hours of personal time each month. Even so, it's an important and prestigious leadership position. An effective SCM can have a tremendous impact on Amateur Radio activity in his section, especially in the area of public-service communications.

Fig. 1 shows the present ARRL section-level organization. All of the volunteers shown are appointed for two-year terms by the SCM, though they often report to other officials in the routine performance of their duties.

The SCM has considerable flexibility in how he utilizes his appointees. He may appoint an Assistant SCM to help with the general administration of his section, although there is usually an Assistant SCM only in the sections with large populations. More numerous are the Section Emergency Coordinator (SEC) and Section Traffic Manager (STM) appointees, although the SCM may choose to perform the duties of one or both of these posts himself. (Incidentally, while we have been using the male pronoun for convenience, it is not at all unusual for SCMs and their appointees to be women. In fact, in the CD structure female hams are represented in a greater percentage than they are in the amateur population as a whole.)

The SEC is responsible for the operation of the Amateur Radio Emergency Service in the section. His duties are listed in Table 2. To accomplish his objectives, the SEC relies on local Emergency Coordinators whose job it is to organize the amateurs in their respective communities into an effective emergency communications team. Like all SCM appointees, the EC must be an ARRL member; however, because ARES welcomes any amateur who is public service minded, his local organization can include nonmembers. In the larger sections, instead of having every EC report directly to the SEC there are District ECs to make the span of control more manageable. As you can see, there is plenty of opportunity for upward mobility in the ARES structure!

Many amateurs start out as members of a local ARES group and assume ever-increasing responsibilities as they gain more experience and wider exposure within the section. Others are satisfied just being members of an effective local ARES group.

Sound interesting? If so, you should write to ARRL Headquarters and request copies of two free booklets: *Operating an Amateur Radio Station* (OARS) and the *Public Service Communications Manual* (PSCM). They go into much more detail

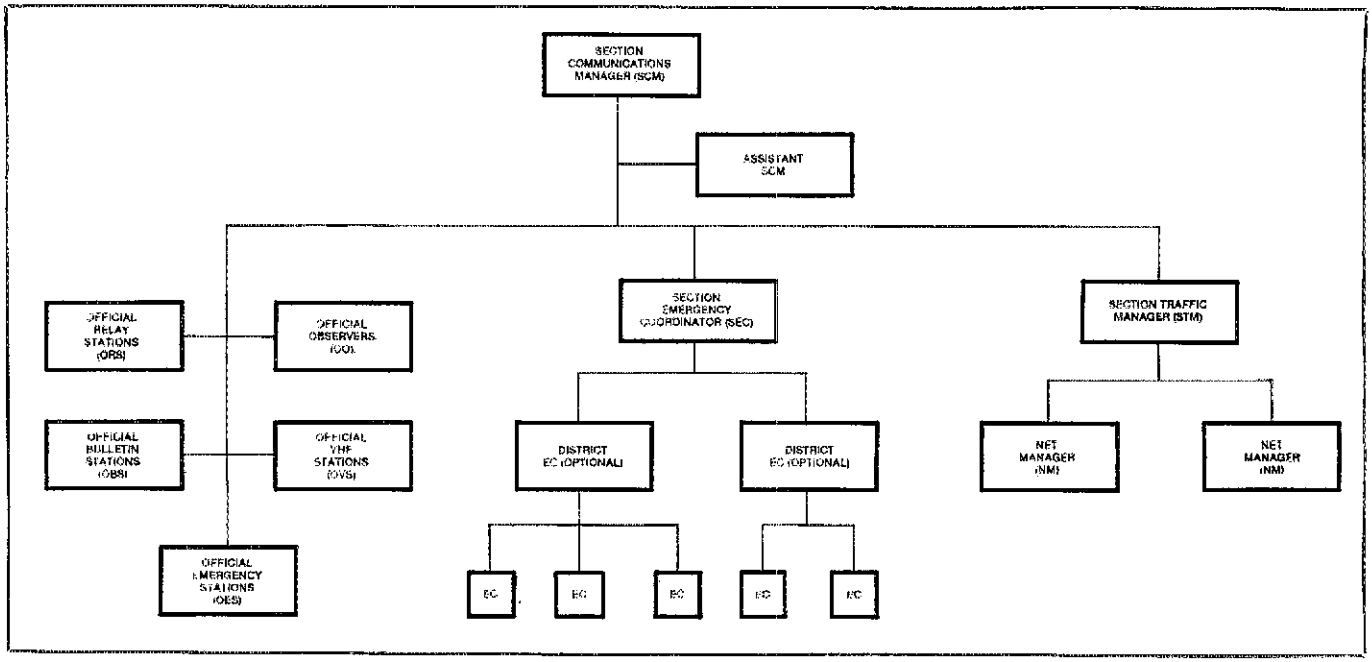


Fig. 1 — The ARRL section-level organization.

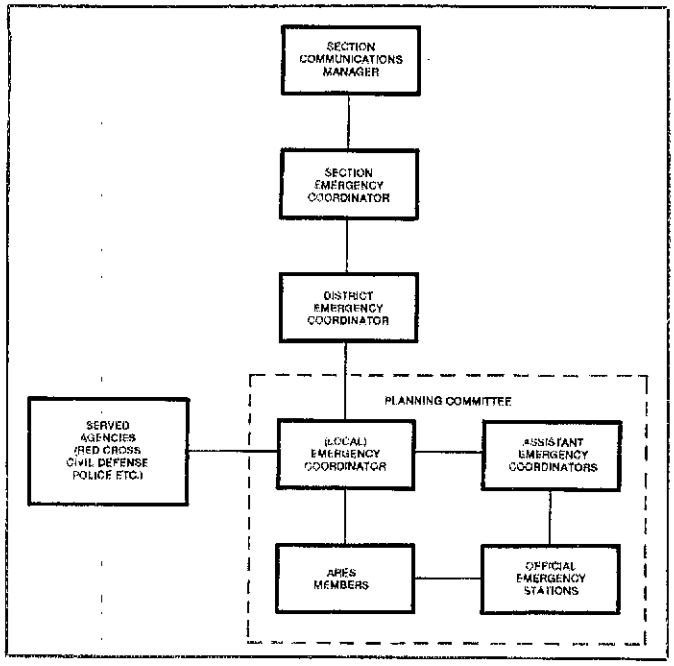


Fig. 2 — Amateur Radio Emergency Service organizational chart.

Table 2

Duties of the ARRL Section Emergency Coordinator (SEC)

1) Encouragement of amateurs in all communities to establish local emergency organizations.
2) Recommendations to the SCM on all section emergency policy and planning, including the development of a section emergency communications plan.
3) Cooperation and coordination with the Section Traffic Manager so that emergency nets and traffic nets in the section present a united public service front.
4) Recommendations to the SCM of candidates for Emergency Coordinator (EC) and District Emergency Coordinator (DEC), and determination of their areas of jurisdiction.
5) Promotion of ARES membership drives, meetings, activities, tests, procedures and so on at the section level.
6) Collection and consolidation of EC (or DEC) monthly reports and submission of monthly progress summaries to ARRL Headquarters.
7) Liaison at the section level with other communications services and all agencies served in the public interest, especially state and local government, civil defense, Red Cross, Salvation Army and the National Weather Service.

in describing the ARES organization and the other facets of the League's operating program. Elsewhere in this article, as well as in the back of the *PSCM*, is an ARES registration form. Fill it out, and send it to your local EC, if you happen to know who he is, or to your SEC (listed in September *QST*, page 79) or SCM (listed on page 8 of every *QST*). If you're not sure what section you're in, send the form to League Hq., and it will be forwarded to the appropriate place.

At the same level as the SEC is the Section Traffic Manager. While the focus of the SEC is on organizing local-level emergency communications capabilities throughout the section, the job of the STM is to organize the section's amateurs into an efficient network for handling messages into, out of and within the section. Traffic nets are very important during emergencies, and for that reason it is important for the STM and SEC to be able to work together.

To handle efficiently the hundreds of thousands of messages that flow back and forth among amateur stations each year, ARRL sponsors a National Traffic System, or NTS. The higher levels of the NTS, those that transcend section boundaries, will be discussed later. The STM is responsible for the smooth functioning of the NTS at the section level (see Table 3).

Each NTS net has a manager. In the case of local nets, the Emergency Coordinator or one of his assistants usually performs this function as a part of his duties. For each of the other nets the Section Communications Manager appoints a Net Manager, or NM, usually on the recommendation of the STM. There may be only one NTS net (and, consequently, one NM) in a section, or there may be several for one or more vhf nets, an hf phone net, a cw net, an RTTY net and so on. More important than the number of nets is that they work together in a coordinated section traffic plan. Net Managers must require that all traffic is handled in proper ARRL form, and that net activity is reported monthly.

Table 3

Duties of the ARRL Section Traffic Manager (STM)

1) Establishment, administration and promotion of a traffic-handling program at the section level, mainly but not restricted to NTS nets.
2) Cooperation and coordination with the SEC so that traffic nets and emergency nets in the section present a united public service front.
3) Recommendations of candidates for Net Manager and Official Relay Station to the SCM.
4) Ability and familiarity with proper traffic handling procedures in two or more different modes.
5) Reporting section net activities monthly to ARRL Headquarters.

ARRL Station Appointments

In addition to the leadership appointments described above, the SCM is authorized to make five different kinds of station appointments to ARRL Full Members in his section who meet specified levels of qualifications and performance. They are: Official Relay Station (ORS), Official Emergency Station (OES), Official VHF Station (OVS), Official Bulletin Station (OBS) and Official Observer (OO). The exact requirements for each are listed in *Operating an Amateur Radio Station*. An ORS is required to maintain high standards and continuing activity in message handling; an OES, in emergency preparedness; and an OVS, in vhf communication. An OBS must retransmit ARRL bulletins copied from WIAW at least once per week, usually on vhf, according to a regular schedule agreed on with the SCM.

The Official Observer is perhaps the most demanding of the ARRL station appointments in terms of responsibility, and for that reason has the greatest experience requirement — four years as a licensee of Technician or higher class. The OO's function is to assist fellow amateurs by identifying technical and/or operating irregularities before they come to the attention of the FCC or the Canadian Department of Communications. The OO performs this function by *listening* rather than transmitting, keeping an ear out for such things as harmonics, out-of-band operations, hum, key clicks, distorted audio, improper identification and so forth. The program is not an exercise in vigilantism or law enforcement; it is intended to help amateurs help themselves. Most OO notifications are sent by mail, and the OO function is completed once the notification has been sent unless the

Name: _____ Call: _____

AMATEUR RADIO EMERGENCY SERVICE

REGISTRATION FORM

Address: _____

City: _____ State/Prov.: _____ Zip/PC: _____

Bus. phone: _____ Home phone: _____ County: _____

License Class: _____ Primary radio interest: _____

Check (✓) bands/modes you can operate:

	160	80	40	20	15	10	6	2
CW								
FM								
RTTY								
SSB								
MOBILE								

Can your home station operate without commercial power? [ ] YES [ ] NO

If yes, what bands? _____

Signed: _____ Date: _____

Fig. 3 — Want to be a part of your community's Amateur Radio public service communications team? Copy this form and send it to your SEC, SCM or to ARRL Hq.

recipient requests assistance. The program is very effective in reducing the number of inadvertent violations on the bands; of course, it can have little effect on the small number of deliberate violators. Tact, diplomacy and a strong desire to maintain a positive image for Amateur Radio are the attributes of an effective OO.

The National Traffic System

The National Traffic System, or NTS, was established in 1949 as a more efficient replacement for the old "trunk line" concept that had flourished prior to World War II. Whereas the trunk lines relied on the daily participation of a number of "iron man" traffic handlers, NTS is designed so amateurs can participate meaningfully even if they can check into a net only once a week.

The principal objectives of NTS are twofold: (1) rapid movement of traffic from origin to destination, and (2) training of amateur operators in handling written traffic and participating in directed nets. Messages handled by NTS generally originate in a local or section-level net. If addressed to a location within the coverage area of that net, they go no farther but are routed to the station best able to effect delivery. The "system" in NTS is more apparent in the case of messages to be sent over longer distances.

Consider, for example, the classic "message from Hartford to Springfield" that created the concept for the American Radio Relay League in the mind of Hiram Percy Maxim. Maxim found a station in Windsor Locks, halfway in between, to relay his message. Although his station could easily reach Springfield today, these days Maxim would check into one of several daily nets on 2-meter fm or into the Connecticut Net on 80-meter cw and would tell the Net Control Station that he had one piece of "thru" (out-of-section) traffic. A designated net representative would accept the message for relay during the next session of the First Region Net to the rep from Western Massachusetts, who in turn would pass it to a Springfield station on one of the two daily Western Massachusetts NTS nets. That may sound a bit cumbersome for handling a single message, but when multiplied by the hundreds of thousands of messages handled each year by the NTS it's easy to see that it's more efficient than just getting on and calling "CQ Springfield." Even more important, the system provides an excellent framework for the handling of widespread emergency situations. A real emergency is no time to design a traffic system; it's a time to use an existing, well-oiled machine.

Traffic handlers earn their stripes in local and section-level nets, acting as Net Control Station as well as sending and receiving messages, and as their abilities improve they earn the opportunity for greater responsibility. The first step is to represent your section in one of 12 *Region Nets* that cover the U.S. and Canada. As in our example, regional reps send and/or receive traffic going into and out of their section. Next comes the opportunity to represent your region in one of three *Area Nets*. The Eastern, Central and Pacific Area Nets are the "major leagues" of the NTS; here you will find only the most accomplished traffic handlers, though some will be teenagers sporting fairly recent call signs. The highest level is the Transcontinental Corps, or TCC, an elite group responsible for handling traffic between the Area Nets. Generally this is accomplished by out-of-net schedules between pairs of stations in different areas. Most of the skeds are run on cw, some on phone, and occasionally on RTTY, depending upon the preferences of the operators. Usually there is a waiting list for the 154 weekly slots, but if you're good — and persistent — you'll get a crack at a TCC assignment.

Each of the three NTS areas has a volunteer Area Staff consisting of the region net managers, area net managers, TCC directors and three "at large" members elected by the other members. Each Area Staff also selects its own chairman. Infrequent in-person meetings are called by the chairman; some ARRL funds are available for the reimbursement of certain travel expenses. In addition to dealing with problems within their areas, each Area Staff functions as an advisory committee to the Communications Manager on NTS matters.

If NTS sounds like your cup of tea, be sure to request the two free booklets, *Operating an Amateur Radio Station* and the *Public Service Communications Manual*, mentioned earlier. Another League publication you should get is the annual Net Directory; it's free as long as you include a self-addressed 9 × 12-in. envelope and 80 cents U.S. postage with your request to Headquarters.

Have We Found a Place for You?

When this three-part series began in February, we wanted to introduce you to the thousands of volunteers throughout the U.S. and Canada whose efforts make the League *work for you*. Without them Amateur Radio could not exist; the League's members could never afford to pay a professional staff to do everything that's done in the name of the ARRL. An important part of our job at Headquarters is to provide the assistance and support needed to make the best use of this tremendous reservoir of volunteer talent.

We also wanted you to see the wide range of opportunities for greater involvement that exists within the ARRL organization. Thousands of hams have found that greater satisfaction can be gained from their League membership if paying dues is not the end of their involvement. The League exists for the protection, promotion and advancement of Amateur Radio; within the League there are countless ways to serve your fellow radio amateur, and to serve the public as well. Your reward is the satisfaction that comes from being a part of a team that's doing an important job, and doing it well!

Happenings

Conducted By W. Dale Clift,* WA3NLO

Massachusetts Attorney General Agrees with League on RFI

Earlier this year the Town of Andover, Massachusetts, began revising its local zoning ordinances. One of the proposed provisions provided certain "operating requirements" for "amateur communication antennae." This section was as follows:

"a. The operation of any device authorized by the Board shall not cause interference to neighboring television and radio reception and, if such occurs anytime after installation, the applicant shall, in a timely manner and at his expense, correct the cause of the interference as determined by a qualified engineer/technician.

League Hq. was made aware of this proposal by Ed Fleischer, K1JRE, who attended hearings but tried in vain to reason with the members of the Andover Planning Board. Ed argued that hams in the community could not accept such conditions and that, in any event, the Board was pinning the blame for RFI on the wrong parties. Nevertheless, the Board passed the ordinance and submitted it to the Massachusetts Attorney General for approval.

Ed contacted Hq. for help. It was fortunate that Massachusetts law requires that all new ordinances be approved by the State's Attorney General because this gave the League another opportunity to oppose the ordinance. The ordinance was not yet "water over the dam."

Chris Imlay, N3AKD, of the ARRL General Counsel's staff, appealed to Assistant Attorney General Henry F. O'Connell. According to Imlay, the Town of Andover did not have the legal authority to regulate matters of radio frequency interference. "In addition," Imlay wrote, "it places upon amateurs a burden over which they have absolutely no control. The problem of radio frequency interference results not from any fault or effect of Amateur Radio transmitters, but from the inability of home entertainment electronic devices to reject unwanted signals."

O'Connell and the State Attorney General, Francis X. Belloti, agreed. In a letter dated September 8 and addressed to Elden R. Salter, Town Clerk of Andover, the Assistant Attorney General stated:

"Paragraph 3(a) seeks to regulate amateur radio equipment and any interference resulting therefrom. The Federal Government has adopted a comprehensive scheme for the assignment of frequencies and the prevention of interference phenomena. (47 U.S.C. §§151 *et seq.*) (47 CFR 97.73, 97.131, 97.133). *See Schroeder v. The Municipal Court of the Los Cerritos Judicial District*, 73 Cal. App. 3d 841, 141 Cal. Rptr. 85, 87 (1977), appeal denied 435 U.S. 990 (1978). A local community may not legislate in this area."

Attached to the letter was a statement signed by Attorney General Bellotti declaring that the proposed insertion of paragraph 3(a) "is stricken and deleted therefrom."

ARRL ELECTIONS — SLATE OF CANDIDATES

Every two years, ARRL full members have the opportunity to select directors and vice directors to represent their ideas and needs on the ARRL Board. The ARRL Board of Directors is ultimately responsible for all League matters, including deciding ARRL priorities, policies and services that will be made available to the membership. ARRL directors and vice directors are elected to represent specific geographic areas called divisions. (To determine your division and the names of your director and vice director, see page 8 of this or any recent issue of *QST*.)

This year, nominations were open in the *Atlantic, Canadian, Dakota, Delta, Great Lakes, Midwest, Pacific and Southeastern Divisions.* The ARRL Board's Executive Committee met September 12 to examine the nominating petitions filed by members in these eight divisions. The following were the only candidates nominated and eligible in their divisions, and for that reason the Executive Committee declared them elected without need for membership balloting.

Atlantic Division: For director — Jesse Bieberman, W3KT.

Canadian Division: For director — Mitch Powell, VE3OT. For vice director — Thomas B. Atkins, VE3CDM.

Dakota Division: For director — Garfield A. Anderson, KØGA. For vice director — Tod Olson, KØTO.

Delta Division: For vice director — Edward W. Dunn, W4NZW.

Great Lakes Division: For vice director — George S. Wilson, III, W4OYI. (The Committee was also in receipt of a petition nominating Atlee S. Hart, W8VR, as a candidate for vice director. However, Mr. Hart withdrew his name from consideration.

Midwest Division: For vice director — Claire R. Dyas, WØJCP.

Southeastern Division: For vice director — Evelyn D. Gauzens, W4WYR.

Ballots have already been sent to all ARRL full members (of record as of September 10) in those divisions where two or more candidates were found to be eligible for elective office. Those divisions and the eligible candidates are as follows:

Atlantic Division: For vice director — Alan H. Komenski, AC2K, and Hugh A. Turnbull, W3ABC.

Delta Division: For director — Clyde O. Hurlbert, W5CH, O. D. Keaton, WA4GLS, and Lionel A. Oubre, K5DPG.

Great Lakes Division: For director — Joseph E. Miller, K4DZM and Leonard M. Nathanson, W8RC.

Midwest Division: For director — Paul Grauer, WØFIR, and Robert S. McCaffrey, KØCY.

Pacific Division: For director — Michael W. Delich, WA6PYN, and William J. Stevens, W6ZM. For vice director — Ross W. Forbes, WB6GFJ, and Jettie B. Hill, W6RFF.

Southeastern Division: For director — Frank M. Butler, Jr., W4RH, and Stewart H. Woodward, K4SMX.

To be valid, ballots must be received at Headquarters by noon, November 20. A committee of tellers under the supervision of the accounting firm Price Waterhouse will count the ballots and results will be announced over W1AW and in *QST*. Any full member of record September 10 in one of the divisions where elections are being held should receive a ballot by November 1. Those members eligible to vote who have not received a ballot should immediately contact Donna Frechette at ARRL Hq.

LEAGUE COMMENTS ON PROPOSED CHANGES AT 1215 MHz TO 40.5 GHz

Last month, "Happenings" reported in detail the changes the Federal Communications Commission has proposed for the frequencies 1215 MHz to 40.5 GHz. The proposal was made as another step toward implementing the Final Acts of the World Administrative Radio Conference (WARC) held in Geneva, Switzerland in 1979. The ARRL has filed comments in this proceeding, the Third Notice of Inquiry in General Docket 80-739, to protect the interests of the amateur service in this portion of the spectrum.

The League expected the Commission's proposal to withdraw from the amateur service the segment 1215-1240 MHz, as a result of the U.S. Government's desire to protect a future Radionavigation-Satellite Service from interference. However, the League has found that the Radionavigation-Satellite system envisioned for 1215-1240 MHz, the Navstar Global Positioning System, represents a system so expensive that it has become a target likely for elimination from the defense budget. It may never become operational. ARRL has taken no position as to the desirability of the Navstar system, other than to observe that there is considerable and unnecessary redundancy among the numerous radionavigation systems already in use. However, the League has requested that the Commission use its authority under Radio Regulation 3279 to authorize continued amateur operation in the 1215-1240 MHz segment until the implementation of Navstar is a certainty. Amateurs should not be "evicted" until there is a reason for doing so.

ARRL's comments support the continuation of the amateur secondary allocation at 1240-1300 MHz, as proposed, but point out a discrepancy between the Commission's pro-

*Deputy Manager, Membership Services, ARRL

posal for the 1260-1270 MHz segment and what had been previously approved by the U.S. WARC delegation and adopted at the Conference. The present Inquiry has left out the U.S. recognition of an international footnote that permits an uplink allocation at 1260-1270 MHz for Amateur Satellite. This appears to be only an oversight. Nevertheless, the League emphasizes that this uplink allocation is extremely important for the future of the Amateur Satellite Service. In fact, construction is well along on satellites using this band. The Commission cannot now abandon U.S. recognition of this footnote without an explanation.

The League's comments support a proposed footnote to give the Amateur Service a higher status than the Fixed and Mobile Services in the band 2300-2310 MHz. However, the League is disturbed by the proposal to withdraw from amateurs the allocation at 2310-2390 MHz. At no time during domestic WARC preparations was such a proposal aired. In fact, Study Group 8 of the International Radio Consultative Committee (CCIR) is only now addressing the possibility that there may be sharing problems in this band. Furthermore, the League has learned that a study submitted only recently to the CCIR concluded that in the 2.3-GHz band, presently allocated terrestrial services *can* share the spectrum by using different frequency-management techniques (USSG-8 Doc. 8F/34, dated May 28, 1981). The Commission's concern, the League recognizes, is that important flight telemetry in the 2.3-GHz band be protected. However, ARRL asserts that the FCC's proposal that the Amateur Service be excluded entirely from the band 2310-2390 MHz is a completely new proposal and inappropriate for this Inquiry. The Amateur Service's status in this band should remain unchanged until a separate proceeding dealing with this specific issue is initiated and terminated.

The League's comments in the Third Notice of Inquiry also supports the allocations proposals for the following bands: 3300-3500 MHz, 5650-5925 MHz, 10.0-10.5 GHz, 24.0-24.05 GHz and 24.05-24.25 GHz. The League's comments also support the definitions to be used in Part 2 of the Rules for "Amateur Service," "Amateur Station," and "Amateur Satellite Service," and do not object to the other definitions proposed.

FCC WORKING PAPER ON DEREGULATING PERSONAL AND AMATEUR RADIO

Recently, two members of the Commission's Office of Plans and Policy presented to the Commission a paper to stimulate discussion and critical comment on issues involving FCC policy. Working Paper No. 6, authored by Alex D. Felker and James A. Brown, Jr., generally calls for much greater flexibility in the regulation of personal radio, including radio amateurs. It is difficult to do justice to a 69-page paper in the limited space available in "Happenings." We have, however, excerpted a few statements that may be of particular interest to Amateur Radio operators.

We reiterate that this paper purports to stimulate comments and provoke discussions about the FCC's regulatory scheme. The authors have warned readers that the opinions expressed in the paper are their own; the ideas do not necessarily reflect the policies or views of the FCC or of any other organization or individual. Felker and Brown very kindly acknowledged in the preface several persons, among them the League's Washington Area Coordinator, Perry Williams, W1UED, and Assistant General Manager, David Sumner, K1ZZ, for their helpful comments. Copies of the paper are available for a fee from the Downtown Copy Center, 1114 21st St., N.W., Washington, DC 20037, tel. 202-452-1422. Some excerpts follow:

"In short, the hobby is a lot of fun, and it needs perhaps no other justification for most adherents. This motivation is not only fully legitimate but is perhaps the main reason individuals become amateur licensees. As such, it deserves official recognition." (page 17)

"Most observers would agree that the service is adequately meeting the public service and international goals. In contrast, many would also agree that the goals of expanding technical skills and manpower and advancing the radio art have fallen on hard times in recent years. . . . If there is criticism of amateurs for not being technically more advanced, it could be misdirected. Perhaps one should place some responsibility on the regulations, not the licensees." (pages 18-19)

"The Commission currently has outstanding a Notice of Inquiry on the establishment of a new personal radio service in the 890-960 MHz band, commonly called '900 MHz' (Docket No. 79-140). This band is essentially "virgin territory." It presents an opportunity to consider new regulatory approaches for 900 MHz personal radio that could avoid locking up spectrum with technologies that might otherwise be obsolete in a few years." (page 31)

"A number of regulations seem inconsistent with the goals of the Amateur Radio Service. They probably no longer serve any useful purposes either because of technological advances or because they were based in the first place on overly pessimistic predictions of troubles that might arise. Although individually these regulations are not serious constraints to goal achievement, collectively their impact may be significant. They are symptomatic of the numerous petty federal regulations so unpopular these days among the American body politic." (page 36)

"A set of personal radio rules for 900 MHz that specified only out-of-band emission levels and in-band limits on total power emitted (or spectral power-density limits) without regard to bandwidth, channelization, or modulation techniques would allow manufacturers to sell modular "black box" transceivers capable of accepting a variety of baseband signal inputs (voice, video, data) and modulation techniques . . . . For example, computer hobbyists wishing to communicate with one another via a radio-based electronic mail system could simply go to a local electronics franchise outlet, buy a black box plus an appropriate digital modulator/demodulator, take the equipment home, and be on the air quickly after only plugging in a home computer and antenna." (page 45)

"The time may be ripe for careful, *systematic* analysis (perhaps backed by professional survey research) of what truly motivates or might motivate licensees to be more technically oriented. . . . Furthermore, a digital class or similar amateur license, which would allow technically competent licensees to operate on VHF amateur bands without passing Morse code tests may be desirable." (page 49)

"The authors are skeptical about the value of the present CB licensing scheme." (page 49)

"In much the same way that coexistence between amateurs and CBers at 27 MHz might be constructive, a mix of these users at 900 MHz could also have certain advantages." (pages 52-53)

"The idea here is to mix Technician operators with General and higher licensees somewhere in the HF radio telephone bands. Such a link could be useful since both Novice and Technician amateurs are now severely restricted in their HF operating privileges." (page 54)

"In summary, among the rules we think should be eliminated or greatly liberalized are the following: (a) restrictions on that third-party traffic for which amateurs receive neither direct nor indirect compensation; (b) restrictions against automatic control and repeaters on HF, which appear to prevent not only conventional two-channel repeaters but also such (spectrum-efficient) techniques as HF packet switching and automatic "electronic mail boxes"; (c) requirements for separate control operators on repeaters; (d) identification requirements that hamper the use of advanced technologies; and (e) nonauthorization of novel technologies like spread-spectrum modulation." (pages 56-57, footnote omitted)

"Amateur radio's comparative lack of regulatory standards is a far better model to emulate at 900 MHz than are the current CB and GMRS [General Mobile Radio Service] rules. . ." (page 65)

BEACON EXPERIMENT AUTHORIZED FOR 10, 18 AND 24 MHz

The Federal Communications Commission has authorized the establishment of an experimental radio beacon on the bands 10.100-10.150, 18.068-18.168 and 24.890-24.990 MHz, these being the bands allocated for Amateur Radio use by the World Administrative Radio Conference, Geneva, 1979. The experiment is intended to permit amateurs to become familiar with the characteristics of these bands, simplifying the scheduled future changeover to amateur use, to improve amateur use of these new parts of the spectrum, and to provide data on sharing between different services. An important element is securing data on propagation under weak-signal conditions, typical of natural-disaster situations. It will be recalled that this use is one of the major reasons for these new authorizations, the first in many years.

The experiments will include two emission types, three operating modes and two time phases. Basic emission is unmodulated carrier (A0), interrupted each 10 minutes for an ssb (2.8A3J) identification and announcement, this occurring at 2, 12, 22. . .minutes past the hour. Announcement will be of the form: "This is FCC authorized experimental station KK2XJM, Daytona Beach, Florida. QSL via W4MB. Next operation will be repeated on _____ MHz starting on _____," and will be repeated.

Initial operations will be at 3 watts erp, on 10 MHz, commencing about the first of October. In stages, the schedule depending on results, operation will include 18 and 24 MHz. Later phases will include operation at 30 watts erp, with sequencing from band to band, sometimes weekly, sometimes daily, as needed to make optimum use of the bands for propagation experiments, worldwide and to specific areas.

Licensee for the experiment is Robert P.

Haviland, amateur call W4MB. Haviland has been an amateur for 50 years, and has participated in numerous CCIR and ITU conferences and preparatory work. He was chairman of the 28-1215 MHz allocations subcommittee of the FCC's WARC Advisory Committee for Amateur Radio, project engineer on the program which placed the first radio transmitter beyond the ionosphere, and has worked extensively on communication and broadcast satellites. He published the first known proposal for an Amateur Radio experiment on a satellite. Additionally, he has been on a number of DXpeditions, having operated from four continents.

Success of the experiment depends on participation by amateurs and SW listeners, and on their reports. Information needed is date, time and location of reception, strength of signal and of other signals on the band, and nature of the receiving installation. All reports will be acknowledged by QSL.

In addition to reception reports, proposals for special tests will be welcomed, subject to the limitations imposed by the license and by regulations for experimental stations. At this time there is no authorization for communication with amateur stations.

Reports, requests for schedules and proposals for experiments, may be sent to W4MB at the *Callbook* address, or to R. P. Haviland, 2100 South Nova Rd., Box 45, Daytona Beach, FL 32019 — *R. P. Haviland, W4MB*

TWENTIETH-ANNIVERSARY AMATEUR SATELLITE FUND DRIVE: $78,185.16

The ARRL Foundation continues to receive fine support in its Twentieth Anniversary Amateur Satellite Fund Drive for the advancement of "Hams in Space." Want to make yourself a part of tomorrow's telecommunications world today? Send your contribution to ARRL Foundation, 225 Main St., Newington, CT 06111. Hams contributing $25 or more will receive a limited edition Satellite Booster Pin; contributors of $100 or more will also have their names and calls presented in *QST*; contributors of $250 or more will receive an attractive certificate; and $1000 contributors will have their pictures published in *QST* and will receive a personal telephone call from ARRL Foundation President Robert York Chapman, W1QV.

Recent contributors of $100 or more include: Fullerton Radio Club, Inc.; Victor Ruebhausen, W6WNK; San Diego County Amateur Radio Council, Inc., John J. Champa, K8OCL; Fr. Charles L. Lum Kee, S. M., KH6HLU; and Alvin H. Groff, KØVM. — *Richard Palm, K1CE, Assistant Secretary, ARRL Foundation*

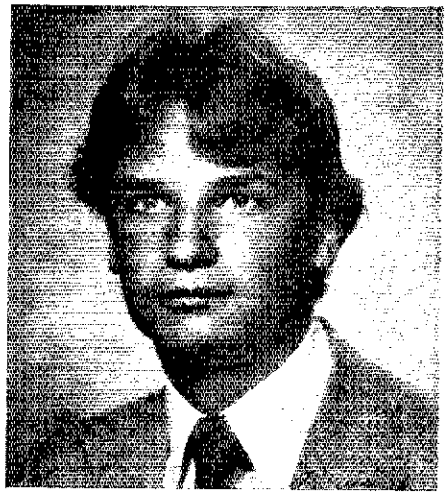
SCHOLARSHIPS: FOR THE ADVANCEMENT OF AMATEUR RADIO

The ARRL Foundation carries the motto "for the advancement of Amateur Radio." In this regard, the Foundation is hard at work in an effort to develop and enhance its scholarship program. How better can the advancement of Amateur Radio be effected than through the provision of supporting funds for youths pursuing an education in the communications field.

Currently, the Foundation's scholarship program centers around the administration of funds for two awards, while we concomitantly are building a separate fund intended to eventually provide a full tuition scholarship annually.

The Long Island School Scholarship was established by monies sent to the ARRL Foundation to provide assistance to youths attending Long Island, New York educational institutions. These funds have aided two young men during the 1980 and 1981 academic year. *James M. Zambik, WB2QYG*, was presented a $250 award for the 1980-81 school year to assist him at Suffolk County Community College, where he concentrated on preparing to teach electronics in a vocational school. He holds an Advanced class amateur license. For the 1981-82 academic year, *Gregory David Jay, WA2EDY*, received $250 in tuition assistance at State University of New York at Stony Brook, where his major is electrical engineering. Gregory is an Advanced class operator and hopes to become a doctor in family practice or cardiology.

James M. Zambick, WB2QYG



Gregory David Jay, WA2EDY

Larry Edwin Smith, Jr., WB9UKE

The second scholarship fund administered by the ARRL Foundation is the *YL ISSB Memorial Scholarship*. This award, established by YL International Single Sidebanders, Inc., provides tuition assistance of $300 to a youth pursuing an education in fields relating to electronics, technology or radio. The recipient of the first YL ISSB Memorial Scholarship award is *Larry Edwin Smith, Jr., WB9UKE*. Larry is studying at Vincennes University in Indiana to prepare for a communications career, hopefully with the NASA team. He holds an Amateur Extra license and a second-class commercial license.

The Long Island School and YL ISSB Memorial Scholarship selection committees had their work cut out for them in deciding on the candidates for these awards. There were 30 applications considered. Academic transcripts and advisor recommendations were important tools in the final analysis. Each year, applications are accepted until May 1 for awards for the subsequent academic year. We have received six already for the 1982-83 school year and invite many more.

In administering scholarships for other organizations, such as is the case with the YL ISSB Memorial Award, the ARRL Foundation acts as a depository for contributions to the award's fund, acknowledges receipt of contributions and invests those funds in high-yield accounts for maximum growth. Although the Foundation scholarship committee is on hand to assist in the screening of applications for particular awards, the final selection procedure can be entrusted to the organization sponsoring the award.

If you, your club or organization are interested in establishing or providing a scholarship or scholastic achievement award, the ARRL Foundation welcomes your inquiries as to how it may be of assistance to you. The advancement of Amateur Radio can certainly be well served through the provision of educational assistance for young amateurs. Your organization cannot make a better investment in the future or leave a better legacy than through the establishment of a scholarship fund. Please address all inquiries to: Andrea T. Parker, K1WLX, Chairman Scholarship Committee, 225 Main St., Newington, CT 06111. — *Andrea T. Parker, K1WLX*

JOHN E. BICKEL, W6NY — IN MEMORIAM

John E. Bickel, W6NY, became a silent key on August 16, 1981. He received his first Amateur Radio call, 6WJ, 68 years ago, in 1913.

"Johnnie," well known in the ARRL Southwestern Division, served as Southwest Division Director from 1940 through 1946, and as Alternate Director 1937-1940 and 1949-1950. He also served his country in both World Wars. In WW I he was a radio instruc-

tor in France with the U.S. Army Signal Corps. In WW II, he was a control-tower operator in the Army Air Force.

During the '30s, Johnnie was an orange rancher in Whittier, California, where he diversified his farming with rhombic antennas as W6BKY. He later engaged in cotton farming near Las Vegas, Nevada, and held the call sign W7OXX.

When he returned to California he received his last call, W6NY. At the age of 70 he retired to Atascadero, California, where he spent the last 15 years. He was a member of ARRL, the California Central Coast Chapter QCWA as well as OOTC. — *Phil Amborn, W6PA*

FCC "CENSURE-Y" CLUB

FCC Revokes KØMGQ

The FCC Review Board has revoked the license of Jerry J. Wells, Pueblo, Colorado, for station KØMGQ and suspended his Amateur Advanced class operator license for the remainder of its term. The Board affirmed the initial decision of FCC Administrative Law Judge Frederic J. Coufal (of January 21, 1981), in which the judge concluded that Wells' station license should be revoked and his operator license suspended because Wells had transmitted on an unauthorized frequency in violation of Section 97.61(a) (Authorized frequencies and emissions) of the Commission's rules. However, the Board did not agree with Judge Coufal that the one-year waiting period be waived to allow Wells to reapply for an amateur license within 90 days.

In directing Wells to show cause why his license should not be revoked and suspended, the Private Radio Bureau alleged that Wells made radio transmissions on 27.550 MHz, a frequency assigned for use by U.S. Government stations in violation of Section 301 of the Communications Act which prohibits unlicensed radio operations. The order further stated that if Wells were transmitting under color of his CB license, he was in violation of numerous CB rules.

While Wells admitted liability for all the CB rule infractions specified against him, except for the charge that he limited the inspection of his CB station, Judge Coufal concluded that this admission could not be permitted to contradict the record evidence that Wells was using amateur equipment and was operating under color of authority of his amateur license. The Review Board agreed with Judge Coufal's conclusion that Wells had not violated the CB rules and that his CB license should not be revoked.

While Section 312 of the Communications Act does not require revocation as a sanction in every case of proven rule violation, the Review Board said that revocation was appropriate in this case. Willful operation of radio transmitting equipment on an unauthorized frequency has been described by the Commission as "a most serious matter," the Board stated. — *FCC News Release*

Traumann, KA6KXF Proceeding

The FCC has designated for hearing an application for station and operator licenses submitted by Marsha R. Traumann, KA6KXF, to determine whether (1) she operated her station in willful violation of Section 97.7 (exceeding privileges of the Novice class license by making voice transmissions and by transmitting on the frequencies 146.10 and 146.22 MHz, reserved for higher classes; 97.84(a) (failure to indentify by assigned call sign) and/or 97.121(a) (identification by false call sign) of the Commission's rules on the night of May 21-22, 1980; (2) she willfully violated Sections 97.82 (failure to have license or photocopy available at inspection) and/or 97.103 (failure to maintain station log) of the Commission's rules on May 22, 1980; and (3) whether she fraudulently obtained an Interim Amateur Permit on March 11, 1981, by presenting a license whose grant had been set aside, in willfull violation of Section 97.129. The Commission will further determine whether Traumann's pending application should be granted and is qualified to be an Amateur licensee. Traumann was issued a Notice of Violation on June 9, 1980. The Commission's DESIGNATION ORDER was issued August 6, 1981. — *Richard K. Palm, K1CE*

Proof of Operation Petition Denied

The FCC has dismissed a petition for rulemaking requesting a requirement in the rules that amateurs submit proof of having accumulated a minimum of five hours of contacts using either A1 or F1 emissions (telegraphy) during the 12 months immediately prior to application for renewal.

The Commission pointed out that prior to December 9, 1975, Section 97.13(a) contained such a requirement, but that under its continuing program of deregulation, it deleted the rule as unduly restrictive and unnecessary. "The Commission at that time held that the requirement constituted an unjustifiable burden on a class of people already shown by Commission examination to be qualified to operate an Amateur Radio station." The FCC said that the petitioner, Patrick M. Berry, has presented no new arguments to justify further consideration of this matter. —*Richard K. Palm, K1CE*

FOUNDATION FOR AMATEUR RADIO SCHOLARSHIPS

The Foundation for Amateur Radio has announced the 1981 winners of the eight scholarships it administers. The John W. Gore Memorial Scholarship ($900) — Brian D. Miller, KAØDGT, Englewood, Colorado. The Richard G. Chichester Memorial Scholarship ($900) — Theodore S. Rappaport, N9NB, West Lafayette, Indiana. The Edwin S. Van Deusen Memorial Scholarship ($350) — Allyn R. Anderson, WB7RVP, Cove, Oregon. The QCWA Silent Key Memorial Scholarship ($500) — Stephen Ketler, WA1WFA, West Bridgewater, Massachusetts. The QCWA Silent Key Memorial Scholarship ($500) — Gary Myers, WA2CUN, Skaneateles, New York. The Radio Club of America Scholarship ($500) — Carl H. Puckett, KA7BWC, Great Falls, Montana. The Edmund B. Redington Memorial Scholarship ($500) — Craig S. Young, KA5BOU, Gretna, Louisiana. The Young Ladies Radio League Scholarship ($300) — Clara L. Muller, KA2DYC, Amsterdam, New York.

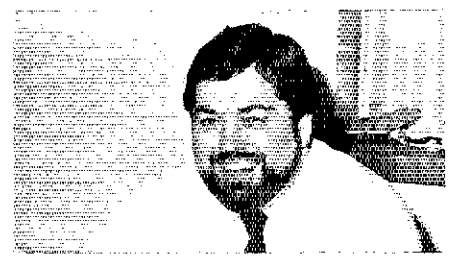
These scholarships were open to all radio amateurs holding at least an FCC General class license or equivalent. This year's applications were received from 29 states, the District of Columbia and Canada. The Foundation is a nonprofit organization representing 49 clubs in Maryland, the District of Columbia and Northern Virginia. It is devoted exclusively to promoting the interest of Amateur Radio and to the scientific, literary and educational pursuits that advance the purposes of the Amateur Radio Service.

Information regarding the scholarships to be awarded next year will appear in the April or May issues of the major Amateur Radio publications. — *Hugh A. Turnbull, W3ABC, Chairman, Scholarship Committee, 6903 Rhode Island Ave., College Park, MD 20740*

BEHIND THE DIAMOND

What you are about to read is the result of a covert (the subject, in his modesty, would never have granted permission for such a project) investigation carried out by the BTD news team. The subject has requested that we not divulge his name. Sorry, *Stephen C. Place, WB1EYI, Manager, Club and Training Department*, we can't do that.

Steve joined the Hq. staff in 1977 as OSCAR Program Manager, helping League members use OSCARs 6 and 7 effectively and prepare for OSCAR 8. In 1978 his duties shifted to the OSCAR Education Program in which he introduced many within the "civilian" education community to Amateur Radio via OSCAR applications in the science classroom, working with various professional societies as the National Science Teachers Association and NASA Education Branch. Early in 1980 he was appointed Manager of the Club and Training Department, which is responsible for the training and club programs, and OSCAR activities.



A native of Boston, Steve lived in Texas, Colorado, Washington and New York during his four years as a bombing/navigation computer technician in the U.S. Air Force. Later, having earned a BS in psychology from the University of Massachusetts, he moved on to Cornell University, where he studied social psychology of deviance (hmm . . .) and interpersonal communication. First licensed as WB2IGW in 1976 while at Cornell, he took a "one year" leave of absence to work at ARRL Hq., where he's now in his fifth year! (which proves the axiom that some have entered the portals of Hq., never to be heard from again).

Steve is a member of the League golf league (the other member is K1CE). It is indeed fortunate that Hq. has a new computer for the large arithmetic task of figuring their scores. A competitive target shooter, Steve has been known to run outside of the Hq. building, pistol in hand, ready to "calibrate" OSCAR 8 in the event of a malfunction.

Steve, still a "single-op" at this writing, resides in the rural Connecticut town of East Hampton. He's an avid ham who enjoys contests, vhfing and radio clubs, and spends much of his leisure time reading. A popular member of the staff, Steve's latest adventures took him to the 1981 National Scout Jamboree, where he was responsible for the operation K2BSA/4, the BSA special-event station. Next time you're in the Newington area, stop by Hq. and say hello to Steve — he's the one with the jovial face, the kind heart and the boy scout shirt. — *Richard Palm, K1CE*

International News

Conducted By Richard L. Baldwin,* W1RU

South Africa

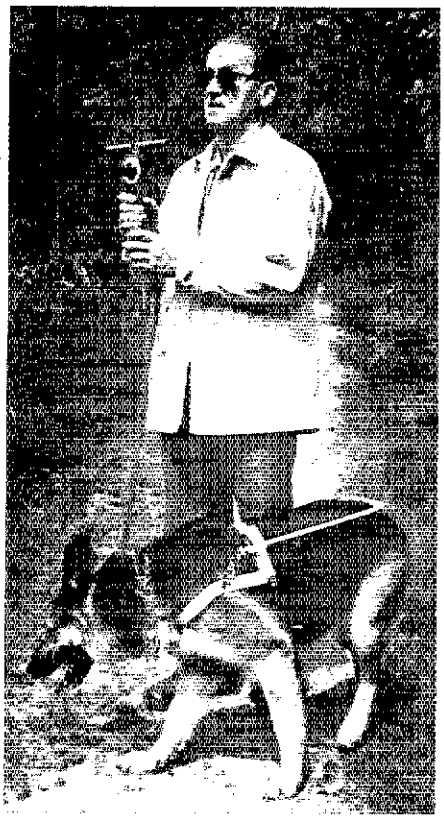
Comes word from ZS1UD that the Postmaster General of the Republic of South Africa has given approval to the issuance of guest licenses for visitors, even where no reciprocal agreement is in force. Application must be made at least three months prior to arrival, a complete itinerary shall be made available, applicants must hold a valid amateur license (Novice licenses do not qualify), the guest license shall be valid for three months, each application will be considered on merit and the license fee shall be R10. Applications may be made directly to the Postmaster General (Telecommunication Dept.), Private Bag X74, 0001 Pretoria, Republic of South Africa. Further assistance may be obtained from the South African Radio League, P.O. Box 3911, Cape Town 8000.

Italy

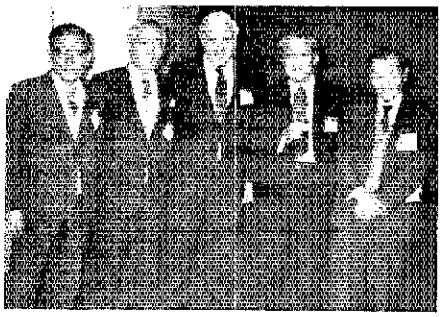
After many years of effort and negotiation, a reciprocal operating agreement between the United States and Italy was finally signed effective August 28, 1981. There are separate applications either for 3-month temporary authorizations or for residents of Italy, and complete information can be obtained either from ARRL/IARU Hq. in Newington, CT 06111, or from the ARI Reciprocal Licensing Department (I4CMF), Via Giorgione 16, I-40133 Bologna, Italy.

Federal Republic of Germany

Fox hunting in Europe is a popular sport, and the annual championships are hotly contested. The eastern countries are particularly keen on this form of direction-finding contest in which the fox hunter charges off in search of the hidden transmitter carrying the direction finder in hand and using his own two legs as locomotive power. Now we have a report of the world's first white-cane Amateur Radio direction-finding contest, held in May of 1981, in conjunction with the year of the handicapped. Under the auspices of the Wurttemburg District of DARC, 11 blind "fox hunters" took part, all with great success. Some were accompanied by people guides, others with seeing-eye dogs, and oftentimes the fox hunters led their guides a merry chase. There were five time-synchronized "foxes," and 10 of the fox-hunting teams found all five of the foxes within the allotted time of one and one-half hours. The winner was DJ6NJ, who located all foxes along the 2-km course within 36 minutes. Second-place finisher was DC4SB, in 43 minutes. Thanks to DJ1OV, Wurttemburg District Fox-Hunt chairman for this inspiring story.



This is DC4SB, second-place winner in the white-cane fox-hunting contest, with his American guide-dog, Amy.



At the CCIR/IARU reception hosted by the Japan Amateur Radio League were (left to right) Mr. Shinzaburo Tanaka, Director-General of the Japanese RRB; Mr. Shozo Hara, JA1AN, president of JARL; Mr. Richard Kirby, WØLCT, Director, CCIR; Mr. Fumio Minozuma, JH1LKJ; and Mr. Shigetake Morimoto, JA1NET.

Japan

Whenever possible, IARU societies host telecommunications officials when important meetings are held in their countries. Earlier this year, a group of ITU CCIR (International Radio Consultative Committee) officials met in Japan, and the JARL, under the leadership of JA1AN, hosted a reception at which there was an opportunity for radio amateurs to talk and exchange views with the director of the CCIR and other ITU officials. This is part of our continuing program to better publicize Amateur Radio among telecommunications authorities.

POSSIBLE IARU RESTRUCTURING

One of the side benefits from the WARC-79 conference was the opportunity for a number of discussions on how the IARU might be strengthened by possible modifications of its organizational structure. Noel Eaton, VE3CJ, president of IARU, named an international committee consisting of the officers and executive committee members of each region, who have in the two years since WARC-79 been exchanging thoughts and ideas on how IARU might be strengthened. The topic has also been a subject for discussion at each of the regional conferences, and certainly will be a major agenda item at the Region 3 conference in Manila. Then, sometime later in 1982, the president of IARU will plan on an international meeting of representatives from each of the regions in order to consolidate the many suggestions into one cohesive plan that can be submitted to the membership of IARU for approval.

REGION 3 IARU CONFERENCE

Every three years each IARU Regional organization holds a conference during which the members of the region have an opportunity to review the status of Amateur Radio in the area and to address common problems. These meetings held since WARC-79 have been particularly important because they have provided an opportunity for in-depth discussions of the WARC-79 results and for mutual agreement on how best to take advantages of the successes we achieved. The next such conference will be held in the early part of April 1982, when the IARU societies of Region 3 gather in Manila, the Philippines.

ROY STEVENS, G2BVN

Just before this issue went to press, we learned of the death, on September 30, of Roy Stevens, G2BVN. Few individuals have been so thoroughly involved in all aspects of Amateur Radio. He was an active amateur, and was high on the DXCC Honor Roll. He served the Radio Society of Great Britain for many, many years, as a member of Council, as President and as a member of many of its committees. He was Secretary of IARU Region 1, and played a key role in the strength of Amateur Radio in Region 1. He was a member of the IARU WARC team at Geneva. There are few indeed who have made such noteworthy contributions to Amateur Radio at both the national and international level. He and this writer worked closely together for the past 20 years, and it is with a great sense of personal loss that we report the death of a good friend. — *WIRU*

*Secretary, IARU

Canadian NewsFronts

Conducted By Harry MacLean,* VE3GRO

Our Man in Ottawa

Ray Perrin, VE3FN, is "Our Man in Ottawa." Most amateurs are surprised when they first meet Ray. His name and two-letter call evoke the image of a kindly gentleman in his fifties, but Ray is 34 years old! A native of Toronto, a graduate of Waterloo University and an electrical engineer, Ray has lived in the Ottawa area for 10 years. He has worked for Bell Canada, the Department of Transport and DOC (the Department of Communications). He is presently with a branch of the civil service that deals with federally regulated telephone companies.

Ray's background, his Ottawa location and his enthusiasm for Amateur Radio, make him an excellent Ottawa liaison person. He knows the people in DOC, and DOC people know him.

If an amateur refers a question to CRRL, a question about DOC policy or regulations, Ray is able to get the answer.[1] If an individual or group asks CRRL to approach DOC about a policy or regulations change, the CRRL Board usually asks Ray to check out the idea, before they pursue it with DOC. When CRRL submissions on behalf of Canadian amateurs come before DOC, it's often Ray who has done the research and written the initial draft. Ray is responsible for much of the content of the CRRL submission on RFI deficiencies in television receivers, and the recent CRRL submission on reciprocal licencing. And now, when DOC has a question about Amateur Radio, or an item of news that they want to share, it's Ray whom they call. Even with all this, Ray manages to take care of a family, and occasionally he even gets on the air! He has been licenced for 18 years. His main interest is vhf DX: He has five provinces and 37 states confirmed on 2 meters. Ray is past president of Ottawa Valley Mobile ARC, and recently became CRRL Central (Ontario) Director.

Representation to Ottawa has been an important function of the Canadian Division of the League since 1920. In CRRL, the new Canadian Division of the League, and representation is very much a team effort. Ray Perrin, VE3FN, is an important part of that team. We're very fortunate to have him.

Ray Perrin, VE3FN (centre) takes a breather at last year's RSO Convention. Ray is CRRL Ottawa liaison. You may recognize the other heads as belonging to Noel Eaton, VE3CJ, and Gerry Hull, VE1BXC, of League Hq. Technical Department.

[1]He shares some of those answers with *QST* readers this month in "Ottawa Mailbox," page 73.

CRRL ELECTION RESULTS

Canadian positions on the ARRL Board, and all positions on the CRRL Board, have been finalized for 1982-83. Mitch Powell, VE3OT, continues as ARRL Canadian Director and CRRL President. Tom Atkins, VE3CDM, is new ARRL Canadian Vice Director and CRRL Secretary. George Spencer, VE6AW, continues as CRRL Western Director; Ray Perrin, VE3FN, is new CRRL Central Director; and Albert Daemen, VE2IJ, continues as CRRL Eastern Director. All stood unopposed, eliminating the need for a ballot in this round of ARRL-CRRL elections.

WHAT YOUR LEAGUE HAS BEEN DOING

CRRL is paying all legal fees in the successful appeal of the RFI case in Mississauga, Ontario. Bob Forbes, VE3QI, was convicted of interfering with a neighbour's stereo under a local antinoise by-law. CRRL arranged for legal counsel, and an appeal was launched. The conviction was overturned on June 8. CRRL was pleased to have taken an active role in this success. The outcome carried favourable implications for all Canadian amateurs. In his summary, the judge stated that regulation of amateur transmitters was a federal matter that could not be made subject to municipal control.

CRRL Counsel Bob Benson, Q.C., VE2VW, has submitted a rewording of tariff item 44534-2 to the Canada Tariff Board. Acceptance would result in duty-free entry of amateur antennas and amateur transceivers with provisions for new WARC bands and/or general-coverage receive functions. The rewording also deletes the word "linear" from the reference to amateur amplifiers.

The *CRRL Newsletter*, as a mailing to clubs, has been discontinued. In the future, *all* Canadian League members will receive the *CRRL Newsletter* twice a year. An abbreviated *Newsletter* formed part of a recent mailing. Instead of a *CRRL Newsletter*, clubs will now receive the CRRL "QST" bulletins, once a month. Bulletin items should be helpful to club editors who are preparing club newsletters.

NOTES FROM ALL OVER

☐ Ten-meter repeater operation is now permitted in Canada. DOC recently made a policy change after a proposal on the matter was submitted by CRRL. DOC must now revise several regulations to bring them into line with the new policy. DOC is presently working on this.

☐ DOC has announced a new third-party traffic agreement with Haiti and a new reciprocal operation agreement with Australia.

☐ The ARRL Board met in Hartford on September 7-10. Two decisions made at the meeting are of particular interest to Canadian amateurs. (1) ARRL dropped its petition for expansion of the U.S. phone subband on 40 meters. A similar petition for 20 meters, however, is still before FCC. (2) ARRL adopted the 160-meter band plan proposed in August 1981 *QST*. Almost all of 160 meters is now available to U.S. amateurs. Similar availability in Canada is expected soon.

☐ Congratulations to Alex Chalmers, VE7AMK, who was runner-up for the Herb Brier Memorial Instructor-of-the-Year award. Alex conducts Amateur Radio classes with Burnaby ARC. Congratulations also to CRRL Past President Ron Hesler, VE1SH, who was recently elected to the QCWA Board.

☐ Welcome to Lester Pearson ARC, which recently became a League-affiliated club. Ray Parett, VE7TG, is the sponsor. Welcome to four new League public information assistants: John Bartlett, VE3DHB, of Barrie; Michael Crestoil, VE2BDM, of Montreal; Jim Munsey, VE6BKW, of Edmonton; and Ron Nagel, VE5RN, of Regina. Also welcome to new League Assistant Director Jon Duerdoth, VE3BKB, of Toronto. Jon has worked with Boy Scouts of Canada for many years and will be sharing his expertise on youth activities.

☐ And finally, we have to share this one with you. From the *Minutes of the Regular Meeting*, June 2, 1981, Vancouver Amateur Radio Club: "Fred Dennert, VE7APT, congratulates himself for recently getting his Advanced ticket." We'd heard it was a small club! Congratulations, Fred.... QST

The CRRL booth is a busy place at any hamfest. Paul Monger, VE3KSK, does the honours at the recent Guelph Amateur Radio Flea Market.

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

Ottawa Mailbox

Conducted By Ray Perrin,* VE3FN

What's Up, DOC?

From time to time, this column will appear in *QST* to deal with some of the questions frequently asked of the Department of Communications (DOC). If you have any queries on Canadian regulations, please write to *Ottawa Mailbox*, c/o Ray Perrin, VE3FN, 128 Withrow Ave., Nepean, ON K2G 3N7, and we will try to answer them in future columns. Our responses for this column have been confirmed with the DOC, and, of course, we will endeavor to reflect the Department's position as accurately and clearly as possible.

Numbers refer to sections of the General Radio Regulations, Part 2.

Q. What are the requirements for keeping a log while operating a mobile station?

A. The regulations state: "33.(2) A radio log is not required to be kept in the case of a mobile station under the operational control of a land station and communicating either directly with such land station or with other associated mobile stations that are also under operational control of the same land station."

What this means is that, if you are mobile and are working a land (i.e. base or home) station, you do not need to keep a log of that contact because the operator of the land station is, in effect, doing it for you as he must log every transmission. If while mobile you work another mobile station, you must log the transmission. A possible exception to the requirement for logging mobile-to-mobile contacts would be if that contact were made through a repeater equipped with a recording device that enabled your contact to be logged by the repeater operator.

All logging requirements are currently under review by the DOC, and this regulation might be changed in the future.

Q. How often must one identify his or her station?

A. This regulation is fairly self-explanatory. It states: "58.(1) The operator of an amateur station shall transmit his assigned call sign

(a) at intervals not greater than thirty minutes during any period in which the station is transmitting; and

(b) at the termination of

(i) a single transmission, or

(ii) each exchange of communications with another station."

Q. What countries permit their Amateur Radio operators to exchange third-party traffic with Canada?

A. Canada has concluded agreements with the following countries to permit Amateur Radio operators to exchange messages or other communications from or to third parties: Australia, Bolivia, Chile, Colombia, Costa Rica, Dominican Republic, El Salvador, Guatemala, Guyana, Haiti, Honduras, Israel, Jamaica, Mexico, Nicaragua, Paraguay, Peru, Trinidad and Tobago, United States of America, Uruguay and Venezuela.

Q. If Canada has a third-party agreement with another country permitting the exchange of traffic on behalf of third parties, can phone patches be used?

A. Third-party agreements with various countries do not deal specifically with phone patches. They state that the regulations of each country must be observed. Therefore, if the regulations of the foreign country permit phone patches, then presumably phone patches can be used in that foreign country when amateurs are exchanging third-party traffic with Canada. As far as phone patches on the Canadian amateur's end of the QSO are concerned, DOC does not regulate them. Though Canadian telephone companies generally tolerate phone patching, Canadian amateurs are cautioned that all phone patching (including autopatch) is not allowed according to the tariffs of most, if not all, of the Canadian telephone companies.

Q. What countries may not be contacted by Canadian amateurs (banned countries)?

A. Canadian amateurs may not contact amateurs in the following countries because they have notified the International Telecommunication Union (ITU) that they forbid radiocommunications with amateur stations under their jurisdiction: Democratic Kampuchea, Iraq, Libya (Socialist People's Libyan Arab Jamahiriya), Somalia Democratic Republic, Turkey, Viet Nam, Yemen and Zaire.

Q. What about operation in Canada by foreign amateurs?

A. There is no formal application form for foreign amateurs wishing to operate in Canada temporarily. An amateur whose country has a reciprocal operating agreement with Canada (other than the U.S.) should do the following before traveling to Canada: (1) Send proof of amateur licensing (a photocopy of the certificate or license will do) to the DOC Regional Office nearest the area of proposed operation in Canada or to DOC Headquarters in Ottawa (see Table). (2) State in his letter the area or place of proposed operation in Canada. (3) If possible, provide an address in Canada where the applicant can be reached. On accepting the application, the DOC will issue a Letter of Authority. This Letter is normally valid for a period of one year and can be extended beyond one year upon request by the applicant. However, the applicant should first note the expiration date on his home certificate or license as no authority that extends beyond this date will be given.

It should be noted that just because Canada has a reciprocal agreement, or arrangement, with a country permitting the temporary operation of its licensees in Canada, it does not mean that a licensed amateur immigrating to Canada from that country will necessarily be eligible for a Canadian license without further testing in Canada.

Q. Isn't there a special agreement of automatic reciprocity between Canada and the U.S.?

A. Yes. A special agreement between the two countries provides for automatic reciprocity among their radio amateurs. U.S. amateurs temporarily visiting Canada no longer need written permits to operate here, and, of course, Canadian amateurs visiting the U.S. no longer need written permission from the U.S. Government to operate there.

Q. What countries permit Canadian amateurs to operate their stations while temporarily in those countries?

A. Canada has concluded agreements or arrangements with the following countries to permit licensed Amateur Radio operators to operate radio stations while temporarily in the other country: Austria, Australia, Barbados, Belgium, Bermuda, Botswana, Brazil, Chile, Colombia, Costa Rica, Denmark, Dominica, Dominican Republic, Ecuador, Finland, France, Germany (Federal Republic of), Greece, Guatemala, Haiti, Honduras, India, Indonesia, Iceland, Ireland, Israel (State of), Luxembourg, Netherlands, New Zealand, Nicaragua, Norway, Panama, Peru, Philippines, Poland, Portugal, Senegal, Sweden, Switzerland, United Kingdom, United States of America, Uruguay and Venezuela.

DOC Offices

DOC Headquarters:

Director General
Telecommunication Regulatory Service
Department of Communications
300 Slater St.
Ottawa, ON K1A 0C8

DOC Regional Offices:

Regional Director
Department of Communications
7th Floor, Terminal Plaza Bldg.
P.O. Box 1290
1222 Main St.
Moncton, NB E1C 8P9

Regional Director
Department of Communications
20th Floor
2085 Union St.
Montreal, PQ H3A 2C3

Regional Director
Department of Communications
9th Floor
55 St. Clair Ave. East
Toronto, ON M4T 1M2

Regional Director
Department of Communications
200-386 Broadway Ave.
Winnipeg, MB R3C 3Y9

Regional Director
Department of Communications
325 Granville St., Room 300
Vancouver, BC V6C 1S5

*DOC Liaison, CRRL, 128 Withrow Ave. Nepean, ON K2G 3N7

YL News and Views

Conducted By Jean Peacor,* K1IJV

YLRL's 43rd Year

The Young Ladies Radio League (YLRL) has announced the election results for what will be the organization's 43rd year. Kay Eyman, WAØWOF, will assume the presidency on January 1, 1982.

Kay has been licensed since 1969 when she operated as KH6HB for three years. She has been a member of YLRL since 1972 and has served as publicity chairman, secretary and vice president. She is also a member of YL International SSBer's, 10-10 and AF Mars, and is an associate member of Buckeye Belles and ALARA. Kay's radio activities include DXing and rag chewing, and she frequently checks into Open House, Tangle Net, Skirts and Shirts and SPARC YL nets. Kay and her OM Mike, WØXM, live in Garnett, Kansas.

Officers for 1982 who will serve with Kay are: Vice President Sandra Heyn, WA6WZN; Secretary Rose Ellen Bills, N2RE; Receiving Treasurer Jerrie Stonier, K6INK; Disbursing Treasurer Jackie Van de Kamp, W6YKU. District Chairmen: 1st—Sue Eichacker, WB1ATJ; 2nd—Minerva Fronhofer, WB2JNL; 3rd—Doris J. Day, WB3GXG; 4th—Jo Melton, WB4NKO; 5th—Hilda Law, WB5YYN; 6th—Jo Anne Dow, WA6ZGM; 7th—Phyllis Douglas, K7SEC; 8th—Doris Smith, WD8IKC; 9th—Adah Elliott, W9RTH; 10th—Pat Cooper, WBØSXN; KH6—no nominee; KL7—Cynthia Henry, AL7BO; VE—Elizabeth Anderson, VE7BIP.

All licensed YLs are eligible for membership in YLRL. Members receive *YL Harmonics*, YLRL's newsletter. Dues for U.S. YLs are $6 per year, due March 1. Dues for DX YLs are $6 plus $2.50 additional for surface mail, or $6.25 additional for air mail. Dues for a family member are $1.25. Subscriptions for nonmembers are $6 per year. For new and reinstating U.S. members joining after August 31 each year, dues may be prorated by half the annual dues for the fiscal year ($3). They should be mailed to the Receiving Treasurer, Jerrie Stonier, K6INK, 9945 Lull St., Burbank, CA 91504.

YLRL's newly elected president, Kay Eyman, WAØWOF.

YLRL announces with pride that the winner of the 1981 YLRL Scholarship is Clara Muller, KA2DYC, of Amsterdam, New York. Clara is a member of a five-ham family. Her mother is KA2ESQ, father KA2DYB, and two sisters are KA2DYD and KA2ICP.

Clara is 18 years old and will be studying Electrical Engineering at the Rochester Institute of Technology. She got her Novice license in January of 1979; she passed her General before the year was out. All of the Mullens are active on the air, particularly on 10 meters.

During a visit to Switzerland last summer, Clara met many radio amateurs, and had the opportunity to operate the club station at International Telecommunication Union Hq., 4U1ITU, in Geneva. She was able to keep in touch with home via Amateur Radio.

The Washington Area Young Ladies Amateur Radio Club (WAYLARC) are working on YLRL Convention plans for June 18-20, 1982. They report that by the first of August they already had registrations from 56 out-of-town YLs.

The convention will be at the Hyatt Hotel, Washington, DC. Arrangements have been made for parking campers and self-contained recreational vehicles in the immediate vicinity of the hotel. Plans also include a boat trip to Mount Vernon, a White House tour and, for the OMs, a special tour of the Goddard Space Center. The YL/OM banquet to be held Saturday evening is expected to be a sellout, and you are urged to make early reservations.

Ione O'Donnell, WA2DMK, and Kay Eyman, WAØWOF, are developing plans for the YL Forum, which provides an opportunity to voice opinions on YLRL matters and its future direction. Any input you might care to make will be welcomed by Ione and Kay.

Further information may be obtained by writing WAYLARC's YLRL Convention Committee, 2012 Rockingham St., McLean, VA 22101 (include an s.a.s.e.).

YL INTERNATIONAL SSB'ERS

14.333 MHz is the frequency. The happenings on this frequency have attracted more than 13,000 worldwide radio amateurs to become members of the YL ISSB. They keep this frequency alive from 1200 UTC each day when a warm-up period begins, until far into the evening hours. The official net starts at 1600 UTC. The net is formally controlled for three successive net sessions, which extend for seven and a half hours, and this is just on the "home" frequency. Depending on propagation, Tuesday and Thursday sometimes finds a net on 21.373 starting at approximately 1600 UTC; weekends on 28.673; there is a ZLDK system on Friday evenings and a ZLVK system on the "home" frequency. YL ISSB provides a time for every radio amateur to take part. All licensed operators are welcome to join.

It all began in November of 1961. A small feminine voice from Johannesburg, South Africa, running low power, plaintively called CQ among all the kWs on 20 meters. She futilely attempted to be recognized by stateside stations. V. Mayree Tallman, K4ICA, zeroed in on her. During the conversation, K4ICA asked: "Would you be receptive to the idea of YL meetings especially sympathetic to low-power stations and for YLs only?" The enthusiastic response that was forthcoming planted the seed that was to grow.

With the staunch support of her OM, Dr. Maurice Tallman, both morally and financially, V. Mayree went to work. Letters were mailed to many radio amateurs. Shortly thereafter a preliminary net had been formed called the YL International FINS. Its credo: "We believe in the dignity of man." Its motto: "Dedicated to the building of friendship among all the peoples of the earth through amateur radio, and to be of service to our fellow man wherever they may be."

On February 9, 1963, YL International SSBers was officially born. As the need for change grew, rules and frequency of net meetings were changed. Originally the net met Tuesdays and Thursdays. By the end of their first year, the deluge of check-ins warranted activity seven days a week. As more and more OMs expressed interest in the system, rules were changed to include OMs.

The first membership list included 473 calls; 93 of these were stateside stations. The first newsletter was mailed to all members in May 1963 (with addresses handwritten).

Knowing the number of stations to be found on the YL ISSB frequency, word quickly spread up and down the bands to the effect "If you have an emergency, go to 14.333 — SSBers can handle it for you." And handle them they did. The net has helped in far too many emergencies to note them all, but they include locating a hard-to-find serum for treating two Nicaraguan children bitten by a rabid dog. One unusual story involved assisting a yacht in flames. The yacht's passengers numbered 17 and it was burning off the Panamanian coast. Within three minutes, SSBer's assistance had Coast Guard helicopters in the air. The yacht and all passengers were rescued. Many U.S. Naval ships had observed this quick action and, as a result, 294 Navy ships, including many tankers and maritime mobile stations were admitted as SSBer members. As the news spread, membership grew to include Air Force bases as well as Voice of America stations.

YL ISSB By-laws now list many purposes. Listed first among them is "Handling national and international emergency traffic."

In February 1968, the SSBer's torch had been kindled and burning brightly in loving friendship throughout the world for 1826 days. Jessie Billon, WA6OET, a strong supporter of YL ISSB since its inception, planned a surprise for V. Mayree, SSBer #1. Can you picture a worldwide secret? That's what Jessie's plans turned out to be. A torch would be passed around the world providing radio amateurs everywhere the opportunity to express to V. Mayree their sentiments on the net's fifth anniversary. Tremendous effort on behalf of all net controls (many staying up all night) saw the torch wend its way, traveling the globe without the sun ever setting on it. On February 10 at 1600 UTC, having completed its unbroken journey, it returned to Jessie, SSBer #2, who presented the "Torch of Friendship" to V. Mayree.

YL ISSBers sponsor an annual QSO Party and sponsor several awards. The YL ISSB Memorial Scholarship Fund provides a $300 scholarship each year for students interested in electronic, technological or radio-oriented studies. Precedence is given to members of the net, or to relatives of a deceased member. The award is administered by the ARRL Foundation at Newington, Connecticut. Direct inquiries to Andrea Parker, K1WLX, c/o the ARRL Foundation.

YL ISSB President is Eleanor Horner, K4RHL; Treasurer Lyle Shaw, KC4LF. Brochures regarding the system may be obtained by writing John Madden, WA1KVC, 347 Western Ave., Lynn, MA 01904, or better yet, listen on 14.333 MHz, then check in — you'll be most welcome.

W1HOZ

David Kuniholm, W1HOZ, scored 1018 points in the phone portion of the 1981 YL/OM Contest. His score was inadvertently omitted from the contest results published earlier.

*Country Club Drive, Monson, MA 01057

Correspondence

Conducted By Bruce R. Kampe,* WA1POI

THE SHRINKING SPECTRUM

☐ As a longtime active amateur and League member as well as an author of the FCC's recently released RFI staff report, I read your editorial on the document ("It Seems to Us . . ." September 1981) with interest. While your summary of some of the policy options is factual, I believe you neglected to explore the rationale behind many of them. Your dismissal of one of the options (licensee responsibility) on the grounds it was economically expedient but technically unsound was particularly surprising.

As you mentioned, the Communications Act mandates the Commission to ". . . generally encourage the larger and more effective use of radio in the public interest. . . ." This mandate requires the Commission to consider two separate, and sometimes conflicting, goals: the effective use of radio, and the public interest.

In nonregulated industries, the public interest (or consumer welfare) and efficient use of resources are tightly linked. The market continuously culls out inefficient firms to make room for more efficient ones. But such a market mechanism has been preempted by the Federal government in the allocation of the resource called "spectrum." This preemption of markets can result in both *apparent* and real inefficiencies. It is clear from your editorial you believe the Commission's actions with

and military in electronic design and system engineering. Some of my work involves RFI and EMI studies and the development of measures for the prevention of RFI and EMI.

Consumer electronic devices are designed as inexpensively as possible for the performance of their intended task without regard to RFI or EMI. For example, I have attempted to use my home computer in the Amateur Radio room without success because of interference to my receiver. Naturally, the computer wasn't intended to operate alongside a communications receiver. A related situation came about when we were performing a series of acceptance tests on a military vhf receiver. A hand-held calculator caused so much hash that we could not use it inside our screen room.

As time goes by we will see more and more consumer electronic devices coming into existence in the home and business, all of which will create pollution of the airwaves. Currently, one can fly over any urban area and note the almost overpowering rf pollution on a tunable hf or vhf receiver.

Keep up the good work, and press forward with the FCC for the establishment of stronger measures and responsibility regarding RFI and EMI enforcement and control. This should include every type of device. Special emphasis should be given to those that are powered from the 120-volt line, as they are usually the most

rules may be even worse than the present wording of the regulations. The current regulations are good, except that few amateurs know them or were examined on them, *ever.*

I enclose a response card from a ham who had a suppressed carrier frequency of 14,348 kHz. He says, "being a new General class, I did not realize I was that far out of band. . . ." Why not? Where was his required "separate and accurate" frequency-measurement equipment, and his routine procedure to ensure fully in-band operation? This of course, would be needed every time the dial is touched near band edges.

I urge the ARRL to see that the newly proposed regulations and license examinations fully cover the legal requirements, so that there will be NO EXCUSE for not knowing. As an Official Observer, I have been "shoveling the sand against the tide," on and off, for about 55 years. It is about time for me to wave a great big red flag in front of the big "bull" and urge that the necessary requirements be met to ensure that *all* amateurs at least KNOW the legal rules perfectly. Your cooperation will be appreciated. — *E. H. Conklin, Capt., USN (Ret.), K6KA, La Canada, California*

☐ I agree with Mr. Gary's letter in "Correspondence" for September 1981. Maintaining the integrity and usefulness of Amateur Radio is of the utmost importance. However

FM/RPT

Conducted By Stan Horzepa,* WA1LOU

Primer For 220 MHz Growth

So you are a 220 user. You love the band because it isn't the zoo that 2 meters often seems to be. But you're getting tired of the constant sniping at 220 by other services (really now, garage door openers demanding a whole 12 MHz?). The problem is that 220 isn't used enough in many places. If you use 220 or are thinking about using 220, here are a few suggestions that may stimulate more use.

1) The most valuable attribute of 220 is privacy. No receiver or scanner for the consumer will receive it. Unless a 220 repeater or remote base cross-links to another band, 220 is the most eavesdrop-proof band below 1 GHz.

Let's exploit that! Suppose that your local 2-meter or 450 machine may be trashed. And suppose that 220 isn't in general use in your area. Now is the time to coordinate fox-hunting activities via 220. Your use of 220 must be kept secret. It's also a good idea to stay off 223.5, the national simplex frequency; virtually all 220 rigs have that channel. Chances are, Mr. Fox will not know that there's a coordinated search underway until it is too late.

2) Without scanners or receivers, 220 is also valuable in emergencies and disasters. If the local emergency services or RACES unit [or ARES group — Ed.] has to pass traffic that isn't for public consumption, transmitting scrambled traffic on the public service band emergency channel may not provide as much security as relaying the traffic on 220. Those who own scanners often own descramblers; yet virtually no one outside of ham radio owns a 220 rig.

Sell this idea to your emergency services director or RACES radio officer [or ARRL Emergency Coordinator — Ed.] and mention that the cost of a crystal-controlled 220 rig is tiny compared to the cost of a commercial public service band unit. From a budgetary standpoint, it's an idea he can live with.

3) How do you turn people on to 220?

The 220-MHz band is not for everyone. Here, in Chicago, 220 is a gentleman and lady's band. If there has ever been a repeater trashing here, I have never heard about it. Furthermore, I've only had one unfriendly QSO on 220 and personalities were not at issue.

The person to target as a future 220 operator is the ham who either: has never gotten into vhf-fm, but is an excellent low-band operator, has been turned off by 2 meters, is technically oriented or is a real ragchewer.

A friend of mine took an informal survey of 220 users in the area and I pass his findings along because they might help you to determine who would get the most out of 220 and who would put the most into it. Of the users who were licensed within the last five years, the larger percentage had previously been on ssb CB channels 16 and 17 where operating practices are more refined than on a-m CB. Some of those polled had even been on "hf," where the operating practices are even more refined, albeit illegal. After coming home to ham radio, these same operators found 2 meters less to their liking than 220 for the same reasons that they shunned a-m cb. The point is that former ssb CB'ers may be good prospects for 220.

Once you've determined who would make the best converts to 220, then gently persuade them. Your best argument, aside from the level of operating practice, is that a typical 220 rig is less expensive than a typical 2-meter rig. If your target is technically oriented, let him or her know that many of the local technical wizards tend to gravitate to 220. That doesn't mean that they don't talk about anything else; you can get some very nifty ragchews and roundtables going. Tried a real ragchew on a 2-meter machine in a metro area lately? They're commonplace in Chicago — on 220.

4) Start a Novice class. Often Novice candidates have heard about 2-meter repeaters. While their minds are still open, clue them in about 220 and place heavy emphasis on good operating practices. We would like to keep 220 a gentleman's and lady's band.

Keep track of the graduates, particularly those with earlier ssb CB experience. And help out those grads when upgrading is nigh and it's time to seriously consider vhf-fm.

5) Ever thought about converting a 2-meter rig to 220? Well, just as the old Business Band rigs gave impetus to 52-, 144- and 450-MHz repeater growth, and as old CB rigs now are doing the same for 10 meters, so can the old crystal-controlled 2-meter rigs do the same for 220. With everyone getting synthesized on 2 meters, a lot of rock-bound rigs are gathering dust in closets or going for a song in the "yellow sheets" or at hamfest flea markets. Why not give them a new lease on life on 220?

Rigs such as the Genave GTX-200, Regency HR-2, Tempo CL-146, VHF Engineering TX2/RF146, Midland 13-505 and the Wilson 1402 all have 220 counterparts. A letter and a few green stamps to the manufacturer should yield the 220 unit's instruction manual and perhaps, if you request it, the coil-winding data to convert the rig to 220.

Those who are really into "putting the ham back into ham radio" (quoth WA6ITF) can also wing it with a 2-meter rig that has no 220 counterpart. This would include the Heath HW-202 and most early Japanese radios.

Some tips: most 2-meter rigs use a doubler as their transmitter's last multiplier stage. Since 144 and 220 enjoy a roughly 2:3 frequency relationship, changing that doubler to a tripler and retuning the final shouldn't be difficult if the amps do not use microstripline circuitry. I have found that most 2-meter power transistors work on 220 with only a small drop in output.

On the receive side, only the oscillator chain and the front-end require work. The oscillator chain shouldn't be much of a problem, since most chains tune quite broadly and the difference in fundamental frequency is not great (45 MHz for 2 meters versus 53 MHz for 220). It's only necessary to change the multiplier from a tripler to a quadrupler. The front end is another story. Judicious use of a grid-dip oscillator and/or a signal generator would be a great help here. Also, "scaling-down" some component values by calculating the reactances of the capacitors (and, thus, the coils) used in the 2-meter rigs, and then using these values to convert the circuit to 220, should help.

Another thought: If anyone makes a successful 2- to-220 conversion, please don't sit on it. Let us all in on it by either publishing or marketing the conversion.

6) Do you own or maintain a 220 repeater? Are you planning or building a 220 repeater? Well, it's time to get together.

For the time being, repeaters are the lifeblood of 220. Where there are 220 repeaters, 220 thrives. Somewhere out there, where all repeaters are on 2 meters, someone wants to put up a 220 machine and doesn't have the finances to buy a repeater package or the knowledge to build one. It took me a year and a lot of help to get my own little system operating properly and now I'm sharing my knowledge and my junkbox with another group trying to make a go at a 220 repeater. It's not costing me a cent, but I'm doing everything I can to help get their machine running right. All established 220 repeater owners and groups have an economic stake in keeping 220 a ham radio band. It behooves you to propagate 220 repeaters, particularly in areas where no 220 machines presently exist.

To those who are contemplating the construction of a 220 repeater, I suggest that if you have no previous experience, contact the nearest 220 repeater operator and seek help to steer you onto the best equipment and construction practices. Cite this article or contact me (s.a.s.e., please). I have a list of ideas that could help you in planning your 220 system. Remember that the local contact is best; the locals are handy, I am not.

7) Some of you are asking why I haven't mentioned the problem of equipment availability and how to get established manufacturers to market gear for our favorite band. Sorry, I have no easy answer — just a pragmatic one: There must be a demand. If what I have said produces results, then there will be a demand. And at this point, I must thank those manufacturers that have supported 220. Without you, 220 would not exist as a ham radio band.

A lot of folks think that "220, use it or lose it," is getting very shop-worn, but it means just what it says. It is a very valuable band and I feel that it's not only worth saving, but that it should thrive. And hams have the resources to get the band moving.

(I'd appreciate it if those who own or maintain 220 repeaters would tell me what your equipment lineup is, including all rf gear but excluding homebuilt control circuits. Rate each item briefly and tell me what you have used in the past that did not work and why. My address is 523 Eagle St., Crystal Lake, IL 60014.) Thanks. — *Art Reis, K9XI*

REGISTRATION/RPT

It's time to register your repeater in order to be included in the next edition of the ARRL Repeater Directory. Even if your repeater is listed in a current edition, you must register each year in order to be included in each edition. November 1 is the deadline for registration, so don't be among the missing. A registration form, CD-240, is yours for the asking from ARRL Hq. in Newington).

*72 Stiles St., Waterbury, CT 06706

How's DX?

Conducted By Ellen White,* W1YL/4

Operating Technique

You sense the euphoric dream-like quality . . . comfortably sitting in the shack, tuning across the cw portion of 20 meters, cruising while you're looking for something interesting to work. There it is, the so-familiar "DE . . ," heralding the start of the pileup . . . a large number of signals, good clean fists, each sending his call once or twice, with just enough frequency separation to be easily read. Ah, *there's* that elusive bait, the "rare DX" station calling "W6XYZ DE . . ." — sending *his* call every 3 or 4 contacts. Every half dozen or so QSOs he makes note of QSL routing information. And, of course, he indicates that calling stations are to call "UP 3 TO 5 kHz."

It is an idyllic situation: the DX station with a decent signal and a good fist, clearly indicating where he wants people to call, who he is listening for (if he desires a specific area), what his call is, who he is working, how to QSL and so on. But, you're in for a rude awakening, OM. Your alarm just went off, and it's time to wake up from that dream.

What is a heck of a lot closer to the truth starts off the same way, with you tuning across 20. However, it all goes downhill in a big hurry from this point! A much more familiar scenario has you running into a massive pileup with what sounds like the whole world calling within 2 to 3 kHz (all at the same time), the DX station only infrequently signing *his* call, the DX station working callers on his own frequency even though he has just told everyone "up 3," W6s calling when the DX station has just said, "W1s, Vermont only." Oh yes, let us not forget all the helpful (?) policemen assisting the traffic flow with their specific suggestions (which need not be mentioned at this point). It's a familiar scenario, isn't it?

If you're still new to DXing (and even if you're not) you can occasionally find yourself sucked up into that maelstrom and wind up sending your own call without first thinking through the situation. Where *is* that DX station everyone is calling? What system (if any!) does he seem to be using? Is he encouraging tail ending (some do, some don't). Is he looking for specific areas — perhaps Utah for his own WAS? (If so, he'll be mighty unhappy with random WB2s jumping in and calling.) *Who* is he — do you really want to call him (do you *need* him on that band/mode) or are you just muscle-flexing?

Even with a kilowatt and big antennas you still have to think through the above areas before you can develop the strategies that will help make you a competent and proficient DXer. Sure, a big antenna and a kilowatt will help, but these absolutely will not substitute for smart operating (and a bit of that elusive element known as luck!).

Listen, and then listen some more. That's probably the best device anyone can give you in relation to effective DX operating. Don't jump into a pileup, listen for 5 or 6 contacts. In particular, try to find the stations being worked by the DX station in question. In that period of time you should be able to determine the method the DX station prefers to use. Keep you calls short. Make sure you're not still calling after he has already gone back to someone else. (This can be downright embarrassing; although it happens occasionally to all of us, try not to make it a habit.) If you've got a good signal and are using the right techniques, signing you call just once (perhaps twice in marginal situations) should be enough. If the DX station likes tail-ending, try it. But, try to time your call just right so as not to interfere with the QSO in progress.

Follow the rules laid down by the DX station, regardless of whether he is on phone or on cw — as well as the special rules delineated by the MC in a controlled net.

If you can maintain your patience you will most certainly be able to analyze the situation and figure out the pattern being followed. Some DX like to work "up" a bit after each QSO. This means you'll have to find the station he is working and be in the right place at the right time. Good knob twirling/calibration (or a second receiver) is essential. If he plays Russian roulette (i.e., spinning his receiver dial to call stations at random) you can be in for an ulcer-provoking situation if you let it get to you. Remember, you can be lucky, too, and go 10 kHz away, call CQ, and possibly raise an even more exotic addition to your countries total.

Keep your perspective, and conscientiously try to improve your techniques. These then furnish the "model" for newcomers to emulate. Please, please, keep your cool. Name calling, holding the key down and so forth won't solve anyone's problem. About the only way to handle that outrageous language/QRM-producing nonsense is the way you do with little kids who are being obnoxious. Ignore them. With any luck, that is exactly what the rare DX station will do.

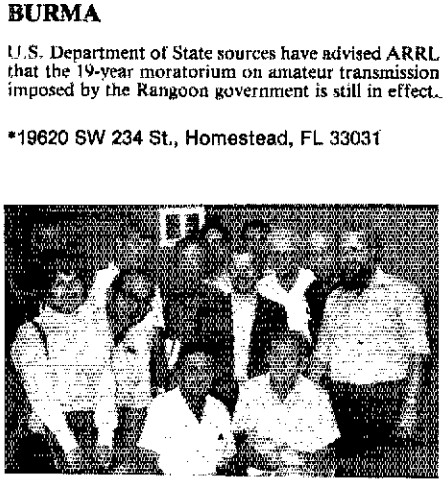
QRL?

OT K4KQ reminds us that possibly there is continued hope for improvement in, at least, cw operation. More and more, Chuck (and others) are hearing the use of QRL? being sent before someone dives in and starts calling CQ. It isn't always fool-proof, but it *is* a start.

BURMA

U.S. Department of State sources have advised ARRL that the 19-year moratorium on amateur transmission imposed by the Rangoon government is still in effect. Rangoon does not recognize the insurgent government controlling the area where the stations in question (XZ5A and XZ9A) are located; thus, their operation cannot be counted under DXCC rules. Oh well, you always did work them first and ask questions later when it came to DXing!

*19620 SW 234 St., Homestead, FL 33031



A visit to Jerusalem by K2EZ and his wife resulted in a special meeting of the local radio club attended by (l-r) front, 4X4OT, 4X4LI; rear, WB7AAC/4X, TI2IB/4X, 4X4JW, 4X4JS, 4X6BM, 4X6CQ, K3ZXC/4X, Aryel (no call as yet), Shimon (no call as yet) and 4X4SO.

ENCOURAGEMENT

"Recently I was thrilled to receive my phone DXCC pin and a promise that the certificate would arrive before very long. Not being an oldtime ham I would not presume to give advice, but perhaps my experience can encourage someone else. All contacts were made barefoot, without speech processing. All antennas were homebrew (partly a multiband quad but mostly vertical ground planes at 34 feet). Being a teacher, I have neither the time nor the money to invest in hamming on the scale I would like. Yet this whole process has been very satisfying. Certainly I drool over the newer and more sophisticated gear. Sure, it took me almost six years from my first confirmed foreign phone contact till my hundreth. But it is good to know that DX is still workable with relatively inexpensive equipment and a little patience. Along the way, practically all foreign operators and most Americans were law-abiding and courteous. That's pretty good, considering the fierce competition." — *WB4IYY*

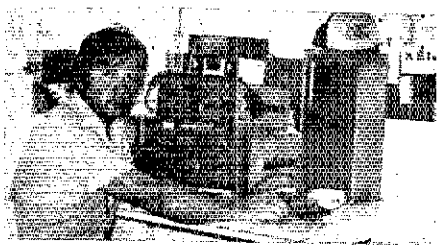
THE CIRCUIT

☐ Look for activation of FS again from about November 21 through December 1, including CQWW — cw. Maestro N6RA again plans to key up FG0FOO/FS from St. Barthelemy, French West Indies.

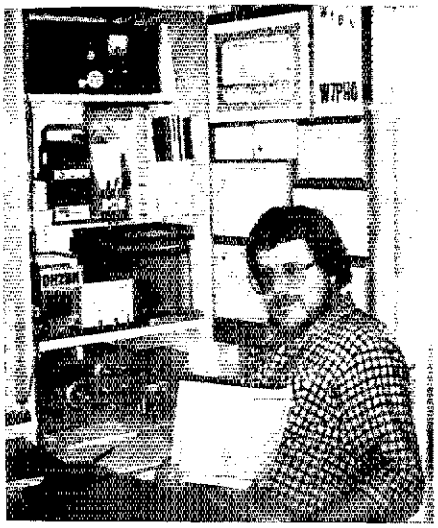
☐ Thanks to LABRE, Brazil's society, for the following list of "special prefixes" and the PY states/territories/districts they denote: prefixes/states — ZV2/Federal District, ZV8/Acre, ZZ7/Alagoas, ZZ8/Amazonas, ZY6/Bahia, ZV7/Ceará, ZZ1/Espirito Santo, ZZ2/Goiás, ZQ8/Maranhão, ZY9/Mato Grosso, ZV9/Mato Grosso do Sul, ZY4/Minas Gerais, ZY8/Pará, ZQ7/Paraíba, ZY5/Paraná, ZY7/Pernambuco, ZW7/Piauí, ZY1/Rio de Janeiro, ZW7/Rio Grande do Norte, ZY3/Rio Grande do Sul, ZZ5/Santa Catarina, ZY2/São Paulo, ZZ6 Sergipe, ZY0/Oceánicas, ZS8/Amapá, ZX8/Rondonia, ZU8/Roraima. To some of us old-timers, seeing a ZS8 prefix in a South American listing causes a double take!

☐ W4JNN reminds us of the Kilburg Geochron World Time Indicator that affords a spectacular look at the world, including very visual dark/light areas. There is a drawback, however (isn't there always?). This nifty item retails for close to a grand. Still interested? Further information may be obtained from the company at 2515 Palm Pl., San Mateo, CA 94403.

☐ QSL manager for the CH2FOU operation is Bob



TL8CN/F2XN, Bangui, QSLs managed by W5RU.



The literate OH2BN of Helsinki uses a Kenwood TS-830S, Heath antenna tuner and random-wire antenna. John has been licensed since 1959 and developed an instant love of cw. The cw DXCC lured him into the DXCC fold, and his totals are now over 250 for that award. His motto? Personal commitment, skill, perseverance and experience make the difference.

Fallot, VE2BCC. The CH2 prefix was used by members of the VE2CTM club from July 1 to 15 to commemorate the International Year of Disabled Persons.

☐ Note that QSL manager WAØJYJ has a new address. He has previously managed cards for YS9RVE and now has the logs for YS9CHE. Cards, please, to John Wieder, WAØJYJ, 1509 Avon Dr., Montrose, CO 81401.

☐ If your recent query to VE3FRA re the *DX Report* was returned as a result of the Canadian postal strike, please try again. *DX Report* is alive and well, and a sample copy awaits you from Alan Leith, 10 Fairington Cres., St. Catherines, ON L2N 5W3. (Gosh, some of those Canadian mail codes begin resembling new prefixes around the time of this conductor's column deadline!)

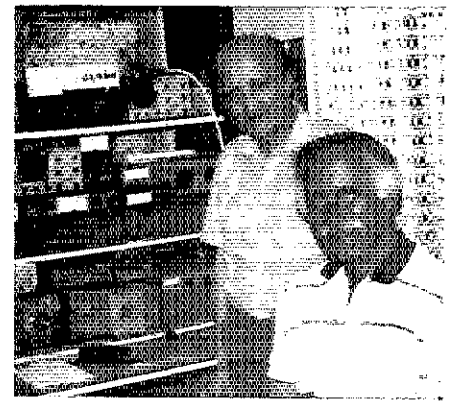
☐ It was an interesting month in a supposedly quiet time with offerings by VU2ALQ via Box 1307, Hyderabad, India; WBØLQS/DU6 via WB7EAE, 3V8BD via G3RGD, S9VCT and 3V8VT via the ubiquitous K5VT, FWØBE via DJ9ZB, FK8CE via K2ROR, KP4KK/DU2 and the exemplary cw operation by OE1ETA/KH8 and ZK2TA, both via OE2DYL.

☐ Let's start a couple of new categories: call hardest to register, both modes. One this scribe worked just recently on cw took longer than usual to penetrate : NH6D/KH4. Whew!

☐ K2ROR (manager for FK8CE) asks that you please QSL with appropriate IRCs or s.a.s.e. instead of through the W2 bureau. Alan indicates that FK8CE is going to Reunion in early December for several months and hopes to sport an FRØ call. A word to the wise: Alan is a stamp collector. Attractive stamps on envelopes going to him wouldn't hurt anyone's cause!

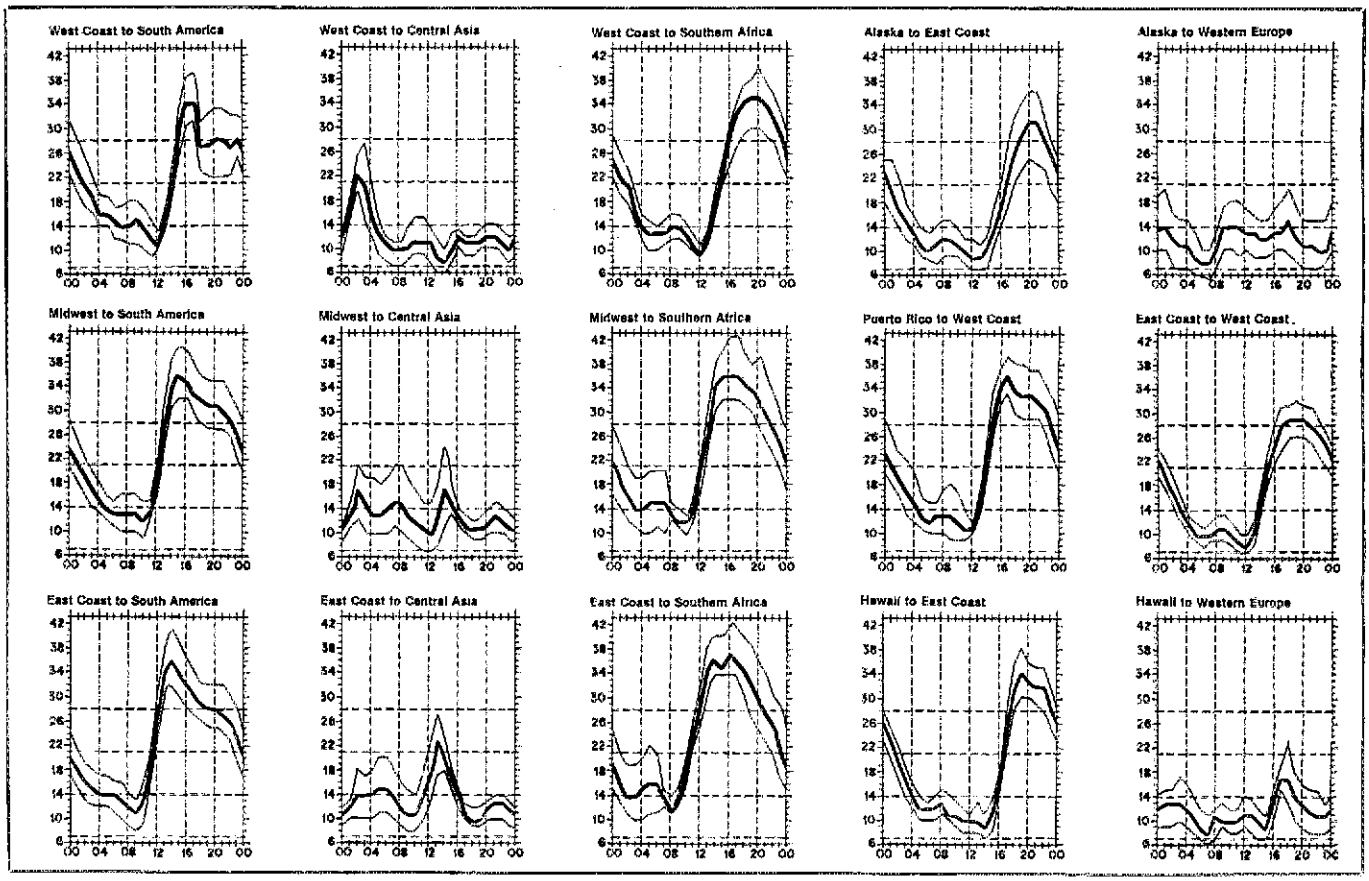
☐ For QSLer of the month, WØRT nominates 9M2LN, op Nara — worked August 25 and card received September 20 on direct route with IRCs. That's fast!

☐ A nice touch when trying to get a speedy return going the direct route is to enclose a useful item to the DX station you're attempting to pry a card out of. How about a picture postcard of something interesting about your area — a map of your state, a DXCC list or a WAS application? Try to make your card stand out by making it special to the DXer. I guess what all of us would do well to keep in mind is to catch the attention and to be thoughtful of the other guy.



A touring DL9BN knocked on WB8MKV's door in West Bloomfield, Michigan, several years ago, leading to many schedules and a developing friendship via 15 meters. This past June, WB8MKV toured West Germany, and the highlight of his trip was staying with DL9BN. Doug, WB8MKV, shown seated in the photo, feels it is a wonderful experience when two hams and their families become such great friends via the medium of Amateur Radio.

☐ OT LU6DJX informs our readership about the significance of the LU calls. The first letter after the number indicates a specific province; the letters A, B and C indicate the capital city of Buenos Aires. T indicates the province of Jujuy, O/Salta, R/Catamarca, K/Tucuman, N/Santiago del Estero, G/Formosa-Chaco, I/Misiones, L/Corrientes, F/Santa Fe,



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

H/Cordoba, S/La Rioja, P/San Juan, M/Mendoza, Q/San Luis, J/Entre Rios, U/La Pampa, DE/Buenos Aires Province, Y/Neuquen, V/Rio Negro, W/Chubut, C/Chubut, X/Santa Cruz-Tierra del Fuego, Z/Islas Malvinas-Antarctic. The number and other letter do *not* indicate location.

☐ The "Big Gun/Little Pistol/Lost Cause" item in the last issue created a lot of good-natured comment. It has come to this writer's attention that the original material appeared in the September 1980 issue of the Albany Amateur Radio Association's fb paper, *B-Plus*, was written by John Yodis, K2VV, and full credit to all should have appeared last month.

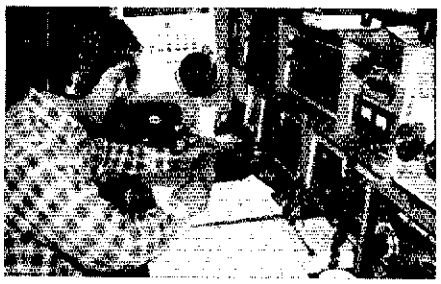
☐ The Northern California DX Foundation, Inc., has a number of interesting items going that you might want to check out. NCDXF sponsors the WB6ZNL beacon and looks forward to near implementation of beacons at KH6O/B and 4U1UN. The Foundation supports, in part, 6 or 7 DXpeditions and is interested in having your input. Send for their questionnaire/Newsletter/beacon information at P.O. Box 717, Oakland, CA 94604.

☐ N9YL asks the question, "How's this for international communicating?" She received an SWL from a French SWL, FE9845, who heard her in a cw two-way with a Romanian station. The French note and card were ably translated by VE2TD resulting in correspondence by Jan and the SWL, thanks to the middle-man efforts of VE2TD.

☐ An example of W6MUR's long-time DX humor was recently reprinted in the Northern California rag, *The DXer*: "The CBer looked at the DXer's tower and asked, 'Why do you have such a high tower?' The DXer replied, solemnly, 'With an antenna that far away from ground, a high tower is absolutely necessary.' "

☐ Heard about the International DX Foundation? As of spring 1981, the Foundation had 527 members in 49 countries. Interested in more information about this group? Send your s.a.s.e. to IDXF, Box 117, Manahawkin, NJ 08050 for details.

☐ W1BBJ completed an interesting statistical analysis of his QSL response covering two years of contacts,



JE1CKA, ex-JAØCUV (thanks W4PRO).

1977-1979. Twelve-hundred cards were sent out, with 841 replies received — a 70% response. Bill clarifies that this was a cw-only survey, the sampling was one of no fewer than 10 contacts and not over 100. CT represents Portugal only, ditto EA Spain only. Best response in terms of percentage was Austria, though Germany, Spain, Northern Ireland and Japan were all quite gratifying. Information refers to country prefix, QSLs sent, QSLs received and percentage.
CO-13-7-54; CT-10-7-70; DL-100-87-87; EA-19-16-84; EI-14-10-71; F-48-33-68; G-50-26-52; GI-12-10-83; GM-16-11-69; GU-10-8-80; HA-56-23-41; HB-50-34-68; I-54-31-57; IS-10-9-90; JA-100-84-84; LA-25-18-72; LU-14-5-35; LZ-17-6-35; OE-23-22-96; OH-29-21-72; OK-100-85-85; ON-15-13-87; OZ-14-9-64; PA-10-8-80; PJ-10-7-70; PY-25-14-56; SM-25-16-64; SP-25-18-72; UK-100-56-56; VK-29-20-69; XE-10-6-60; YO-19-12-63; YU-100-67-67; Y-34-30-88; ZL-14-12-86.

QSL Corner

Administered by Joan Becker

Here is some QSL information for those of you who would like to QSL direct to the station location. It is passed along as we receive it and, therefore, may not be accurate. The call sign in parentheses is the QSL manager.

Many thanks to the following for their contributions: W2QL, AA4MI, EA1QF. Do you have some information that might help? All contributions are always most gratefully received.

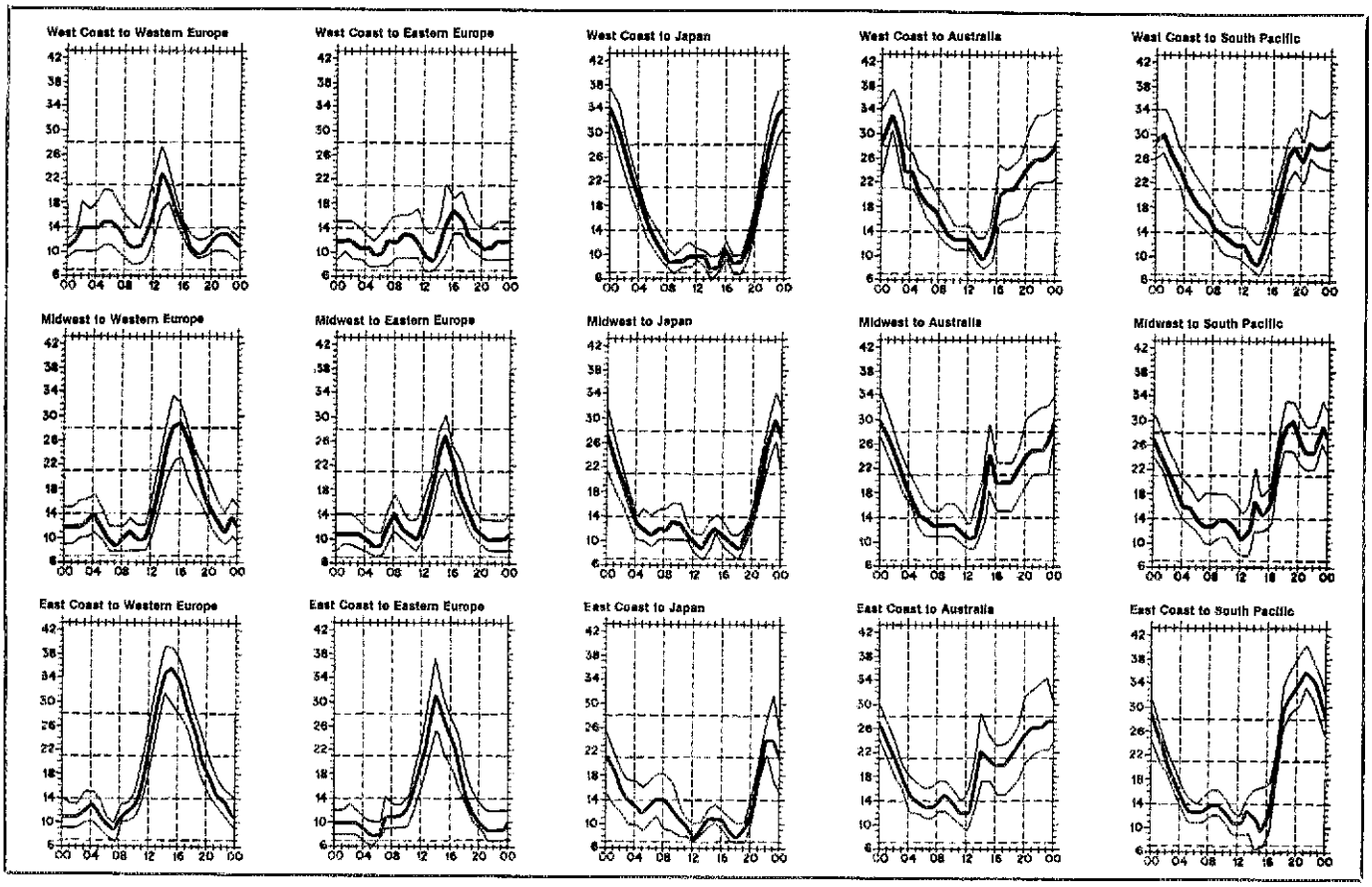
AP2ZA (W6NLG)	R2PR (UP2BEB)
A71AE (DF4NW)	STØAS (DK2OC)
C3LLM (EA3BDW)	TL8CN (W5RU)
C3LMF (EA1QF)	UA1ZEX/U5J (UK5JAR)
C6ADV (N7YL)	VY3CPX (VE3GCO)
EC1AD (EA1QF)	YU7QCC/HBØ (YU7GMN)
EC1BW (EA1QF)	VQ9AA (AJ3N)
EC9AA (EA1QF)	3B8AE/3B9 (3B8CF)
EC9AV	3C1AB (EA1QF)
P.O. Box 278, Mellilla	3C1CE (EA1QF)
FC9UC (F5RV)	3C1JP (EA1QF)
HC8KA (HC5KA)	3C1MM (EA1QF)
HFØPOL (SP5EKZ)	3X1Z (W4FRU)
HT1CTJ (HK3LT)	4N1R (YU1DZ)
J28AZ (I8JN)	4N1Y (YU4YA)
J88AH (WB2AMO)	4N2DX (YU2DX)
OA4DW (N4DW)	4N9PEP (YU2DX)

QSL MANAGER VOLUNTEERS

K5MHZ
KA3ARF
WB1GLH
KM5D

Note

In the September 1981 "QSL Corner," page 67, appears an explanation of the ARRL Membership Outgoing Service. July 1981 "QSL Corner," page 61, contains a list of incoming bureaus and addresses. For information on the bureau operations (Incoming and Outgoing), send a self-addressed, stamped envelope to ARRL, QSL Bureau, 225 Main St., Newington, CT 06111.



lowest curve (optimum traffic frequency, or fot). See January 1977 *QST*, page 58, September 1977 *QST*, page 35 and January 1979 *QST*, page 11, for a complete explanation. The horizontal axis shows Coordinated Universal Time (UTC); the vertical axis, frequency in MHz. Data are provided by the Institute for Telecommunication Sciences, Boulder, Colorado. These predictions, for November 15, 1981, to December 15, 1981, assume a sunspot number of 121, which corresponds to a 2800-MHz solar flux of 168.

DX Century Club Awards

Administered By Don Search, W3AZD

The ARRL DXCC is awarded to amateurs who submit written confirmations for contacts with 100 or more countries on the official ARRL DXCC List. You may also submit cards to endorse your award in 25-country increments through 250, 10-country increments through 300, and in 5-country increments above 300. The totals shown below are exact credits given to DXCC members from July 17 through August 13, 1981. An s.a.s.e. will bring you the full rules for participation in the DXCC, the DXCC list and application forms.

New Members

Mixed

A4XIH/178 F6GXB/108 JA2JRG/152 N1BHC/119 WA2AHP/100 KA4IKT/105 WA6CQW/113 N8AXY/218 N9AII/100
AH2H/110 G2ANT/125 JE2FTC/251 W1KSC/112 WA2HZT/104 KC4NH/100 WA6SIX/176 W8DJI/109 N9CIC/106
CT2AQ/105 G3BPV/110 JH4MUQ/107 WB1FYV/107 WA2LBW/110 KM4M/104 WD6CMT/144 W8SQ/162 W9EHQ/101
CX3BBH/109 G4DRS/125 OE3PKU/116 AI2F/150 WA2NSM/261 WA4LBT/110 KB7OD/145 WB8UZT/106 W9MYJ/100
DF7AU/119 G4GIR/186 PAØFRS/104 K2IBW/181 WB2SJA/109 WA4PCJ/106 KB7QD/104 AF9M/104 WB9TYT/112
DF9ND/129 I1UNO/213 PY5OGG/171 K2JEK/110 WB2VJO/103 K5MHZ/110 KI7X/103 K9NR/128 WD9DGA/103
DJ5FT/109 I2XIP/209 SM3LGO/102 KA2GQW/158 WD2ADX/104 KB5FU/277 W7KSG/322 KA9EMF/123 KAØAAJ/100
DJ6PL/108 I6VYV/110 SM5DKJ/237 KA2HTX/101 K3PPI/163 KB5ZC/102 K8HMS/105 KA9FYA/106 KFØF/110
DJ9HX/119 JA1SFL/158 SM6KRE/122 KB2CB/102 KB3V/107 N5CAS/107 K8RLQ/100 KB9M/113 WØEO/103
DK8ZB/129 JL1LRU/100 VE3JGC/107 N2BTG/100 WB3CMY/104 WD5HUH/205 KB8LH/110 KB9RM/103 WØNPH/114
EL2EV/121 JA2IIG/166 5N3PJR/100 W2KJN/102 WB3DCT/109 KD6EO/135 KB8XD/112 KG9E/111 WDØFSJ/101
F5WF/135 JA2IVK/291 KA1JV/201 W2ODH/103 KA4AVO/199

Radiotelephone

A4XIH/165 G4EHQ/100 JH4MUQ/106 8P6OR/108 W3FMM/105 WA4PCJ/104 WD5FJZ/102 KA8DBM/102 WD8PNJ/108
DF4JE/142 G4GIR/159 ON7FL/131 K1HDO/241 W3TCI/114 WA4ZBK/105 WD5HUH/205 KB8LH/103 K9KJS/103
DJ2JJ/127 I1JJZ/173 P29DP/103 W1KSC/109 W3WD/100 WB4FQX/106 KB6HW/110 KB8RD/117 W9LQI/140
DK6KM/103 I1UNO/193 PY2CSV/199 K2IBW/156 KA4AVO/157 KA5AUO/105 KD6EO/134 KB8XD/110 W9ZUV/107
DL7ZR/141 I4BAC/279 PY5OGG/171 W2IMG/188 KB4BC/106 W5OPZ/105 KN6H/102 KB8ZY/139 WB9TOL/117
DL8MAG/128 I6DVX/151 VK3NXX/110 WA2NSM/260 N4BPT/103 WB5NTI/108 KB7TW/124 W8SQ/161 WB9WID/100
DU1EFZ/100 JH1UUT/109 VS6CT/197 K3KNL/104 NM4R/103 WB5WKU/122 W7LJI/105 WB8NWS/105 WØRHZ/100
EA5ANR/129 JA2IIG/131 5N3PJR/100 K3PPI/158 W4DDP/105 WD5DMH/113 WA7SIG/101 WD8LCE/105 WDØBIE/120
G2ANT/115 JE2FTC/247

CW

DF3EC/107 G4BWP/145 JI1FOL/106 JAØVBJ/104 K2JF/104 K3OX/106 AG5X/109 W8GGX/101 K9RR/102
DLØHSC/104 HB9AIJ/212 JA2IIG/113 KD1O/106 KA2GQW/106 KD4BE/102 N6BJG/109 WD8LCE/102 KB9RM/102
F5WF/109 IT9ZGY/108 JA2IVK/196 WB1CWT/101 KC2X/104 W4WG/137 W6TMD/187 K9AYK/126 WB9VIN/112
G3GHY/102 JA1SFL/125 JA2JRG/123 AA2Q/104

RTTY

N4WW N4SF

5BDXCC

W4ZD OK1WT W3EVW AA4AK G3MCS UWØMF W4HY N9DX W5LP
JA4BJO CN8AK

Endorsements

Mixed

CT2CE/224 JA2HMF/219 KA1CMP/154 WA2CWP/176 KB4UO/185 AK5B/252 W6BJH/315 WA7NEO/260 KC9R/178
DA2DC/274 JA3ANW/250 KA1HQ/206 WA2DFC/169 KC4CT/269 W5AL/351 W6BYH/331 AD8J/175 KC9Z/235
DF5DP/132 JA7MA/330 W1CNU/269 WA2IFS/254 KC4DY/229 KA5FUI/130 W6DPD/261 KBMNG/281 KE9A/261
DF3EC/126 JA7ZF/302 W1GKK/366 WA2PHA/195 KR4M/310 K5GK/274 W6KG/351 K8UE/289 N9ADN/163
DF6CY/259 JA8AYN/317 W1HSP/282 WB2QLO/152 N4AFU/129 K5LP/303 W6LOI/254 K8CMO/306 W9FUI/291
DF4RD/250 JA8FKO/300 W1IKB/295 K3OX/234 N4AH/280 KC5M/225 W6MJP/309 K8BIO/175 W9GDI/316
DJ1IK/251 JA8MHG/176 WA1AER/308 KA3BFX/256 N4AXT/251 N5BA/197 W6MUO/125 KB8ZW/252 W9GGN/125
DJ1ND/252 KL7AF/262 WA1LOU/203 KA3R/185 N4AYO/256 W5CWQ/291 W6NLG/245 KN8R/261 W9GIL/357
DK2UA/280 NL7M/225 WA1TIV/177 KB3OQ/277 N4EY/137 W5IRG/315 W6OU/283 N8II/283 W9LQI/162
DK2XX/234 OH2BAD/328 WB1CNM/175 N3ARV/201 N4VG/259 W5ISF/260 W6SC/331 W8BKP/330 WA9DYV/124
DL1ES/295 OH2BR/330 WB1GZE/223 N3AUE/209 W4DKL/207 W5LVD/313 W6SJC/231 W8ELE/315 WB9LFD/255
DL7EW/203 OH3XZ/300 AE2A/264 N3GB/281 W4GYP/320 W5OVU/310 W6YK/356 W8QWI/322 WB9UIO/154
DL7SY/303 ON4FQ/278 K2ENT/252 N3US/301 W4OMY/172 W5RUH/365 WA6AIL/234 W8RV/220 WB9VIN/249
DL7ZR/152 OZ5KU/214 K2NJ/287 W3DO/259 W4PTH/300 W5SP/323 WA6EJL/251 WB8JSQ/230 WD9COI/217
DL8MAG/234 OZ5VT/310 K2OLG/281 W3KFQ/319 W4RA/283 W5TZN/175 WA6TDX/150 WB8KSG/252 AC0M/279
F5JF/130 PY4LW/312 K2PLF/276 W3WGS/261 WA4QBX/303 WA5ZUH/261 WB6YNI/228 WB8OFG/309 KØKES/267
G3EGG/153 SM3RL/322 K2RZ/157 WA3JLD/135 WB4AGH/160 WB5YKD/232 K7AA/323 WD8IXV/251 KØLD/274
G4BWP/233 YU3AE/X/226 K2TK/203 WA3KCY/298 WB4EDD/306 WB5ZKR/229 K7AII/268 K9AYK/131 KNØQJY/227
HB9ALY/160 YU7ODO/316 K2UFT/179 WB3JNX/224 WB4FTU/253 AC6T/209 K7CU/262 K9BB/305 NØBIZ/130
HK3YH/225 ZE4JS/332 KA2CEK/229 AA4BA/289 WB4MXI/250 AE6U/301 K7NNN/324 K9TN/315 NØOA/325
HKØEHM/208 ZP5CE/310 KC2X/178 AA4WA/272 WB4PRM/263 K6AG/300 K8FSF/125 K9TTM/152 WØHZ/329
I2GXS/232 4X4JO/157 KG2A/233 K4BVQ/336 WB4RFZ/290 K6FM/272 W7BJ/307 K9UA/291 WØJF/262
JA1IOA/288 K1EFI/259 W2ARQ/280 K4EJI/200 WD4GSF/225 K6LAE/329 W7OC/200 K9US/262 WØRT/260
JA1KF/323 K1HDO/261 W2GND/249 K4TF/290 WD4GSG/125 N6BQI/204 W7SFF/269 KA9ERV/147 WBØNAA/285
JJ1KUV/202 K1ST/300 W2IFK/260 KA4BFT/263 AE5V/199 N6DR/150 W7YF/160 KB9UV/260 WBØOHI/150
JA2DOU/225 K1WJL/296

Radiotelephone

A4XIU/165 JG1IIE/135 K1ST/281 KB2MY/183 WB3BXQ/152 W4WMQ/225 KD6CN/126 KB8KW/281 N9ADN/161
CT2CE/224 JA2HMF/206 KA1BRD/183 KC2X/133 WB3EFC/250 WA4ECA/226 W6AEQ/185 KB8HT/134 W9BM/316
DA2DC/274 JA7MA/329 KA1HQ/206 W2AKW/156 WB3FQB/282 WA4OPW/314 W6AXH/315 KB8ZW/260 W9DOH/292
DF5DP/130 JA7ZF/295 KA1JV/201 W2ARQ/278 AA4M/264 WA4QBX/258 W6DPD/261 KC8AV/160 WA9WGJ/198
DK2BL/329 KP4BS/149 KA1PU/126 W2RFU/126 K4BVQ/326 WB4RFZ/290 W6GR/334 KN8R/261 WB9LEF/179
DK2XX/225 LU8CW/301 KB1I/254 WA2IFS/251 K4KAK/254 AE5E/227 W6NLG/245 N8AXY/218 WB9LFD/254
DL7SY/291 OH2BAD/320 N1API/205 WA2PHA/189 KA4BFT/235 K5GK/268 W6OUI/270 N8BKB/210 WB9UIO/154
DL8QS/260 OH2BR/311 W1GKK/343 WB2LEI/149 KB4BW/218 KB5FU/277 WA6AIL/233 N8II/264 WB9VDX/275
EA3AOE/154 OZ3CE/135 W1HSP/265 WB2QLO/151 KC4CT/269 KC5M/223 WA6DJS/138 W8GDA/185 WB9VIN/247
EA3LA/143 OZ5VT/304 WA1AER/308 K3LDE/173 KC4DY/228 N5BA/157 WA6PJR/261 W8QWI/167 WD9COI/217
EA6GP/132 OZ6EII/154 AI2F/150 K3OX/185 N4AXT/241 W5AL/264 WA6VIQ/200 WB8SRD/230 KØLD/265
G4BWP/222 P29GC/225 K2ARQ/272 KA3BFX/254 N4AYO/252 W5HT/211 K7NN/324 WD8PUG/227 KB0U/272
G4IJW/211 S83P/225 K2ENT/252 KB3PJ/310 N4CSF/199 W5KIA/204 W7BJ/305 K9BB/281 WØCSZ/340
HKØEHM/208 SV1IW/252 K2EYJ/276 N3AUE/188 N4DQF/160 W6SGI/255 W7FJE/199 K9BLY/129 WØEAN/220
I2BVG/304 5VØBC/205 K2NJ/224 N3GB/260 N4VG/257 W5SP/304 WA7TTM/270 K9UA/274 WØPXM/225
I2OMF/259 XE1NI/289 K2OLG/280 N3US/293 W4KHW/260 WA5BBR/200 K8CMO/305 K9US/280 WB0OHI/150
I8INW/268 ZF1AK/137 K2TK/149 W3WGS/260 W4PDL/341 WD5DIV/260 K8VIR/290 KC9Z/233 WBØWAY/260
IC8OGS/150 ZL1AAS/310 KB2MK/162 WA3KCY/291 W4RA/277 AC6T/150 KB8IO/175 KF9J/259 WDØCHO/209
JA1KF/312 ZP5CE/306

CW

DJ2AA/197 I2GXS/140 OH2BAD/252 WA1AER/254 K3EQ/203 N4EY/125 AA6DP/204 N7MC/223 KØKES/253
DJ3XD/178 JA1KF/227 OZ5VT/162 K2FU/302 KA3R/141 N5BA/128 AD6D/207 N8II/241 KØRP/230
DL3BK/235 JA8MHG/174 SM7CZC/135 K2NJ/176 N3AUE/137 W5KC/253 AE6U/268 W8QWI/202 WØCAW/231
DL7SY/237 KL7AF/195 ZE4JS/153 K2PLF/163 W3KA/171 W5SP/172 K6TQ/228 K9TE/140 WØJF/152
F3AT/293 LA5HE/224 W1YY/271 KG2A/188 AA4M/254 WB5PLD/151 K7CU/161

DXCC NOTES

5BDXCC correction; LA8CG should be LA8CJ.

September Correction; New Member, Phone, K5GH/311

Honor Roll Correction; Mixed, W6UF should be W6EUF 318/339.

New DXCC country; The ARRL Awards Committee has accepted the recommendation of the DX Advisory Committee to add the Sovereign Military Order of Malta to the DXCC list of countries. Previous contacts with 1AØKM will count for DXCC credit, but cards should not be submitted before January 1, 1982. Cards submitted before that date will be returned without credit.

Single mode DXCC; Minute 41 of the September ARRL Board meeting prohibits mixed mode contacts for CW, Phone, and RTTY DXCC awards with the date of implementation to be set by the ARRL Awards Committee. The committee has met and announced the following schedule for implementation of this Board action. Mixed mode contacts for the CW, Phone, and RTTY DXCC awards will not be acceptable for contacts dated October 1, 1981, and after. Contacts made previous to this date will be acceptable for credit only through December 31, 1981. No submissions will be acceptable for any mixed mode contacts for the single mode DXCC awards beginning January 1, 1982, regardless of the date of contact. For those holding mixed mode confirmations, DXCC rule 5 regarding the submission of cards is waived for single mode DXCC awards during this three-month grace period to permit submission without regard to the number of cards submitted.

QST Profiles

Conducted By Carol Colvin,* AJ2I

"The Old Man's" Partner

Clarence D. Tuska is a name etched in the foundation of the League and QST. *As a young man in the pre-WW I era, Clarence was given a wireless sending and receiving device made by his cousin, and was from then on caught up in the exciting world of wireless communications, which became his life-long interest. As fortune would have it, in 1909 his family moved from New York to Hartford where he joined the Radio Club of Hartford, an active and helpful group including Hiram Percy Maxim.*[1] *A close and enduring friendship flourished between the two: Maxim with his technical knowledge and foresight, Tuska with his youthful enthusiasm and exuberance.*

One of the results of their combined thinking was the idea that amateurs could organize so as to more efficiently relay messages across long distances. They decided to start such an organization. At first, their fledgling group, operating under the auspices of the Radio Club of Hartford, was informal. But dissention soon brought about the creation of a separate, nonprofit organization, devoted solely to Amateur Radio, called the American Radio Relay League. Maxim, as President, and Tuska, as Secretary, sent out application forms and spread word of their relay idea on the air. Response was spirited, and the newly formed ARRL blossomed as hundreds of amateurs signed up to be official relay stations, which were published in lists and distributed to members.[2]

Nearly a year later, Tuska felt that the League needed something more than "relaying," and he suggested to Mr. Maxim that they create a monthly magazine. Thus QST *was born, and the first issue was out in December of 1915. A cottage-industry operation at first, the offices for both* QST *and the League were in Tuska's parents' home in Hartford. The popularity of both increased steadily, because of the great interest in the concept of radio and relaying and because of celebrated* QST *articles such as those by "The Old Man," a pen name of Mr. Maxim.*

Soon the United States was embroiled in WW I, and Clarence, then a student at Trinity College in Hartford and eager to get more involved with the commercial aspects of radio, joined up. He took a commission as Second Lieutenant in the Radio Section of the Signal Corps and was ordered to establish a radio school in Houston. There he met and was so impressed with a student, K. B. Warner, that he knew he had found his eventual replacement in the ARRL and QST. *After the war and successful efforts to get the magazine off the ground again, Mr. Tuska severed his ties with* QST *and the League, and later started the C. D. Tuska Company, which manufactured radios and associated equipment (most notable is the "Tuska Tickler," a differential capacitor that could be connected into a vacuum-tube plate circuit and was compatible with the regenerative circuits so popular then).*[3] *Tuska later joined the A-K (Atwater Kent) Company as a patent consultant specializing in patent law. In 1935 he joined the Radio Corporation of America and became its patent director. Now retired and living in New Jersey, Mr. Tuska remains a most articulate, modest and charming gentleman. "For what it is worth," he says now, "I believe that I have learned more from my failures than I have learned from my successes."*

Clarence D. Tuska, ex-SNT and 1WD, cofounder of the ARRL and QST

Notes

[1]"A Memorable Meeting," C. D. Tuska, *QST*, Jan. 1965, pp. 5-6.
[2]*Fifty Years of A.R.R.L.* (Newington: American Radio Relay League, Inc., 1965), pp. 9-12.
[3]D. Deeley, "History of the C. D. Tuska Company," *The Old Timer's Bulletin*, June 1980, pp. 6-9.

QST: It seems that the League was a solid idea with somewhat shaky beginnings. How did it begin?

Tuska: My conversation with Maxim went something like this (remember we were in the days of spark transmitters): "We can communicate with an amateur in Springfield, Massachusetts, and I suppose he can reach an amateur 25 or 30 miles toward Buffalo. pointed out the dangers. He explained that *each* month came around so quickly. I was concerned about getting sufficient publishable material. But my uncle, who had printer's ink in his veins, told me that I would have more material than I could use after the publication was started.

A decision was made to start on a three-months' trial basis. Note that the early issues [illegible] "THREE MONTHS FOR 25[illegible]

The only one to reply was a music store, which would not pay for the service, but offered to supply phonograph records. Clearly this attempt was ahead of its time.

QST and the League were not ahead of their time, however. After the War, K. B. Warner took my position at the ARRL and *QST*. I have no doubt that much of the success in both jobs was due to Warner's hard work and good judg-

In Training

Conducted By Steve Pink,* KB2GG

GIVING THE NOVICE CODE EXAM

In talking with many of your fellow instructors over the past several months, we've found ourselves caught in a crossfire of friendly "discussion" about the proper way to administer the Novice code exam. It seems that not every instructor shares the same interpretation of Part 97.28 of the FCC Rules and Regs. Fear not: When in doubt, go to the source. We contacted Jay Jackson at the FCC to clarify the issue. (Refer to Part 97.28, "Manner of Conducting Examinations," paragraphs b and c, the *Radio Amateur's License Manual*, 78th edition, page 9-6.)

The key (ouch!) in giving the code test is to understand that when you complete Section II-A of the FCC Form 610 as examiner, you are simply certifying that the applicant has demonstrated the ability to send and receive international Morse code at 5 words per minute. No more, no less. What constitutes satisfactory performance? Is there *one* correct way to give the exam? Though certain minimum requirements do exist, how you determine ability is a matter between you as examiner and your student.

According to the FCC, *proper* code test administration includes a full five minutes of sending and a full five minutes of receiving at five words per minute. That's right — a full five minutes regardless of your experience in some FCC examiners' offices during 13-and 20-wpm tests! To determine code speed, use this simple technique: Five characters make one word, with punctuation and numerals counting as two characters each. The Novice applicant is responsible for knowing 26 letters, 10 numerals and the necessary basic punctuation marks: comma, period, question mark, double dash (BT) and virgule (DN). Use a good mixture of these at the proper rate.

Another requirement is that your student must form the characters *manually* while sending. Hand keys and bugs are acceptable; keyboards (obviously) and electronic keyers are not. For those students who are unable to operate conventional equipment because of physical handicap, the "puff 'n sip" keyer is all right.

What constitutes satisfactory performance? Again, that's between you and your student. Knowing that you as a registered ARRL instructor are a responsible standard bearer who cares about both your students and the health of the Amateur Radio Service, we suggest the following criteria. (Don't forget, the "sins" of the instructor — unnecessary lenience, low standards and poor example — will be visited upon the entire Amateur Radio Service where it hurts the most: on the air!) Your tests and practice sessions should be in the form of sample QSOs that are conducted properly. The greatest dividends arise from practice that is directly relevant to the eventual task; your students will gain competence through experience and you will instill a sense of confidence in them long before they face their first contact.

But how do you measure performance? The choice is yours. A multiple-choice quiz may be used, with eight out of 10 questions correct being the minimum passing grade. Avoid making your tests either foolishly obvious or confusingly tricky; you are, after all, testing code proficiency, not cleverness. Similarly, you can adopt the FCC's current method of fill-in-the-blanks, with seven out of 10 the minimum passing grade. Or, if you prefer, you can adopt the traditional one minute of solid copy out of five minutes sent. Whatever method you choose, make sure your students know what to expect well before the test.

And yes, for those of you who favor the old "beat-the-code-test-jitters" ploy, a warm-up session or practice test *can* serve as the actual test if it is given for a full five minutes at a valid five-word-per-minute rate.

Our responsibility as Novice instructors is an important one. We, by our attitudes and examples, chart the course for our students' Amateur Radio careers. If we lower our standards, teach only the test or drill our students on a single passage in Morse until they have learned only that passage by rote, we are not meeting our responsibility. We'd do little more than create unskilled, unqualified "monsters" who would return to haunt us with their ineptitude. Let's do it right. Your signature on the back of the Form 610 is your word that the applicant has qualified, and an announcement that an eager, competent new ham is about to join our ranks.

*Training Program Manager, ARRL

Morse Code: Teaching Tips and Resources

Before firing up your "classroom key" for the Fall training season, spend a little time going through Chapter Three of the all-new *Tune in the World* and review the new code cassette. Note that the letters are presented in groups and that group drill and cumulative drill are given systematically. Supplementary exercises are given in the new *Novice Instructor Guide*, and yes, they do follow the suggested 10-week course schedule. You may not be aware that casette tapes covering exactly these supplementary exercises are available to ARRL registered instructors for a refundable deposit of $10. You may duplicate these tapes and return the "masters" in good shape for a prompt refund. Both the set of four cassettes and the *Novice Instructor Guide* ($1.50 prepaid for shipping and handling) are available from the Training Branch at ARRL Headquarters.

Though code tapes can be a valuable teaching aid (machine-generated code comes close to being the "ultimate fist"), we encourage you to send at least a portion of the initial practice manually. We know a few young Boy Scouts from urban troops who honestly believed that milk comes from bottles ("A cow!?! You gotta be kidding. Yeech."), and eggs from a packaging machine in some remote assembly line. We hope our students won't "grow up" believing that Morse code is a series of tones mysteriously emanating from a radio or cassette player's speaker. Let them see from the outset that the responsibility for quality and ease of copying lies solely with the sender.

Incidentally, our practice tapes consist of characters generated at about 16 wpm that are spaced to give a net speed of 5 wpm. This ratio is important in learning the code the proper way: aurally (by sound). Your student is less likely to break a character down into component dots and dashes and more likely to perceive the total character pattern when the code is sent this way. Do your students a favor and *DO NOT* teach them the old way with written dots and dashes. Refer to the reprint of "Morse Decoded" at the back of your *Novice Instructor Guide*.

In the beginning, receiving is usually more difficult to master than sending; therefore, more practice is needed in receiving than in sending. An earthshaking revelation? Of course not. But here's one way to ensure the proper emphasis. Split your class up into groups of four, giving each group *one* key and code practice oscillator (simple circuits for both 555-timer and two-transistor CPOs are given in the *Novice Instructor Guide*). If each student then takes a turn at sending, they will have little choice other than following the 4:1 receive:send ratio. This will also bring home the need to form characters carefully with the proper rhythm and spacing.

Is one of your students having trouble with rhythm? Have him generate his own code practice by sending into a cassette recorder. By listening to short stretches of this tape and then trying to correct the shortcomings, he'll get the immediate feedback he needs, without losing face in a group.

Have you other tried and true "tactics" for teaching the code? Share them with your fellow instructors through "In Training" and the *Instructor's Newsletter*. — *Steve Place, WB1EYI*

Hamfest Calendar

[Note: Sponsors of large gatherings should check with League Headquarters for an advisory on possible date conflicts before contracting for meeting space. Dates may be recorded at ARRL Hq. for up to two years in advance.]

Georgia: The Alford Memorial Radio Club will sponsor its 9th annual hamvention on Nov. 14 and 15 at Stone Mountain Inn, Stone Mountain. Registration is $5. Dealer displays and large flea market area. Talk-in on 146.16/76 and 52. For further information contact Carl Nichols, K4ZYK, Chairman, 1657 Flicker Dr., Jonesboro, GA 30236, tel. 404-478-4515.

Indiana: The Allen County Amateur Radio Technical Society presents its 9th annual Fort Wayne Hamfest on Sunday, Nov. 15, at the Allen County Memorial Coliseum, located on U.S. 30 in Fort Wayne. Admission is $3 at the door, $2.50 in advance. Children under 11 admitted free. Coliseum charges $1 for parking. For tickets and further information write to ACARTS Hamfest Chairman, P.O. Box 10342, Fort Wayne, IN 46851.

Michigan: The 12th annual Swap 'n Shop sponsored by the Oak Park High School Electronics Club will be held on Thanksgiving Sunday, Nov. 29, from 8 A.M. to 4 P.M., at Oak Park High School, 13701 Oak Park Blvd., Oak Park. Admission is $1.50 in advance, $2 at the door. All 8-foot tables: $5 in advance, $6 at the door, $3 for half-table. Prizes and refreshments. North and east doors open at 6 A.M. For tickets, tables, information, send s.a.s.e. to Herman Gardner, Oak Park High School, 13701 Park Blvd., Oak Park, MI 48237, or tel. 313-968-2675.

Michigan: The 16th annual Hazel Park Amateur Radio Club Swap and Shop will be held Sunday, Dec. 6, at Hazel Park High School, Hazel Park. Hazel Park High School is located on Hughes St. at 9-1/2 Mile Rd., 1 mile east of I-75. Tickets are $2. Tables are 75¢ per ft. Doors open at 8 A.M. Plenty of food, parking and prizes. Talk-in on 52. For more information send s.a.s.e. to Jack Field, WA8UPU, 1444 E. Evelyn, Hazel Park, MI 48030.

Minnesota: The annual winter hamfest of the Courage Center Handi-Ham System will be held on Saturday, Dec. 5, at the Eagles Club in Faribault. There will be a flea market, dinner at noon, programs and prizes. For more information contact Don Franz, W0FIT, 1114 Frank Ave., Albert Lea, MN 56007. — *Marjorie C. Tenney, WB1FSN, Hamfest/Travel Coordinator, ARRL*

Coming Conventions

February 6-7, 1982
Florida State, Miami

February 27-28
Ohio State, Cincinnati

March 27-28
Nebraska State, Kearney

ARRL NATIONAL CONVENTIONS

July 23-25, 1982
Cedar Rapids, Iowa

October 7-9, 1983
Houston, Texas

The New Frontier

The World Above 1 Gig

Conducted By Bob Atkins,* KA1GT

10-GHz Frequency Marker

One of the problems encountered when operating on the microwave bands is knowing exactly where you are in frequency. A frequency marker, such as is described here, is a harmonic generator that, when driven with a signal of known frequency, produces a series of harmonically related signals. This frequency marker was designed to produce a signal in the 10-GHz amateur band at 10,368 MHz (the preferred frequency for narrowband operation) when driven at 432 or 384 MHz. The signal produced is sufficiently strong to be used not only for frequency calibration, but also for aligning filters or as a short-range transmitter for testing and optimizing antennas. I don't know what the ultimate range of such a transmitter might be, but the signal is quite strong over a range of several hundred feet using small horn antennas and a good (2-kHz bandwidth, 8-dB noise figure) narrowband receiver.

Fig. 1 shows constructional details of the multiplier. A 1N23 series diode is centrally mounted in a section of waveguide, about 7.5 mm (in. = mm × 0.3937) from a blocked-off end. Fig. 1A shows details of a decoupling capacitor made from a thin sheet of Teflon and a small brass disc. Fig. 1B shows a small connector that can be constructed to be a push fit onto the diode. Soldered connections can then be made to this connector rather than to the diode (which can be damaged by excessive heat).

Fig. 2 shows a circuit that can be used between the diode multiplier and a drive source in the region of 400 MHz. R1, R2 and R3 constitute a pi attenuator (6 dB), which provides some degree of isolation between the driver and the diode. L1 is a 0.78 in. long hairpin of no. 22 wire, one end of which is attached to the diode via the connector shown in Fig. 1B. C1 and C2 are adjusted for minimum VSWR at the input or maximum diode current (the two more or less coincide). R4 is used to set the diode current to about 25 mA. The whole circuit shown in Fig. 2 can be mounted on a small piece of pc board and attached to the top of the waveguide. The diode can be driven with up to about 250 mW of rf (1 W at the input), but lower power levels are safer for the diode. The circuit shown in Fig. 2B can be used to measure the diode current. It can be replaced by the circuit in Fig. 2A if desired when the diode current has been set.

The circuit could be driven at 144 MHz or any other frequency with some adjustment of C1, C2 and L1 (for 144 MHz make them larger, and tune for minimum input VSWR). The lower the drive frequency, the lower the power output at 10 GHz will be, but with any drive frequency above 50 MHz audible harmonics in the 10-GHz band should be detectable.

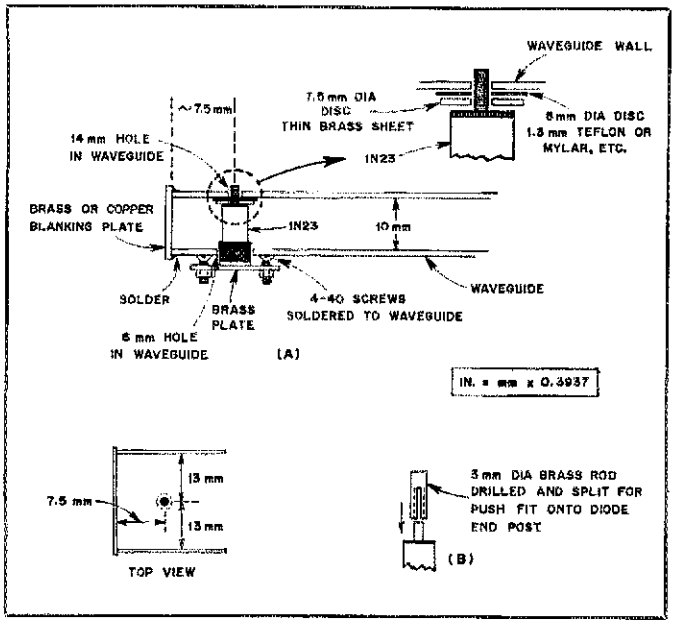


Fig. 1 — 1N23 diode multiplier for 10-GHz signal source.

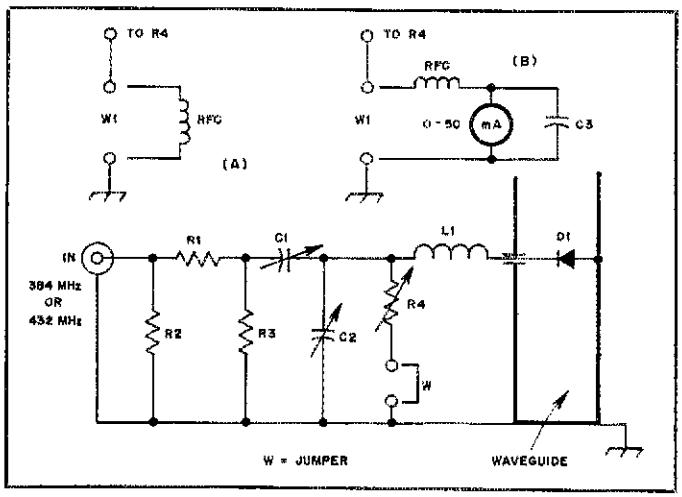


Fig. 2 — Input circuit for waveguide diode multiplier.
C1, C2 — 10 pF variable.
C3 — 1000 pF.
D1 — Waveguide-mounted diode (see Fig. 1).
L1 — 20-mm loop, no. 22 (see text).
M1 — 50 mA.
R1 — 36 Ω, wattage suitable for input power.
R2, R3 — 150 Ω wattage suitable for input power.
R4 — 1500 Ω variable.
RFC — 15 turns no. 28, 3-mm dia.
W1 — Shorting link (see Figs. 2A, 2B).

IARU REGION 1 CONFERENCE

The IARU Region 1 Conference was held in the UK this past April. A number of decisions of importance were made concerning the microwave region of the rf spectrum. A brief summary of these follows.

". . . The dividing line between vhf/uhf and microwaves was confirmed as 1 GHz. This decision was based on the argument that operation above this frequency was still highly experimental, a view which was supported by most of the countries which took part in the discussion. . . . In line with the practice established at the last conference, it was agreed that microwave bands should be specified in terms of frequency rather than wavelength. The preferred designations of new bands allocated at WARC are 47, 76, 120, 142 and 241 GHz. The recommendation that initial operation should center on harmonics of 1152 MHz has been extended, where possible, to the new bands. Specifically, the recommended center frequencies are 24.192, 76.033, 145.152 and 248.832 GHz: . . . It was agreed that the nominal working frequency for 10-GHz narrowband operation should be 10,368.150 MHz, and that the preferred operating frequency for 24-GHz wideband equipment should be 24.125 GHz.

"For EME work at frequencies above 1 GHz, transmitted signals should have right-hand circular polarisation, except on 2.3 GHz where the standard is left-hand circular. It may be noted that reflection from the moon causes a reversal in polarisation so that received signals will be left-hand circular, with again the opposite on 2.3 GHz. The reason for 2.3 GHz being the odd man out is that advantage can be taken of the 2276-MHz beacon left on the moon during the Apollo program. This beacon has already proved useful in testing antennas and 2.3 GHz receiving systems, but unfortunately it transmits right-hand polarised signals, and so the standard was reversed for 2.3 GHz.

"One bad piece of news came from West Germany, whose delegation reported that they were no longer allowed to use frequencies in the 2.3-GHz band below 2320 MHz. As this excludes the narrowband section 2304-2306 MHz, a segment for narrowband operation has provisionally been established from 2320 to 2322 MHz." — *RSGB Radio Communication, July 1981*

CORRECTION

Last month's column stated that the new UoSAT spacecraft antennas will have right-hand circular polarization. They will, in fact, have left-hand circular polarization. QST

*111 Reinman Rd., Warren, NJ 07060

The World Above 50 MHz

Conducted By William A. Tynan,* W3XO

A VHF/UHF Primer — EME

This month, the series on basic vhf techniques, begun in the March 1981 column, continues with a discussion of what is undoubtedly the most challenging facet of operation in the world above 50 MHz. The challenge comes not as much from operating skill and patience, although these are certainly required, but in the assembling and maintaining the gear necessary for success. This month's installment will outline propagation and some equipment considerations, and will take a look at a few of the operating skills needed for successful earth-moon-earth, or EME, operation.

The first thing one must understand before attempting moonbounce is that nature has made it very difficult with the power permitted us amateurs. Because of the distance between the earth and the moon, some 240,000 miles (km = mi × 1.6), and the relatively poor reflecting ability of the body, the free space attenuation that a 2-meter signal experiences when traversing the space from the earth to the moon and back is approximately 253 dB. This varies approximately plus and minus 1 dB as a result of the fact that the moon is not in a circular orbit about the earth so the distance to it varies as it proceeds in its 28-day journey around our planet. On 70 cm the attenuation is greater by about 9 dB because of the "wavelength factor." This arises from the fact that the higher one goes in the radio spectrum, the smaller a resonant antenna becomes. The smaller an antenna is, the less area it has to intercept signals. Thus, for example, a half-wave dipole for 432 MHz, being only one third as long as a half-wave dipole for 144 MHz, will intercept only one ninth of the signal power. This might make it seem that moonbounce is much easier on the lower band, or that it is nearly impossible on the higher one. Such oversimplifications are not valid for several reasons. One reason is that if an antenna for 70 cm is the same physical size as one for 2 meters, the wavelength factor is overcome. At the same time, that antenna will have more gain on transmit than its 2-meter counterpart, thus increasing the effective radiated power of the station. Therefore, a "minimum array for 70-cm EME is considered to be eight high-performance Yagis or a 16-foot dish. On 2 meters, four big Yagis can produce contacts. Another consideration working in favor of the higher bands is that cosmic noise is greater on 2 meters than on 70 cm. As a result, the difficulty of moonbounce is about a toss-up between the two bands. Most vhfers making their first attempt at EME start out on 2 meters, although some do begin on 70 cm. These are by far the most popular bands for this exacting mode of communication. There is, however, a growing number of hams using 1-1/4 meters and 23 cm. Only a few EME contacts have been made on 6 meters and 13 cm over the years since completion of the first amateur two-way QSO via the moon in 1960. That was on 1296 MHz between W1BU and W6HB. The first 2-meter contact, between W6DNG and OH1NL, did not occur until four years later.

The remainder of this discussion will emphasize 2-meter moonbounce, but much of the information is applicable, with some modification, to the higher bands.

As stated earlier, the attenuation of a 144-MHz signal traveling between the earth and the moon and back is about 253 dB. That's a bunch! It is enough to make a moon-reflected signal barely detectable, even when the maximum power allowed is used, the antenna has a gain of around 20 dB and a state-of-the-art receiver is employed. But, if all of these conditions are met, stations can be worked off the moon (witness the over 30 WAS awards achieved on 2 meters to date). It should be understood that, at least with present techniques, moonbounce is not a ragchewer's mode. Signals are usually very weak, and EMErs do well to get calls and reports across. Therein lies part of the challenge. Although one need not normally have to wait for "freak" propagation conditions, which is the excitement for many in other modes, moonbounce operation does require considerable operating skill to pick out the weak signals near the noise level. Almost all EME operation is via cw at about 10 words per minute and normally entails protracted schedules. And, success is not always assured even then. Even in this line-of-sight mode, transmission conditions do vary. Not all of the reasons for this are understood, but some are. For example, the presence of aurora can have a considerable detrimental effect. Then there is Faraday rotation, a continual rotation of the plane of polarization of the wave. This effect exists when radio waves pass through an ionized medium in the presence of a magnetic field. The ionosphere and the earth's magnetic field provide the ingredients necessary for this gremlin to plague EMErs, making it necessary sometimes to wait a quarter hour or so for "the Faraday to rotate around" so that signals can be copied. Then there is libration fading. No, this has nothing to do with imbibing any kind of beverage. It is a rapid flutter type of fading caused by reflections that are coming from many places on the surface of the moon, rather than from a discrete point. Therefore, the reflected signals from these various reflection points may either interfere with, or enhance, one another. Since the moon wobbles somewhat as it goes through orbit, these enhancements and cancellations are continually changing with time. I have already mentioned the approximately plus and minus 1-dB variation in signal level experienced between the moon's apogee and perigee. Naturally perigee is the favored time to set up schedules, especially those involving stations with just enough capability to make the grade. In addition to these propagation variations that affect the strength and quality of signals being returned from the moon, several sources of noise tend to mask whatever signals are present. One is earth noise. When an EME array is aimed at, or near, the horizon, it picks up man-made and other noise originating on the earth in its vicinity. Thus, when the moon is low in the sky, signals will tend to be more difficult to copy than when the antenna is aimed at "cold sky." Even when the antenna is pointed well above the horizon, assuming that antenna side-lobe response is low (making earth noise a small factor), the quantity of noise may vary, thus affecting working conditions. This variation is caused by galactic noise variations in different regions of the sky. For example, if the moon is positioned such that one's antenna must be pointed toward the plane of our galaxy (the Milky Way), the sky noise will be at a maximum. On the other hand, if the moon is in an area in which there are few strong radio noise sources, moon-reflected signals will appear louder because they will be accompanied by less noise. If the moon is near the sun, noise is usually increased.

In upcoming months, I will discuss equipment considerations as well as methods of finding and tracking the moon.

ON THE BANDS

6 Meters — By the time this appears, we should have an inkling as to how good F2 propagation is to be this fall. One indication may be a report from ZD8TC received on 28.885 just as this is being written on September 7. Ted says that his season began August 25 with reception of the PY2AA beacon, which incidentally is now on 50.062. Ted also completed a contact with LU3EX that evening. The following evening he began hearing the Cyprus and Nairobi beacons. These have been in every night since that time. On September 3, he heard FY7THF and on the 5th, ZB2VHF. On the 4th he QSOed EL2AV followed on September 6 at about 2215Z by contacts with KV4FZ and WD4EXH/KV4, along with PJ2DW and 8P6KX. The "real" DX came at 2320 that evening when Ted received a call from CEØAA (Easter Island), who built up from S-8 to S-9 plus 40 dB over a period of about 15 minutes. This was in the midst of many QSOs with PYs and LUs. 9Y4LL also reports working CEØAA at 0310Z September 7. It looks like we may be in for a good time over the coming weeks.

I have received many letters about the "VHF Primer" series, most saying that it has been helpful in answering some basic questions concerning the world above 50 MHz. One of these is from KA8GMJ (Leslie, Michigan) whose previous experience had been mostly with cw on the hf bands. Bill became interested in 6 meters as a result of reading the Primer and went out and purchased an IC-502 along with a Cushcraft three-element beam. Unfortunately, he got on at the tail end of the Es season but, nevertheless, made a few contacts via that mode. He has, however, been able to work stations up to 150 miles away on groundwave. There should be some more Es this winter, Bill, and a lot more next summer. In the meantime, have a good time with the groundwave, and watch out for F2 opportunities. Another one of the numerous 6-meter operators who has done very well with 3 watts from an IC-502 is WA3GYW (Baltimore). Fran has hooked up with all 10 U.S. call areas plus VE1, 2 and 3, and C6A. Success with such low power hinges on the use of a reasonably good antenna. Both of the above stations, and most others reporting good luck with set-ups such

*Send reports to Bill Tynan, W3XO, P.O. Box 117, Burtonsville, MD 20866, or call 301-384-6736 and record your message.

as this, are using small Yagis at about 30 feet above the ground or higher.

K5ZMS reports that KC4P (Alabama) won top spot in the June SMIRK contest with 22,680 points. He was followed by W4OO (Florida) with 16,948, while the "show" position went to W3XO with 15,566. This was just enough to nose out WD4GQU (North Carolina) who racked up 15,416 points. Appearing in the top 10 were JA1RJU with 13,400 and XW1TIS who made many Ws and VEs happy while running up a score of 13,002. SMIRK's next contest takes place for 48 hours beginning at 0000Z November 7. Multipliers this time will be ARRL Sections instead of U.S. states (except in the case of the Maritime Section where the individual provinces apply) and Washington, DC, which qualifies as a separate multiplier not as part of the Maryland-DC Section. Japanese Prefectures and states, or similar suitable subdivisions in all other countries, are also considered separate multipliers. Participants should be careful to collect the required information if they wish to avail themselves of all the multipliers due them. Tip: Mexico does have states.

SMIRK has decided to present a trophy to the first to have worked 50 countries on 50 MHz. Those who may qualify are urged to submit reports of stations worked, including dates of all contacts, and date when last QSL was received. Mail to K5ZMS, 7158 Stone Fence Dr., San Antonio, TX 78227. Please have your list verified and signed by two other amateurs.

The other information from SMIRK concerns the disagreeable subject of dues. The Board of that organization has reluctantly agreed to institute a one-time charge for new members of $6 and a yearly fee of $3 for the *Newsletter*. S.a.s.e.'s are no longer needed in order to receive the *Newsletter*.

K3QMX reports that VP9WB is now back in the U.S. and living in Florida. I am sure that Chuck will be happy to forward any remaining QSLs for Walt.

Good luck to all on the coming F2, and remember to keep 50.1 to 50.125 clear for two-way DX and to use the rest of the band for crossband and U.S./VE contacts via backscatter or other modes. Also, as many have urged, when you hear a DX station announce on 28.885 that he has a beacon running on a particular 6-meter frequency, don't start calling on that frequency, possibly preventing you and others from hearing the station.

CU around 50.2.

2 Meters — More on the Perseids was promised for this month, but who could have expected a report as noteworthy and heartwarming as the one from WØEMS. Frank, who has provided Nebraska contacts to countless 2-meter operators over the years, becomes the second to come up with all 48 continental U.S. states without using moonbounce. The first was WØSD, who pulled off the trick last year. The clean sweep for WØEMS finally came as a result of contacts with WB7TYU/7 (Oregon) at 1200Z August 11 and K9AKS/1 (Vermont) at 1120Z the following day. I can't think of a more deserving guy to accomplish this feat, and he, as well as the others who made it possible by being on the other end, are certainly due congratulations from all of us.

Another station reporting success during the shower is WØRT (Kansas). Dick landed four new states as a result of contacts with W3BDP (Delaware), W2AZL (New Jersey), WB1FVS (Connecticut) and WB7QBC (Wyoming). Also worked were WB4CHU (Florida) and WA2GSX (New York). He says that EME is next. From a well-known old hand at vhf, W4GJO (now located in northwest Georgia), comes word of more Perseids success. Grid QSOed AF1T (New Hampshire) for state number 37 as well as VE3ASO, K1FO, K1JX and W1VD (Connecticut), W2AZL and W2RS (New Jersey), and two Texas stations, W5VY and N5BBO. Trying m.s. for the first time were N3BMH and WB2TRN operating N3KZ, the club station at the University of Pennsylvania. David and Leo worked WA5FDF (Arkansas) for their first meteor contact and heard many more. You can bet that N3KZ will be in there pitching in the future. N1AIS spent all of his operating time with skeds rather than taking the random route. He completed with WA4PCS and WA4DKH (Kentucky), W9BGW (Indiana), K9XY (Wisconsin) and WA4CQG (Alabama). Phil has been spending some time talking to potential converts to weak-signal vhf operation and has stressed a point that he believes should receive wider exposure — the interference that newcomers sometimes cause to skeds and other weak-signal activities. Particularly vulnerable are m.s. schedules where the procedure is to call the same station over and over again in a timed sequence that may last for an hour. Phil urges that newer operators not jump in and call the station being heard. Instead, listen yourself in the direction of the station being called. When you are absolutely sure that the QSO has been completed, then try to make the contact yourself using the same timing sequence.

A widespread tropo session between August 17 and

Frank, K9HMB (left) and Kosie, ZS3E, display just-exchanged QSLs during Kosie's June visit to the U.S. Photo was taken in K9HMB's shack. *(K8EFS photo)*

19 has been reported by a number of stations. W4GJO and NØAJU are among them. From his northwest Georgia location (near Chattanooga, Tennessee) Grid reports working WØEMS (Nebraska), WBØYQS (South Dakota), WBØSWG (Iowa) and Illinois stations KC9B, WD9AQL and KA9BBK. NØAJU (Nebraska) picked up nine new states in one week as a result of the tropo doings. John says that signals from as far away as Ohio and Texas were very strong at his QTH.

Another good tropo opening this one along the East Coast the evening of September 4, is noted by KA1GD/3 (near Washington). Andy says that many New England stations were putting out very good signals, with K1WHS registering S-9 plus 20 dB.

K1WHS continues to give those who wish to get their feet wet in EME an opportunity to give it a try. Even those with single Yagis have a chance. One of the latest is Lorna, WA5EIW (near Corpus Christi). Her husband is WA5TBE who also made it from Texas to the moon, and back to Maine. K1WHS reported that their signals were the strongest he has heard in some time from a single-Yagi station. A good take-off over a body of water in the direction of the rising moon probably has something to do with their good results. Another new EMEr, VE3EQQ, also broke the ice with K1WHS. Mac uses a Tempo-2002 to four 8-element Yagis and is looking for skeds. Call 519-348-8955.

Speaking of EMErs (in this case not so new) — WA4MVI has switched Carolinas. Jim's new address is 20 Country Club Dr., Greer, SC 29651, and the phone number is 803-877-1713. He plans to be back on the bands soon.

And we think that 2-meter Es is exciting around the U.S. and Canada. W1PL passes along a report from HA5HO via an hf-band QSO. The Hungarian station recounted 2-meter Es contacts back in June with 4X4, OD5, 5B4, SM, OZ, LA, 9H1, GJ and UA6. You dyed-in-the-wool vhfers will have to get out your *Callbooks* and check out those prefixes! Another DX note comes from KP4EOR who reports reception by ZD8TC of the 144.145-MHz beacon from ZB2VHF for about an hour, back on May 16. Signals were quite good; however, Ted could not get in touch with Jimmy on the vhf liaison frequency of 28.885, so no contact resulted. Better luck in this year's TE season.

The Higher Bands — Perseids operation was not limited to 2 meters. W3GPY (Pennsylvania) added five new states to his 1-1/4 total via m.s. contacts with WØVB (Minnesota), K4GL (South Carolina), WD4IIS (Georgia), WA4CQG (Alabama) and N4JS/5 (Mississippi). Mike also worked WBØTEM (Iowa) during his 28 hours of skeds. He says that there were periods of up to 30 to 45 minutes when nothing was heard, but that a few 2- to 5-second bursts and a few 20-plus second bursts enabled him to complete his schedules. He ran a comparison between eight 14-element KLMs and a single beam of the same type, and observed little difference in performance on the meteor mode.

That tropo happening, reported in the 2-meter section, was also observed by WB9SNR (near Chicago) on 220 MHz and above. On 1-1/4, Jim landed WØRT (Kansas), W5HN (Texas) and VE3EMS. On 70 cm, KØALL (North Dakota), WØOHU and WBØIUT (Nebraska), N5DL (Arkansas), WA4UWR (Tennessee) and K2YCO (New York) went into his log along with three Iowa stations, WBØTEM, WBØUWG and WØWMP. WAØSJR, WDØGCS, WBØWMD, KØTLM and WØFY (all in Missouri) were also worked.

50-MHz DX Standings

Number of DXCC countries worked via 50 MHz based on information received by September 22, 1981.

	1	2	3	4		1	2	3	4
LU3EX†	59	57	0	0	WB8GEW	22	19	4	4
KH6IAA	54	50	0	0	K9XY	22	18	0	0
W2IDZ	50	49	9	7	K2OVS	22	17	11	5
ZD8TC†	48	44	0	0	K1FWF	21	21	0	0
JA4MBM	47	44	0	0	W5KRH	21	21	2	2
VE1AVX†	45	41	20	20	N7AKB	21	20	1	0
JA1RJU	44	43	0	0	W3OTC	21	17	0	0
JA1VOK	44	43	0	0	K5VVV	20	19	3	0
JA2GHT	44	42	0	0	W1AIM	20	19	0	0
JA2DDN	43	42	0	0	AD1C	19	18	10	2
W2IDZ	43	41	6	6	N5WN	19	13	2	2
JA3EGE	43	41	0	0	WA2YWP	19	8	3	1
W6XJ	43		3		W9OEH	19	—	0	0
N3AHI†	42	40	12	11	N4CD	18	17	6	5
JA5HTP	41	41	0	0	WA5VJB	18	14	1	1
W8CMS	41	38	7	5	N9CEX	17	17	5	5
K1ZFE†	40	40	0	0	W7KNT	17	17	0	0
K8WKZ†	40	39	14	13	K2YOF	17	16	7	7
JE1TGN	39	36	0	0	WB9OPD	17	16	1	0
JA1NVG	38	38	0	0	VK4AYX	17	14	0	0
W3XO	38	33	12	4	KØCJ	16	15	5	2
LU7DZ†	38	30			KØWN	15	15	1	1
LU9AEA†	38	26	0	0	VK3AOR	15	14	0	0
K5SW	37	36	10	10	VK3AUI	15	13	0	0
JA7QVI	37	35	0	0	KØSE	14	14	3	0
WA7JTM†	37	34	1	1	WØRGU	14	13	3	1
WA5IYX†	37	33	7	7	WA6HXM	14	13	0	0
VE1BNN	37	33	4	0	K1LPS	14	13	0	0
KH6IAA	36	33	0	0	WA1AYS	14	12	9	6
W6ABN†	36	32	3	3	K8RZB	13	13	3	2
W5HN†	36	24	0	0	KB7Q	13	12	0	0
WB5CHW†	35	33	4	4	W7IDZ	13	12	0	0
K7ICW	33	32	1	1	VK3NM	13	11	0	0
WB8IGY	32	30	9	7	K6QXY	13	11	0	0
W7KMA	31	30	0	0	WØRRY/5	13	—	4	—
K5ZMS	31	29	2	0	VP9WB	12	11	4	1
XE1GE	31	27	0	0	WØVB	12	12	1	0
WB6NMT	31	26	2	1	N6AMG	12	10	0	0
W2BN	31	24	4	1	W1QXX/KP4	12	10	0	0
W4GKD	31	23	11	11	K9SW	11	11	5	3
LU6DLB	31	16	0	0	VE5JQ	11	11	0	0
WA6BYA	30	30	0	0	WØSD	11	11	0	0
WB2MAI	30	29	9	7	K6ZMW	11	11	0	0
WBØPKN†	30	29	6	5	VP2MX	11	11	0	0
W3BWU	29	29	8	5	WA5OLT	11	10	4	3
WA9AHZ	29	28	9	9	WB5MKU	11	8	1	1
NØLL†	29	28	6	6	KL7JJH	10	10	0	0
KH6FLD	29	27	0	0	WA6IBZ	10	6	0	0
WB8BKC†	29	26	14	13	XE2BC	10	—	0	0
WA8OGS†	29	25	0	0	KL7HMH	8	8	0	0
AE3T†	28	26	12	12	KL7WE	8	8	0	0
WB8GEX	28	26	9	8	VP2VDL	8	6	0	0
W1EJ	28	25	8	5	AL7C	7	7	0	0
WB2CZB	27	26	8	7	NØAIT	7	7	0	0
VE1BNN	27	24	0	0	EI2W	7	—	—	—
N2ASC	26	26	3	3	K7LYT	6	6	0	0
W1QXX	26	25	9	5	W6OAL	6	5	0	0
K3QMX	26	25	8	8	K3LTV	5	4	0	0
WD4FAB	26	25	5	4	WØPVL	5	4	0	0
K8UNV	26	25	1	1	F6FHP	5	—	—	—
K5FF	26	25	0	0	VK2ZDI	2	2	0	0
W3IWU	26	24	14	12	G4BPY**	1	1	21	12
KA4AOK	26	24	7	4	SM7BAE	1	1	6	3
NP2AE	26	21	0	0	OK6JL	0	0	12	5
K4CKS	25	25	13	12	SM6PU	0	0	7	—
W1JR	25	25	7	3	OZ9QV	0	0	5	1
W4OO	25	23	3	—	G3VZJ	0	0	4	4
W5NKG	25	24	0	0	G3PLP	0	0	4	2
N8AXA†	25	19	5	4	I5CTE	0	0	4	0
WA3DMF	24	23	11	11	G4ANT	0	0	3	2
WB8PAT	24	—	4	—	G3TAA	0	0	3	2
WA2BPE	23	23	9	0	HB9QQ	0	0	2	2
W5FF	23	23	0	0	F6EMT	0	0	2	2
KØTLM†	23	22	4	4	G3RDQ	0	0	2	2
AE3T	23	18	9	6	OE1HGW	0	0	2	1
K6PHE	23	20	0	0	OZ7IS	0	0	2	—
K7GGI	23	18	0	0	G4ANT	0	0	2	2
KØGJX	22	21	0	0					
K1FJM/4	22	20	7	6					

1 — 6-Meter Two-way Worked
2 — 6-Meter Two-way Confirmed
*3 — Crossband** (6 to 10) Worked
4 — Crossband* Confirmed

*Crossband countries listed are those not duplicated by two-way contacts.
†Stations on all continents have been contacted.
**Two-way is 6- to 4-meter crossband.

In addition he QSOed Oklahomans K5SW, K5JKP, WB5ZUJ, K5CM and W5OFU, along with the two stalwarts from Big D, W5HN and WB5LUA. On 23 cm, Jim completed with W9TFY and W9AAG in his own state as well as WB5LUA, the latter representing a distance of about 750 miles. Jim notes a pronounced "skip effect" in which the more westerly stations were the strongest at his location. WB5LUA sends along a copy of his very impressive log covering the period of the opening. Al also notes that W5HN made numerous contacts on 1-1/4 meters including WBØTEM and KØDAS (both Iowa) and WØVB, as well as WB9SNR.

WB2BYP is compiling a list of 1-1/4 meter stations in North America. Please send your vital statistics and future plans to John Stevens, 1097 White Oak La., Victor, NY 14564.

Silent Keys

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

W1AKR, Donald H. Sutherland, Bangor, ME
W1AMA, Howard A. Reffelt, Sandy Hook, CT
W1KOV, George W. Wicks, Warwick, RI
W1KYX, Louis H. Smith, Bedford, MA
K1LXC, Webster A. Thayer, South Newfane, VT
W1MGD, E. Earl Roberts, Ridgefield, CT
W1MKA, Lester A. Witham, Bradford, NH
W1NGJ, Edward A. Burns, Waltham, MA
W1UAC, Mats G. Forslund, Stratford, CT
W2IIA, Robert A. Reikosky, Trenton, NJ
K2EF, Joseph W. Gibbons, Port Jervis, NY
W2GLP, Alfred Dolid, Minneapolis, MN
WA2ILH, Jason M. Cady, Mayville, NY
W2JBF, The Rev. J. Stanley Wagg, Barnegat, NJ
KA2JIW, Albert Rose, LeRoy, NY
W2OST, Robert Smolenski, East Orange, NJ
W2SGA, Marvin L. Fauer, West Orange, NJ
W2VJH, Louis R. Aikins, W. Long Branch, NJ
W2VYJ, James H. Ennis, Ocean City, NJ
W2YLE, Lewis B. Kaufman, Jr., Scarsdale, NY
K2YXJ, William C. Lewis, Addison, NY
W3HGA, Ralph P. Graber, Wilmington, DE
WB3HLJ, John F. Spitzer, Catonsville, MD
WA3NAZ, William H. Davis, Jr., Columbus, GA
W3OKK, Edgar F. Sadd, Sewickley, PA
WA3QHB, Paul J. Mroz, Baltimore, MD
W3REH, Robert E. Sheridan, Baltimore, MD
W3RT, Major Roy L. Knight, East Lansing, MI
W4BLQ, Joseph H. Harms, Edgewater, FL
KA4GGC, Marion Linderman, Collegedale, TN
K4GKI/ex-W2GYG, J. W. "Win" Morris, Sarasota, FL
W4GPE, Joseph O. Routh, Winter Haven, FL
WB4HTN, Ernest Sweet, Jr., Horse Cave, KY
K4LD, Anthony J. Mony, Douglasville, GA
W4OYV, Charles B. Archibald, Ridgeland, SC
K4PBY, Manfred D. Ratliff, Birmingham, AL
W4RIR, Earl R. Smith, Jr., Hialeah, FL
WA4SCK, Irving J. Rovang, Vero Beach, FL
W4SUY, George R. Marr, Sr., Bumpass, VA
W4VCQ, Ira Hicks, Ft. Lauderdale, FL
W4WS/ex-VK2BRJ, Robert H. James, Dunedin, FL
WA4YCI, Donald A. Peck, Jupiter, FL
W5FT, William Obrist, Albuquerque, NM
WA5IFJ, Dr. Leonard E. Hascal, Dallas, TX
W5KRD, James T. Thompson, New Hebron, MS
K5MDH, Audave C. Pilgrim, Tulsa, OK
WA5QZS, John R. Smith, Houston, TX
ex-W5SI, E. Ray Arledge, North Little Rock, AR
W5WUM, Bland M. Harris, Sheridan, AR
WD6BGV, Kurt H. Kanthack, Menlo Park, CA
K6CIN, Charles W. Ashling, Bend, OR
N6CUU, Harold W. Campbell, Anaheim, CA
W6EAH, Clarence H. Haas, Santa Paula, CA
K6EWH, Orrin R. Hall, Pollock Pines, CA
KA6GIM, Arthur L. Holtzhauer, Felton, CA
W6HE, Stuart F. Wainwright, Thousand Oaks, CA
K6HRY, William H. Gibbon, Yucca Valley, CA
W6IRV, William L. Reid, Visalia, CA
K6JW, Samuel Sabaroff, Woodland Hills, CA
W6KTS, Harold A. Scott, Long Beach, CA
W6NY, John E. Bickel, Atascadero, CA
WA6NZQ, A. W. Folkenberg, Ukiah, CA
WA6OSO, William B. Johnson, Millbrae, CA
W6QF, Robert E. Rice, Valley Center, CA
WB6UJO, Wesley Loudon, San Rafael, CA
WB6WAR, Charles E. Brown, Rosemead, CA
WB7AMG, Martha C. Deatherage, Puyallup, WA
WB7CPY, Harold E. Swanson, Tucson, AZ
WA7GPW, William E. Reed, Spokane, WA
K7JVC, James M. Draxler, Salt Lake City, UT
K7JZT, Alden N. Bice, Seattle, WA
WA7LPP, Dell O. Downing, Port Angeles, WA
*W7NWJ, William F. Ford, Elmer City, WA
WA7WPR, Vilas M. Brandt, Nampa, ID
WA7WVM, Richard P. Farrington, Milwaukie, OR
W8BAX, Walter G. Baker, Columbus, OH
WA8BHQ, William R. Shaw, Reed City, MI
W8BUQ, John M. Braschwitz, Cleveland, OH
WB8DMB, Donald J. Ayers, Fort Wayne, IN
W8EUC, Albert J. Prebelich, South Range, MI
KM8G, Patrick J. Kealy, Detroit, MI
AB8L, Robert H. Finegold, Kettering, OH
W8RFB, Elmer W. Hill, Wakefield, MI
W8TF, Peter Smedes, Sterling Hts., MI
W8ZKJ, James H. Warner, Romulus, MI
W9BRF, Arthur G. Cummings, Michigan City, IN
W9CDB, Alf F. Adel, Mount Prospect, IL
W9CID, Irving W. Jackson, Presque Isle, WI
KA9DFF, Hyland M. Fulton, Valparaiso, IN
K9EJU, Eugene W. Clehouse, Terre Haute, IN
W9FOO, Carlyle S. Stockslager, Brookfield, IL
KB9FS, Richard A. Neider, De Kalb, IL
WB9GGO, Rex D. Renner, Colchester, IL
W9GHG, Clarence L. Crawford, Cornell, WI
WB9ILH, Raymond C. Lenburg, Rockford, IL
K9INB, Donald B. Cook, Evansville, IN
K9ITK, Joseph T. Bordeaux, Farmersburg, IN
WA9JZK, Russell A. Naset, Mundelein, IL
W9OSG, Mark B. Rufner, Indianapolis, IN
ex-W9OUB, Norbert J. Richard, Milwaukee, WI
W9PBN, Alex R. Christopher, West Allis, WI
W9UIJ, William C. Canterbury, Rockford, IL
W9VDB, Charles A. Richards, Ft. Wayne, IN
K9VYS, William Simlik, Berwyn, IL
WØANM, Verlin E. Anderson, Fremont, NE
KAØAZU, John T. Clark, Cedar Rapids, IA
NØBYX, Roger D. Buehler, St. Cloud, MN
KBØCM, Denver F. Bennett, Albuquerque, NM
WØCYA, Lloyd A. "Bud" Felber, Fairmont, MN
WØEAL, Carroll S. Mohn, Minneapolis, MN
WØEKX, George W. Alexander, West St. Paul, MN
WØFCT, John L. Anderson, Ord, NE
WØIII, Maurice W. Almfeldt, Ames, IA
*WAØKDJ, James E. Daugherty, Merriam, KS
WØMLI, John Weisert, III, Yuma, AZ
WAØQEH, Ludvik C. Novotny, Stockton, KS
WØQXN, Joe Starr, St. Louis, MO
WAØRSK, Jimmy Lee Drapal, Shelton, NE
WØUID, Louis E. Baker, Monett, MO
WBØZEI, Martin D. Wittstrom, Boulder, CO
VE6AGM, Clifford C. Cartwright, Del Bonita, Alberta
VE7TL, John Bower, Chilliwack, BC
G2BVN, Roy F. Stevens, Essex, England
G3PBC, C. D. Craythorne, Leicester, England
F1DCI, Pierre RouyrH,bGrauthet, France
XE1MML, Mario Myncayo, Veracruz, Mexico
ZS2KS, Frank E. Johnstone, Port Elizabeth, South Africa

In order to avoid unfortunate errors in the Silent Keys column, reports of Silent Keys will henceforth be confirmed through acknowledgment only to the family of the deceased. Thus, those who report a Silent Key will not necessarily receive an acknowledgment from Hq.

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. Please allow several months for the listing to appear in *QST*.

50 Years Ago

November 1931

☐ Loy Barton of RCA takes 5-1/2 pages to describe "The Class B Push-Pull Modulator," a milestone in radio-telephony development. The editor evaluates its importance: ". . . the Class B modulator marks an advance in amateur 'phone technic (sic) just as significant as was *QST*'s publication of the first practical information on 100% modulation in 1929." A complete description of a practical transmitter using a Class B modulator is promised for a forthcoming issue, and ". . . it won't be a flea-power transmitter, either. It will deliver a 40-watt carrier, completely modulated, even though it contains no tube larger than a Type '10.'"

☐ Ross Hull discusses the present and future in "Television — What About It?" He points out that the currently-broadcast 60-line picture is primitive, acceptable only to experimenters and hobbyists. Commercial television will demand far better resolution, possibly as high as a 250-line presentation, with consequently greater bandwidth and a sophisticated replacement for the scanning disk. Frequencies above 40,000 kc. and cathode-ray techniques appear to offer the best approaches.

☐ "More About Economical Crystal Control," by George Grammer, is a discussion of possible pitfalls in amplifier neutralization and a method of obtaining higher efficiency when frequency doubling. The practical transmitter described uses a popular '10-'10-'03A combination.

☐ A New York dealer advertises the new SW-3 receiver (less tubes) with coils for 80, 40 and 20 meters for $32.34. The a.c. power supply goes for $20.30.

25 Years Ago

November 1956

☐ Bob Ehrlich, WØJSM/W2NJR, tells "How To Adjust Phasing-Type S.S.B. Exciters" by two different methods of monitoring. One requires an oscilloscope, the other a *good* receiver. [The author, now a Silent Key, was one of the pioneers in ham sideband techniques.]

☐ ARRL-IGY Project Coordinator Mason Southworth, W1VLH, describes "A Low-Noise 108/144-Mc. Converter" for earth satellite tracking or 2-meter DX. Credit is given to W2AZL for an unpublished "cascode" design that served as the base for the current article. Using a 417A input tube, a noise figure under 3 db. is obtained.

☐ "A 4X250B Linear," by Irwin Wolfe, W6HHN, and Hugo Romander, W6CH, makes the most of the new external-anode tetrode. A pair of the tubes in parallel are blower cooled and band switched, 80 through 10 meters.

☐ E. T. Bishop, K6OFM, uses TV biconical antenna parts for a center-loaded, 8-foot-long 10-meter antenna he calls "The 'Wonder-Bar' Antenna." Comparison tests with an 8-foot, center-loaded dipole and a half-wave (16-foot) dipole show the "wonder bar" has an s.w.r. bandwidth closely approaching that of the half wave.

☐ Most 'phone men know the advantages of voice-controlled break-in operation, and L. O. Leigh, KT1LS, describes "The 'Universal' Voice-Control Circuit" that he developed to work with many combinations. It features noncritical, sure-fire VOX and anti-trip operation.

☐ The "Twin Lamp" is a simple s.w.r. indicator for 300-ohm Twin-lead, but it introduces some discontinuity and unbalance to the otherwise balanced line. Reginald Wood, K2BUZ, offers a solution in "The Balanced Twin Lamp." Using similar pickups on either side of the line, the four-lamp device retains the balance and also minimizes the discontinuity.

☐ "Your Novice Accent," by Keith Williams, W6DTY, is subtitled "And What To Do About It." It is W6DTY's effort to ease the growing pains of the newcomers [and it did an excellent job]. — *Byron Goodman, W1DX*

Club Corner

Conducted By Sally O'Dell,* KB1O

YOU CAN DO IT, TOO!

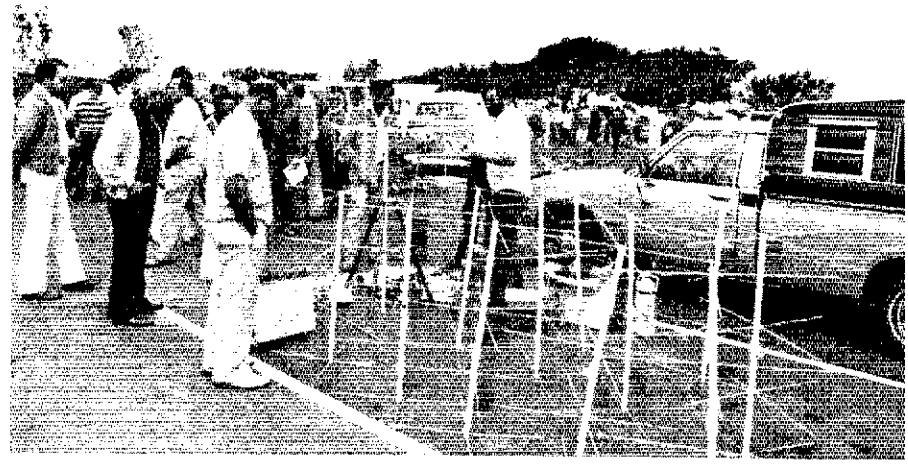
"Boy, a flea market like this one must be simple to put together." This statement, made by a ham walking through a swapmeet, reflects the number of Amateur Radio operators who ignore the time and hours that go into planning. Many hams who are not involved in putting one of these together don't realize what goes into a well-organized gathering.

Frequently clubs sponsor flea markets or hamfests (check station activity reports for some of the many listings each month). The best organizers spend up to a full year gearing up for their major money-making event. A few clubs throw in a slightly different twist: monthly fleamarkets! Bill Schrecengost, WA6EVS, describes his club's monthly Swapmeet.

"It's the last Saturday of the month, 6:30 A.M., and vehicles loaded with Amateur Radio equipment are pouring into the TRW Co., parking lot at Redondo Beach, California. It's the Amateur Radio Equipment Swapmeet sponsored by the TRW Amateur Radio Club. By midmorning there will be 1200 or more amateurs wheeling and dealing. The Swapmeet is scheduled to start at 8 A.M., but the anxious hams, who come from all over Southern California, like to get started early. Items for sale range from small components to complete amateur stations. Test equipment, antennas and other amateur accessories are plentiful. Bargains abound, and much good equipment will change hands before the morning is over.

"The TRWARC has steadfastly followed a policy of not charging admission to the swapmeet sellers or guests. Its members voluntarily man the club's refreshment booth and provide traffic and crowd control. Whatever small amount of money is earned from the sale of refreshments at the club's booth is used to purchase club station equipment and to pay their annual ARRL Field Day expenses."

SANDRA, the San Diego Repeater Association, sponsors a similar monthly event. Both of these groups are well organized — the results speak for themselves! Though the northern half of the United States and Canada may have difficulty sponsoring a *monthly* hamfest because of the weather, some clubs might be successful with biannual events. You don't have to *settle* for a seasonal flea market controlled by the weather. Several Detroit-area events are held in the middle of their snowy winters. The only difference is a roof overhead. Oak Park (Michigan) ARC holds their winter flea market in a local school. Try relocating your flea market indoors, as they do in Oak Park, in a warehouse, civic building or defunct discount store.



TRWARC in action at one of their monthly swapmeets.

TRW supplies important information to both sellers and visitors — *the rules*. 1) Each seller must sign log when entering site with name, call, vehicle license number and city lived in. 2) Items offered for sale must be Amateur Radio related. 3) TRWARC reserves the right to refuse entrance to anyone. 4) No commercial sellers permitted. 5) No alcoholic beverages permitted. 6) All pets to be on leash and under control. 7) Each seller must clean up his general area prior to leaving. 8) The TRWARC disclaims all responsibility for the validity of claims made by sellers.

The club also passes a "task description" sheet to club volunteers before each meet. The *set-up person* arranges for signs and trash cans at specific locations by 7:15 A.M. and assists at the refreshment booth. After the swapmeet, he returns supplies to storage. The *refreshment person* picks up jugs, water and coffee, sets up, sells the goodies and closes by 11 A.M. as the meet breaks up. The *overseer* picks up the "sellers only" sign before the meet, directs people into the lots and helps with the final cleanup.

Besides the crucial task planning and well-defined rules, TRW offers a local information sheet. (Refer to "The Personal Touch" in your club's copy of *Radio Club News* - issue #44, for a description of a local information sheet. Send an s.a.s.e. for a copy of this back issue of *RCN* if your club copy has been misplaced.) Even if your flea market is held only once a year, TRWARC's careful planning strategy and abundant good sense just might help make your next one an event to remember!

*Club Program Manager

Special Events

Conducted By Mark Wilson,* AA2Z

Frankenstein, Missouri: Mid-Mo ARC will operate KØETY and NØSS from sundown *Oct. 31* until sunrise *Nov. 1*. Frequencies: phone — 3.963 7.225 14.275 21.350 28.550; cw — 40 kHz up from bottom band edge. Special QSL/certificate for s.a.s.e. to: Tom Hammond, NØSS, 707 Ihler Rd., Jefferson City, MO 65101.

Washington, DC: Naval Research Laboratory ARC station W3NKF will relay QSOs from N3ES as he runs the U.S. Marine Corps Marathon starting at 1400Z *Nov. 1*. While running the 26.2-mile course, N3ES will complete as many QSOs as he can. Frequencies: 7.225 14.300 21.360 28.5 29.6; also Washington-area 2-meter repeaters. QSL for special card to: W3NKF, Code 9015, Naval Research Laboratory, Washington, DC 20375.

Louisville, Kentucky: Amateur Radio Transmitting Society of Louisville will operate W4CN aboard the steamboat *Belle of Louisville* from 2300Z *Nov. 6* until 2300Z *Nov. 7*. Frequencies: 7.240 14.285 147.72/12. Certificate for large s.a.s.e. to: ARTS, Box 7391, Louisville, KY 40207.

Antigua and Barbuda: Antigua ARS is sponsoring a QSO party from 0000Z *Nov. 7* until 2400Z *Nov. 8* to commemorate Antigua and Barbuda's independence. Work four Antigua stations (new call V2A) during that weekend for certificate. Send log data and s.a.e. with return postage or IRCs to: Independence QSL Party, Box 550, St. John's, Antigua, West Indies.

Muskogee, Oklahoma: Choctaw/Muskogee ARCs will operate W5FX from the submarine *USS Batfish* from 0100-0500Z and 1300-2100Z *Nov. 14*. Frequencies: phone — 3.805 7.168 14.230 21.268; cw — 47 kHz up from lower band edge. QSL with s.a.s.e. to: W5FX, 109 E. Myrtle Dr., Midwest City, OK 73110.

Biloxi, Mississippi: Keesler ARC will operate K5TYP in celebration of the 40th anniversary of Keesler Air Force Base from 1700Z *Nov. 14* until 0500Z *Nov. 15*, and 1700-2300Z *Nov. 15*. Suggested frequencies: top 10 kHz of 80-15 meter general bands, and 28.600. Certificate available from: Dan Young, 5229 A St., Biloxi, MS 39530.

Spartanburg, South Carolina: Spartanburg ARC will operate K4JLA, to celebrate the club's 25th anniversary, from 1700Z *Nov. 14* until 0500Z *Nov. 16*. Frequencies: phone — 25 kHz up from lower General band edge; cw — 15 kHz up from lower Novice band edge. Certificate for large s.a.s.e. to: Spartanburg ARC, 1091 Mayfair St., Spartanburg, SC 29303.

Trenton, New Jersey: Delaware Valley RA will hold its second annual QSO party from 2300Z *Nov. 13* until 2300Z *Nov. 15*. Frequencies: phone — 3.900 7.235 14.280 21.360 28.610; cw — 35 kHz up from lower band edge; Novice — 7.135 21.105 28.105. Certificate for 5 QSOs. Mail (include large s.a.s.e.) to: DVRA, Box 7024, Trenton, NJ 08628.

Plymouth, Massachusetts: Whitman ARC will operate from Plimoth Plantation from 1400-2000Z *Nov. 26*. Frequencies: 21.260 (1400-1500Z); 7.280 (1500-1700Z); 21.385 (1700-2000Z). Certificate for large s.a.s.e. to: WARC, Box 48, Whitman, MA 02382.

Note: The deadline for receipt of items for this column is the 15th of the second month preceding publication. For example, your information would have to reach Hq. by November 15 to make the January issue.

Dr. Earl Skelton, N3ES, can't bear to be away from his amateur gear for too long — so he's taking it along as he runs the 26.2-mile U.S. Marine Corps Marathon on November 1.

*Assistant Communications Manager, ARRL

Results, Field Day 1981

By Bill Jennings,* K1WJ and Mark Wilson,** AA2Z

Sundown on Saturday evening at W9MO/9, The Glen Gates Gang (1A).

Where were you on Field Day Weekend in 1981?

It's 1700Z Saturday 27 June 1981. Two longtime friends, KB7CQ and KB7CR, have hauled their Amateur Radio gear and support equipment to the peak of 7000-foot Sundance Mountain, which is pretty near as far north and west as you can go in Idaho without crossing the Washington state line. The gear has not been unpacked as the operators take a well-deserved break. They will attempt a "fire drill" start in the 1-B Field Day class precisely at 1800Z and thus earn three "extra" hours of operating time. They have no hint that in the next 27 hours they will spend almost as much time fighting the weather as doing battle on the bands. When it's time to break down the station at 2100Z Sunday there will be several inches of new snow fortified by a couple of inches of hail on the ground, along with memories of a particularly nasty four-hour lightning storm.

1715Z. In northern Texas, cloudy skies and rain replace the sunshine and 100°-plus temperatures of the 1980 Field Day weekend. It hasn't rained on FD Weekend in nearly 10 years in the Dallas area. It's up for debate as to whether the mud and oppressive humidity of '81 are preferable to the killer heat of '80. What you had or what you could have had is always preferable to what you've got. The seven operators of the Raiders of the Lost ARC (Bell AR Contest Club) have better things to do than sit around and argue about the weather. The generator that they had modified to run on 180-proof grain alcohol has problems. It will take more than 20 hours for the gang at N5HD to get the beast running smoothly. In the best spirit of Field Day, they have a backup generator and finish near the top of the 1-A category.

1730Z. On the campus of Ulster County Community College in Kingston, New York, the Natural Power Bonus for the Overlook Mountain ARC will be earned as a 19th-century steam engine is coupled to an alternator to power a rig for the required number of QSOs. Those extra 100 bonus points will help move the club into the "top 25" in the 2 A listings. Now with less than one hour to go before the official start of Field Day, the fire is going and the pressure is starting to build in the boiler.

1745Z. Up in Saskatchewan, Canada, the 18 operators of the Saskatoon ARC have VE5AA all ready to go. They are awaiting the 1800Z starting time and are anticipating the arrival of invited members of the local news media. On Monday, there will be a dandy story on VE5AA in the *Saskatoon Star Phoenix* and 100 publicity bonus points added to the VE5AA score in the 2 A competition. Field Day Chairma VE5RC has some plans for his son's mini-computer, which include trying to make the chore of submitting the club's FD paperwork a little easier. Things are looking good in Saskatchewan.

1750Z. K4OU is testing his QRP rig, which is on his houseboat "The Love Barge" on the Little River in Tennessee. Dan hears fellow sailor WB2VYA, anchored in Long Island Sound, testing his peanut-whistle transmitter. Maritime-mobile types will be well represented.

1755Z. KA8IIN, a Novice operator in Orchard Lake, Michigan, has fired up his home station. Ray can't make it out but has no intentions of missing his first Field Day.

1757Z. The Yankee Clipper Contest Club/Wireless Institute of the Northeast stalwarts at W2RQ are aiming to break their own all-time FD QSO record. The towers are up, antennas all set, generator running smoothly and kilowatt amplifiers all tuned. In 24 hours, they will have broken the old FD QSO record with 11,201 entries in the logs.

1759Z. KB6XU is mobile and has pulled

*Communications Assistant, ARRL
**Assistant Communications Manager, ARRL

off Highway 101 in Los Angeles County. This is the first of several such stops that Bob will make during the Field Day period.

All across the United States and Canada, across the Pacific to Hawaii, down into the Caribbean to Puerto Rico, across the Atlantic to a U.S. airbase in West Germany and up into Alaska, single operators and groups, both large and small, are all set to go. A lot of time and effort has been spent to make this Field Day a success.

1800Z. It happens. The bands spring to life. QSO information is exchanged. Stations are manned and maintained and, all logistical support functions carried out. Visitors to the FD site are given the "$1 tour" of ham radio with prospective licensees given a little extra encouragement. The questions of local and national news media people are answered, resulting in hundreds of newspaper and magazine articles, scores of television news stories and a lot of favorable publicity for Amateur Radio. Newly licensed Amateurs are "shown the ropes" by those more experienced, ensuring a cadre of trained operators for the future. Everyone in the group pitches in to help, each lending their own special talents, reaffirming their commitment to the goals of the club, the challenge of Field Day and the aims of Amateur Radio in general.

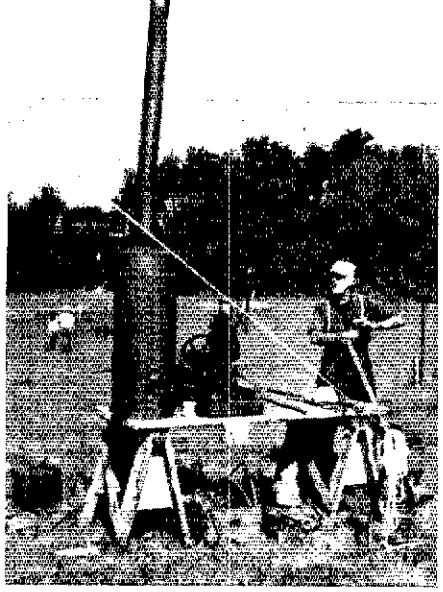
Sunday 28 June 1981 1800Z. The 24 hours are up. Time sure flies when you're having fun. Time to pack it up until next year. An orderly retreat. Again the proof of the old theory that "things come down more quickly than they go up." Probably has something to do with the laws of gravity.

2100Z. Twenty-seven hours past the start of the FD weekend. The last of the "fire drill" set-up stations reaches the end of its operating time. Just enough time to meet the rival crosstown group on 80 meters and compare rough scores to see who won that "beer bet."

Carrying on the tradition of "bigger and better," Field Day 1981 saw 1760 Field Day reports arrive in the mail sacks here at ARRL Hq., as 23,816 operators put 4559 stations on the air on the weekend of 27-28 June 1981.

Those FD entries described an exotic array of gear powered by some very inventive power sources. QRP rigs were brought to life by batteries charged with solar cells. Many a FD operator lost some sweat and a few extra pounds in pedaling a "Rube Goldberg" bicycle/generator arrangement to earn the natural-power bonus. Steam, water and wind were harnessed and "converted" to usable electrical form. And for the first time, pouring alcohol into the generator caused almost as much excitement among some FD groups as pouring alcohol into the FD operators themselves.

Among those ways of accumulating bonus points open to the class A and B FD stations, the 100% emergency power, message origination to the SCM/SEC and the publicity (whether through the news media or public exposure) proved the most popular. Far fewer of those eligible claimed credit for messages handled (this bonus does *not* include the message origination to the SCM/SEC) and contacts made through the Amateur satellites. It is quite surprising that less than 60% of those eligible for the bonus points bothered to copy the W1AW Field Day message. It is an easy 100 points and the message can be obtained by relay from other sources as well as directly off the air from W1AW. If you didn't copy the message this year, you missed a real treat — greetings from President Reagan. Thank you,



Henry Wiggins, a friend of the Overlook Mountain ARC, was the chief operator of the 1878 vintage steam engine that was used to generate the power at K2HA (2A).

THE WHITE HOUSE

WASHINGTON

June 20, 1981

I am happy to send my sincere best wishes and appreciation to the nearly 400,000 amateur radio operators who stand ready with equipment and skills to serve in the public interest in times of disaster. May your 45th Annual American Radio Relay League Field Day emergency preparedness exercise be successful.

Sincerely,

Ronald Reagan

Table 1

Entries/Operators per Field Day Class

Class	*Entries*	*Operators*
1A	215	1827
2A	462	6488
3A	321	5461
4A	151	3422
5A	118	2587
6A	43	1179
7A	30	941
8A	14	287
9A	12	385
12A	2	71
15A	2	80
1B	127	214
2B	26	52
1C	34	59
3C	1	3
1D	88	111
2D	9	33
3D	4	42
8D	1	8
1E	43	80
2E	7	61
3E	2	17
4E	3	56
check logs	20	25
late/incomplete	24	307

K5WNH/Ø atop Devil's Head Mountain in Colorado. Terry carted the QRP rig, battery, antenna tuner and vertical antenna up the big hill to give it a go in the 1B battery class.

Mr. President. By the way, it might be a nice gesture if each of us were to thank the President for his good wishes. A message to the White House via Amateur Radio seems an appropriate way to do this.

The following narratives are a sample of those received with the Field Day entries.

Battleship Cove Group (W1ACT 6 A)

Early on the morning of 27 June 1981 on the battleship *Massachusetts,* destroyer *Kennedy,* and the submarine *Lionfish,* all anchored at Battleship Cove in Fall River, Massachusetts, one could find Amateur Radio operators scurrying around the decks and up and down the masts of the ships. Members from Sub Sig., Bristol County, Newport County, and Fall River Amateur Radio Clubs were erecting antennas, fueling generators, and testing radios in preparation for the 45th annual ARRL Field Day exercise, which was to begin at 1800 UTC. By 1745 UTC, everything was running smoothly and the large generator that powered the entire destroyer had been put on line and was performing flawlessly. This generator would also power the station on the submarine, while portable gasoline generators would be put in service for the equipment on the battleship. The whole setup went very smoothly, thanks to coordination communications which were handled out of the communications van of the Fall River Chapter of the American Red Cross.

Signs explaining our FD operation were posted aboard the three ships for the benefit of the many nonham tourists. We set up a public information station, complete with a modern Amateur Radio station, informative posters, QSL card displays, ARRL pamphlets, books and magazines, and a table at which a couple of our operators accepted outgoing messages from the public. Quite a few people were exposed to Amateur Radio at this FD site, for in addition to the normally heavy tourist flow, there were 300 or so Boy Scouts and Girl Scouts from neighboring Connecticut and New York spending the weekend aboard the ships.

Precisely at 1800 UTC, our six stations plus Novice setup began operation as W1ACT. Even though all stations were running low power, we experienced some low-level interference due to the close proximity of the antennas, but nothing that we could not live with.

We tried to go with antennas of simple design: verticals, slopers hung from the ship's mast, long wires, inverted Vs and dipoles. The only beams used were those on 6 and 2 meters aboard the destroyer. We could hear many more stations than stations could hear us. Metal, metal everywhere — to the sides — above — below. Oh well; you can't make warships out of paper.

We spent a lot of time on publicity before Field Day and local television, radio and newspapers showed a lot of interest. The mayor of Fall River had proclaimed the week as Amateur Radio Week. His Honor and the mayor of Newport, Rhode Island, as well as a host of other local officials were given a full tour of the three ships and radio station locations. They then presented us with several certificates and commendations, expressing appreciation to the amateur community and acknowledging the potential that Amateur Radio holds for serving the city and surrounding area.

Potential space cadets. Members of the Wallingford ARS, drag out the heavy artillery as they launch their annual assault on prime antenna locations in neighborhood trees. You've got to admit this is sure classier than the old rock and twine over the tree limb. 3...2...1... W1SY (2A)

John, W1EOF, used a 2-meter fm link to relay the outgoing messages from the ship complex to other amateurs who would then put them into the National Traffic System. In all, we handled 162 messages for the visitors at the FD site, most handled by KA1FE, KA1EAL, and W1EOF.

The story of the power generator on the destroyer began two years before FD 1981 with a group called the "tin can sailors" who volunteered their time to restore the destroyer. The generator had to be torn down and many replacement parts machined especially for this project to get it operational. The generator ran without interruption for the entire Field Day period. One visitor from Michigan who had served on the destroyer and had, while in the service, been responsible for this same generator was truly impressed and happy to see it being used for such a worthwhile purpose.

We considered this Field Day a big success. Although our score was not impressive at all, we did demonstrate our emergency preparedness and did expose a large number of people to Amateur Radio at its best.

The story does not end here. Our Field Day outing marked the beginning of the operation of a permanent working Amateur Radio station at the Battleship Cove Complex. With the full support of city officials and directors of the complex, we will be able to handle traffic, conduct licensing classes, promote Amateur Radio and provide emergency communications if required. — *AE1S*

Syosset High School Amateur Radio & Television Club (WA2JAS 3A)

In a Field Day interview for CBS Radio, ARRL President Harry Dannals, W2HD, described the event as "a national exercise to test the emergency communications facilities of our Amateur Radio Operators."

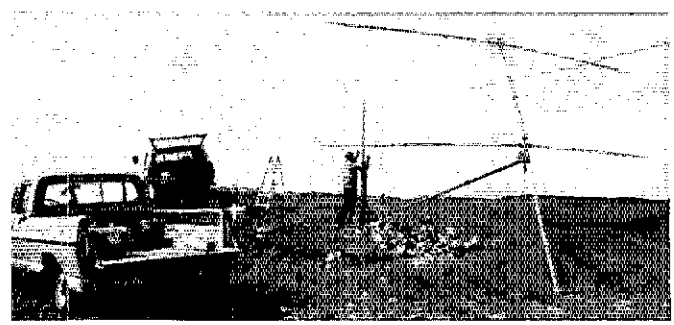
If he can sell that to the public at large, that's fine, but we know better. Field Day is a contest . . . no, it's more . . . it's an epic battle . . . a fight to the finish between Murphy and the Multitudes!

Every year, we forsake the comforts of home to take *him* on, knowing full well the truth of *his* creed: "Everything that can go wrong will, and every solution breeds new problems."

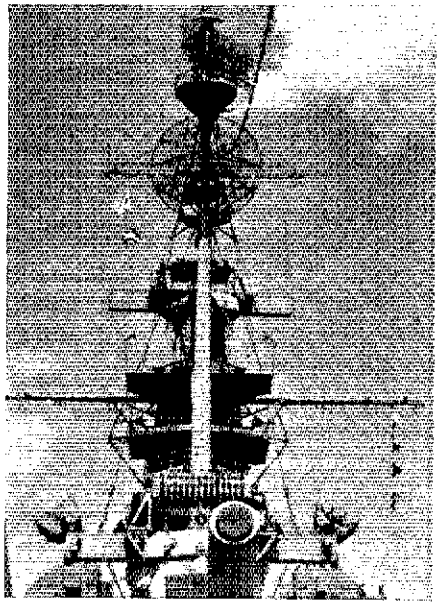
The WA2JAS gang was set to beat ol' Murph this time around. We were borrowing from the Boy Scouts. We *were* going to be prepared . . . so we thought.

Antenna construction was going to be a snap this time. We'd arranged for the use of a

FIELD DAY 1982
JUNE 26-27



Set-up time on 8000-foot Pike Mountain in Idaho for 2B partners W7JDA and WA6IRN.



Big Guns in the 6A class, the Battleship Cove Group, W1ACT, had plenty of room to string those wire antennas from the rigging of the battleship *Massachusetts*.

As part of their public-information station, members of the Wild Rivers ARC, located in downtown Hayward, Wisconsin, during the National Musky Festival, offered a "free message service" to all visitors. AC9C mans the station alone as the rest of the crew checks out the other festival exhibits, especially the beer tent just across from the station location. AC9C (1A)

"cherry picker" to help erect our twin 50-foot towers. But when the truck was in place for the first big lift, there was Murphy sneering at us from the engine compartment. Dead battery.

The old arm-strong method got the towers raised with little more than the minor inconveniences that we'd come to expect from ol' Murphy . . . cables a few inches too short, forgotten power cords, jury-rigged keyer inputs, etc. We were on the air but we'd not heard the last of our annual foe.

He was patient this time. *He* didn't throw any rain in our faces or whip up any whirlwinds to tear down the 40-meter hanging quad. But Murphy hadn't left our camp. This was a test of emergency preparedness, and by gosh, Murphy was going to see to it that we were put to the test!

We were in high gear with our three stations plus the Novice station filling up the log pages for us. Then he struck. The smooth hum of the generator began to miss a beat then the hum became a chug-a-chug.

"No problem," cried one of our "experienced" hands. "I'll have it smoothed out in no time." And smooth it out he did, but not without raising the voltage output past the breaking point of several of the rigs.

When the smoke cleared, we counted up the casualties. Four hf rigs lay dead. We could hear Murphy's laugh echoing over our hilltop. We struggled on, vowing that we'd have the last laugh.

The 2-meter, all-mode rig that had been carted along for fun and games was pressed into earnest use. There were long hours of wringing faint signals out of the ether with nothing but a Ringo at 50 feet to trap that elusive rf.

There was precious little time left when replacement equipment arrived. Murphy continued to cackle as we got it on the air. The epic battle raged down to the very last minute.

I guess that we'll have to make arrangements to do a little better in the score department next year. We know that Murphy will be prepared, so we'll have to be prepared, too. After all, it's tough to pick a winner when it's Murphy versus The Multitudes.

You'll find the WA2JAS score in the Field Day results. But Murphy keeps only a check sheet and he keeps it to himself. — *WA2SEL*

QRP Field Day, Juneau style. KL7JJA at the controls while 1B battery partner WL7ALN works the shutter for this photo.

The Delta ARC (VE7SUN 2 A - Battery)

Field Day 1981 gave us an excellent excuse for a beach party. The Delta Amateur Radio Club, VE7SUN, is a brand new club, formed to assist the municipal government with emergency communications. This was the first Field Day for our club.

The municipality of Delta is a suburb of Vancouver, about 20 miles from downtown and 10 miles from the U.S. border. It is located at the mouth of the Fraser River where it empties into the Pacific Ocean. The weather is quite mild year-round and we are sheltered from most Pacific storms by Vancouver Island just 22 miles off our coast. Delta is known as the home of the sun god. Thus the call — VE7SUN.

The site we chose was a narrow strip of public beach beside the Tsawassen Ferry Terminal. This is the mainland terminal for the BC Ferry between Vancouver and Victoria on Vancouver Island.

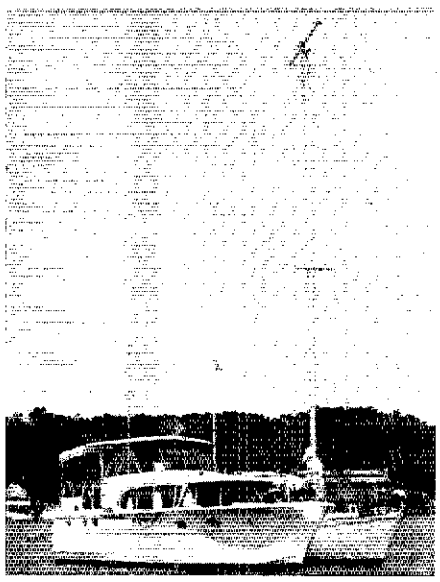
On Friday night, we arrived just after supper so we could reserve a space. The weather was excellent and we were located in a popular spot for campers and those launching boats. We managed to get a space about 50 by 175 feet for our camper, motor home and trailer plus antennas.

On Saturday morning, we had 11 members out to set up the stations and erect antennas. Since we were operating only two stations, setup went smoothly — two trap verticals, a 40-meter long wire, and my new triband beam on 16 feet of tower.

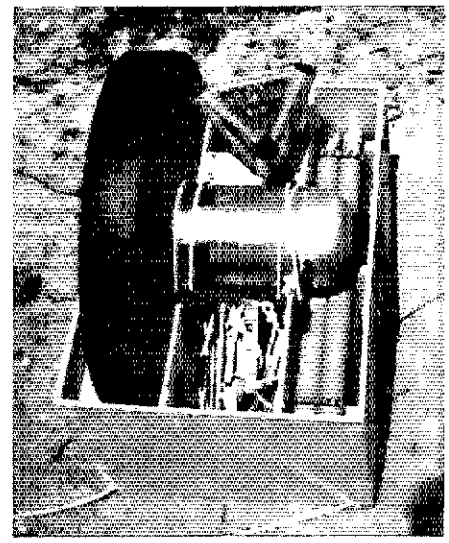
At 10 o'clock (local) Saturday morning the cameraman from channel 10 television started filming, and he didn't quit until 1 P.M. By 11 A.M. we were ready to go and there was quite a crowd from the public beach interested and watching.

Glen, VE7FHZ is 14 years old, newly licensed and eager to make his first QSO. After he watched Ted, VE7JH, and Vern, VE7ZE, operate the cw station on 40 meters for an hour or so, he was tuned up in the Novice band, put in front of the key and guided through his first few contacts. When Ted and Vern returned an hour later, Glen was busily making contacts, and they couldn't get him away from the rig. Now that's how to get a new ham over his nervousness in a hurry. When we shut down for the night at midnight, Glen was still going strong.

Meanwhile, I was operating the phone station. Every time an unlicensed person would pass by the rig, I'd get him or her to sit down, log for a while, then make a couple of contacts



Tribander over Lake Michigan. Six members of the S.W. Michigan DX Assn. found it smooth sailing through FD weekend K8MPF (1C).



The Gatineau Park Field Day Group brought out the "portable wind generator" to earn the natural-power bonus. The unit breaks down into carrying size and stores easily. VE2CV (2A).

The five members of the Bellflowers ARA found the rock and hope that there is no "hard place" nearby. Left to right are WB6CIA, WA6PZL, WB6JJE, WA6FSF and WB6VRN.

with me there in control. I think we will have quite a few students in our licensing classes next Fall from those who dropped by.

We thoroughly enjoyed ourselves on Field Day and *will* be back next year. We were especially gratified by the public involvement and encourage other groups to try it, too. Our plans this Fall are to build a portable tower so we can be more competitive next year. See you then. — *VE7CEZ*

The Foothills ARS (K6YA, 4 A)

The Foothills ARS started planning for Field Day 1981 in July of 1980. We have participated in every Field Day for the last 25 years. To us, FD is the big outing of the year. Even when the club was small (10 or fewer members) we managed to put several stations on the air. Now the club has grown to over 50 members and we managed to feed 65 at dinner on Saturday night.

The site we have used for the past several years is located atop a ridge overlooking part of San Francisco Bay. From our 1300-foot elevation, we manage to put out a respectable signal to the east. Our location is in a cemetery. We don't have any TVI complaints from the neighbors. We do have a herd of cows which comes to visit and occasionally rub against the towers, causing some anxious moments.

For Field Day '81, we managed to borrow a three-element, 40-meter beam. After years of trying various dipoles, wire beams, etc., we managed to put out a decent signal on 40 meters from the West Coast. Where else but on Field Day can you try out a three-element, 40-meter beam and some of the other goodies that you might like to have.

Also for 1981 we had a complete computer logging system — four terminals, two disk drives and a line printer. One of our biggest worries was whether it would work with the generator. It did — like a charm.

Some of the more vital statistics are: over 300 cans of beer, 48 cans of pop, three gallons of wine (for dinner), three turkeys (the cooked variety), 11 towers with 12 beams, five trailers, one motor home, 40-mile-an-hour winds, fog, cows, and 45 very tired operators on Sunday afternoon. Look for K6YA next year at or near the top of the scoring column. We will be there. — *W8RPA*

The Willmar Area Emergency ARC (WØSW, 5 A)

The Willmar Area E.A.R. (Emergency Amateur Radio) Club of Willmar, Minnesota, operating WØSW, had one of its most successful Field Days in recent history thanks in part to two non-Amateurs from neighboring Benson. Through a club member, Arnold Hanson and Glen Forbord found out about the ARRL-sponsored annual June madness and decided it offered a unique opportunity to demonstrate the capabilities of wind power as an alternative source of energy.

The FD Site was a beauty, sitting high up on a hilltop in west central Minnesota's famed Glacial Ridge country overlooking beautiful Lake Florida about 10 miles north of Willmar. Last year the wind on the hill only succeeded in flattening tents and keeping the mosquitoes away. However, in 1981 it was successfully harnessed and ran the entire WØSW operation on 40 meters! Here's how.

Starting with a generator from an old truck, Hanson and Forbord designed and built a wind driven system delivering up to 25 amps to a bank of 1925 Thomas A. Edison nickel-iron alkalai storage batteries. The generator rather than an alternator was chosen for reasons of efficiency. It was rewound using wire one half the diameter of the original wire and increasing the number of turns to seven for every two turns of the original winding. This enabled the production of 12 volts at a much lower rpm rate. Further efficiency was achieved by compounding the fields in the redesigned generator.

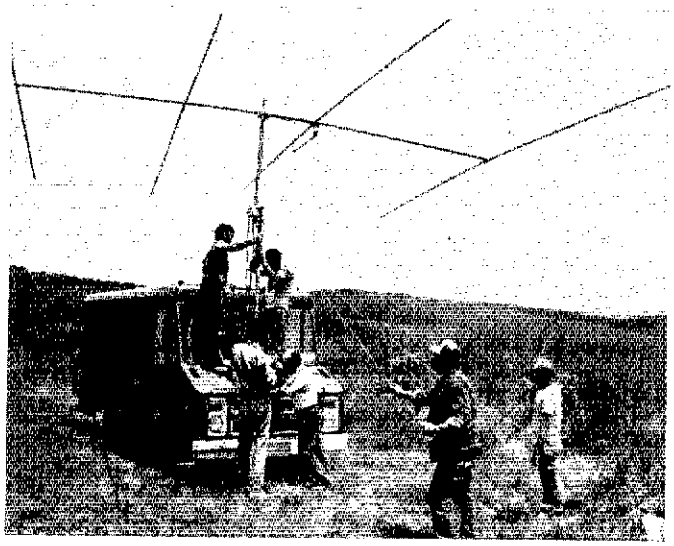
Between the batteries and the generator was a homebrew control board constructed of junk parts. An old voltage regulator and meters were salvaged from the junk box and were installed with switching to allow monitoring of either the generator output or battery voltages. An ammeter checked current from the generator.

Catching the wind and converting it to circular motion to drive the generator was a handmade, seven-foot propeller hewn from a 2 × 6-in. piece of stock. Glen Forbord did the carving and finishing and balanced the prop by drilling holes in both ends and filling them with lead.

Twenty-five original Thomas A. Edison cells were purchased by Hanson and Forbord as junk at an auction. The batteries were cleaned up and a new electrolyte solution of 21% potassium hydroxide was prepared. A plywood case was built to house the nine 1.4-volt cells.

The generator and prop assembly was raised to a level just high enough to catch the full force of the wind — about 25 feet — with a boom truck. Southeast winds of 15 to 25 mi/h prevailed throughout most of the 1981 FD period. The winds subsided to light and variable breezes for the last four or five hours, however, and the batteries held enough reserve power to enable us to finish the full 24-hour FD operating period.

The wind generator/storage battery system was used to power WØSW's 40-meter station.



Members of the Murgas ARC, K3YTL, put the finishing touches on the 15-meter beam. Pretty slick installation, guys (8A).

Sheik . . . er . . . chic Field Day attire by Dave, WB3AKI, with the Lebanon Valley Society of Radio Amateurs (5A).

The system was totally noise free! No hash was generated and therefore no filtering was necessary.

Says Jim, WDØGUX: "We would have had twice the contacts on 40 had our set-up not been so neat and generated so much off-the-air ragchewing about its operation . . . but what's Field Day all about, anyway? The lessons learned and shared at this Field Day were worth more than any amount of points ever could be." [Amen, Jim!] — *KNØKCW*

Nashua AREA RC (W1YR/1 5A)

"Yankee Radio" is back (last two years we were K1HI)! We set up nine stations plus the Novice station for our first crack at 5-A (normally we're 4-A). Each hf band/mode had a station with a station chief and dedicated crew. A field telephone with switchboard at a central control point was used to keep the right number of stations active on the most productive bands. Stations not operating went into the monitoring mode, some making "band graphs" (courtesy K1HI) to literally graph where there were stations we had not yet worked. Three towers held monoband beams for each band/mode on 10, 15, 20 and 40 meters. Two meters was used for traffic and as the band for our "natural power" effort, which was an exer-cycle driving a generator, regulated by a 7812 powering an ICOM IC-215.

We had quite a few visiting dignitaries including U.S. congressmen, a mayor, and representatives from hospitals, the Red Cross, ambulance services, police departments, fire departments and REACT.

We had 45 club members out for most of the weekend and the biggest thanks go to the Field Day kitchen (La Maison de Communique), which served five gourmet meals with a French flavor (French bread, French-cut green beans . . .). Now as to that rumor about talking squirrels running through the night . . .

AB7E (1B battery)

Pat, AA7M, and I used the occasion of Field Day to escape the Phoenix heat and set up operations at Bear Canyon Lake in the central Arizona high country. The weather was nice and cool, although there were the daily afternoon thundershowers to contend with. Since the antennas might at any moment double as lightning rods, we convinced our wives to keep an eye on the kids for any signs of hereditary mental deficiencies.

The rains were far less predictable than the propagation and when we were breaking camp on Sunday afternoon there was a tremendous downpour. Most of the weekend was a great combination of Amateur Radio and Arizona mountain air. — *AB7E*

Administrative Stuff

As you might or might not notice, the traditional class call-area leaders boxes for the class A and class B stations is not included in this report. With the relaxation of the requirement to sign portable even when out of one's "traditional" call area, it seems that the call-area class leader box is inappropriate.

AMATEUR. That's the way it's spelled in *Webster's New World Dictionary*. In going over the entries this year we seem to have accumulated a list of eight different ways to spell "amateur," among which are: amatuer, amature, amataur, amater, amatre and amatere. A slip of the pen on the FD entry form is no big thing, but when information sheets which are given to the public as a part of the publicity bonus proclaim "Welcome to *Amature* Radio Field Day," it's time to stop and think. AMATEUR.

We do receive more FB Field Day photos than we can use. We try to put the best photos (in terms of composition, focus, clarity, etc.) in the FD report, while a good many of those left over pix may be used at another time to illustrate an article on Field Day. Please keep those photos coming. They are appreciated.

Let's offer a special thanks to Contest Aide Venise Hould for typing the FD score listings. It's a pretty big chore.

That just about finishes Field Day 1981 — a pretty good turnout and a pretty good time had by all. Where will you be on Field Day weekend in 1982? Plan to participate; it's worth the effort.

FEEDBACK

Kindly note the following additions, deletions and corrections to the results of Field Day 1980. See pages 80 through 91 of the November 1980 issue of *QST*.

The Texas DX Society, class 3A champs, give their "mobile scaffolding" a good workout in preparation for their FD '81 operation, which will net them nearly 4300 QSOs. K5DX/5

In the 1-B battery category, credit KA1CXC with an additional 100 points due them for the WIAW Message bonus. This moves them up eight places in the standings.

The FD entry of the Cape Fear ARS finally made it here on the second try (first one was lost in the mails). In the 2-A class, add WB4YZE (+KA4FOP) 1127-B-21-3240.

In 7-A add 487 points to the score of W4CA for QSOs that were not listed on the summary sheet, giving the Roanoke Valley ARC a total of 2750 points.

The top station in the 1-D category is WA5ZUP (+WA2PRB), not WA5ZUD as listed.

In the call-area leaders box, 1-A, K9VV should be listed as the ninth call area leader.

In 1-A battery, add 200 points to the score of WØAA for a total of 5280.

The score numbers were transposed in the listing for the Jones County ARC, WØGN, in the 3-A class. Their score should be 4874 not 8474. This makes KØBM the Ø-land call-area leader in the 3-A category.

The report of the Mercer County ARC was mailed but never arrived at Hq. 3-A W3LIF (+KA3DRR) 2473-B-22-8056.

SCORES

Class A stations are clubs or groups operating portable, with more than two operators. Score listings are grouped according to the number of transmitters in simultaneous operation. The listings show club or group name, call(s) used, total number of QSOs, letter indicating highest level of power used (where A is 10 watts or less, B is greater than 10 but less than or equal to 200 watts dc input, and C is greater than 200 watts input), number of participants (if known), and total score — listed in descending order from the highest to the lowest score.

Class B stations are those portable stations manned by one or two operators. Where two persons participated, the call of the other operator (if known) is shown following that of the amateur whose call sign was used. Numbers following the call(s) indicate number of contacts, power (same as class A) and final score.

Class C are mobile stations. They are listed by call (number of operators), number of contacts, power (same as class A) and final score.

Class D are home stations using commercial power sources. Line scores are listed as those of class C stations.

Class E stations are home stations using emergency power sources. Line scores are listed like those of class C stations.

Asterisks (*) denote stations (class A and B) that did not begin setup operations until 1800 UTC on Saturday.

ANOTHER AMATEUR FIRST

Field Day 1981 marked a milestone in Amateur Radio communications. The Radio Amateurs of Texas Tech Society, (RATTS), at Lubbock, Texas, along with the Texas Tech University Crosbyton Solar Power Project and the U.S. Department of Energy, cooperated for the operation of an Amateur Field Day station using power from a commercially feasible solar-power station. The setup is shown on this month's cover.

The solar collection dish is 65 feet in diameter and is comprised of 430 trapezoidal mirror panels. The fixed bowl is tilted 15° to the south for maximum solar exposure. A receiver/boiler suspended above the bowl tracks the sun so that a concentrated solar beam strike the 19-foot-long boiler cylinder, which is made of a special high-temperature nickel alloy. Steam at 1000° F and at a pressure of 1000 psi is produced and is used to generate electricity by means of a conventional turbine generator. The system was designed as an experimental/pilot project to produce electricity for the 2500 residents of Crosbyton, Texas (during daylight hours!).

After the RATTS learned that the experimental solar-power station was available for their Field Day use, the club, under the direction and sponsorship of KC5W, a professor at Texas Tech, decided to use the solar-derived power for their Field Day effort this year. Although Murphy didn't knock the station off the air, it did force the club to retreat to the alternate gasoline generator on occasion when there was a "good case of the clouds!"

This activity didn't result in the greatest of Field Day scores but it did show what Field Day is all about and proved that a group of college hams could produce and operate an Amateur Radio station that would run at the forefront of technology — and have fun doing it. — *WICUT*

Club/ non-club portable

1A - Battery

Mara-Juana FD Party
W1MJ* 672 A-11-7220
Club Radio Amateur Sorel-Tracy
VE2CBS 680 A-20-7000
The Aggie Effort
K5MW 676 A- 6-6665
CCMARC
AC2U 627 A- 3-6570
Morrice, Minnis, Bartholow & Goldman
WB6ITM/6*647 A- 5-6515
Arrowhead RAC
K9SVW/9 582 A- 3-6220
New Mexicans Engaged in Radio Discussions
N5MF* 587 A- 3-5970
Massillon ARC
W8NP* 640 A-12-5650
Ontario FD Assn
VE3FOX/3* 616 A- 6-5235
Michigan QRP Club
KM8X* 407 A-15-4220
Non-Club Group
N8AF* 808 B- 4-4770
Old Florida AR Transmitting Society
K4GNP/4* 571 A- 4-3655
Clallam County ARC
W7FEL 512 A- 6-3520
Jersey Devils RC
K2HR/2* 901 B- 5-3486
Non-Club Group
KA8F 327 A- 4-3270
GCWA
AA4TT* 306 A- 3-3270
Three Mousketeers ARC
VE7ZAP/7*333 A- 3-3120
Fort Herkimer ARC
KB2BK 296 A- 9-3110
Harper Air Hawks
K9BCM 300 A- 4-3105
QUARTS
W4EFI* 282 A- 5-2965
Red River Valley RC
WB5RDD 288 A-10-2880
Elgin ARS
W9IKN 245 A- 3-2850
San Diego DX Club
W6OGI* 329 A- 6-2815
Non-Club Group
K4VFV/4 452 A- 4-2600
River City Contesters
K5SG 341 B- 2-2570
The Principia College ARC
W9VM 335 A-14-2550
Pacific Northwest Alpine International QRP Assn
W7EL* 238 A- 3-2525
RCA ARC
N9RJ 505 A-10-2303
Western Iowa Surfing and Mountaineering Club
WA9VBW* 312 A- 4-2280
Maui ARES
KH6H 578 B- 8-2238
University ARC
KB7Z 691 B-10-2112
Beacon Radio Amateurs
W3AA 556 B- 7-2110
East Alabama ARC
KE4T* 547 B- 7-1848
The W6NLG, KA6DXN, WA6QDB SCV/SJV Gang
W6NLG* 404 B- 3-1816
Gunnison ARC
WØGYV* 653 B-10-1808
Brenham ARC
W5TDT 734 B-16-1804
Beltows Beltowers
KH6IQ7/KH6 602 B-12-1734
Lat. AR Klub
NØANY* 159 A- 5-1690
Parsons Family
VE6PDO/6 155 A- 4-1650
Rolla-Regional ARS
AGØE 429 B- 7-1628
Worldradio Staff ARC
N6WR* 570 B- 4-1622
Kerr Lake Campers
N4SW 706 B- 6-1612
The Back Country Hams
N6KW 141 A- 3-1610
Colorado Traffikers
WØGOD/Ø* 486 B- 5-1552
Non Club Group
KKØH* 242 A- 9-1515
The upper Crab Creek of Eastern Washington Propagationists
W7JBN 514 B- 4-1472
Hams for a Democratic Field Day
K6VDP 451 B- 8-1412
Richmond County ARC (NY)
WB2PJH/2*370 B- 5-1378
M.P.S. Verses Murphy
WA7NTU 191 A- 3-1345
Huron ARC
WØNOZ 398 B-11-1096
Non-Club Group
N1ABO 399 B-10- 998
Fidelity ARC
KI1NQG* 62 A- 8- 975
Non-Club Group
KU6X* 421 B- 4- 944
Midway ARC
WBØWVZ 328 B- 8- 932
Paducah ARES Club - Group B
KS4V 238 B- 3- 912
SCARS
KJ7B 173 B- 8- 826
Temple University ARC
WA3TVT* 169 B- 4- 798
Arkansas Valley ARC
NØFS 297 B- 3- 794
Communications Dist.'s RC
N8AXA/8 106 A- 3- 630
Tillamook Radio Communication Club
K7QPS 265 B- 3- 630
Non-Club Group
W8TWJ/8 263 B- 4- 550
West Essex FD Group
WA2LWT 71 B- 3- 384
Four Novices in Colorado
KAØDGN* 61 B- 4- 344
Lompoc ARC
W6UJ 22 A- 5- 220

1A

Bozo and the Lids
W9TG 1142 B- 3-4828
Delta DX Assn
W5RU* 1426 B-10-4762
Raiders of the Lost ARC (Bell AR Contest Club)
N5HD 1383 B- 7-4/12
Thibodaux ARC
W5YL* 1243 B-40-4484
Varian Alumni and FD Club
AC6I 966 B- 4-4120
FT. Wayne Emergency Communications Team
N9NO 1359 B- 3-3974
Belleville AR Foundation
K9BGL/9 1207 B- 5-3942
Pikes Pique ARC
W6JI 1128 B-12-3916
Idaho Falls Mavericks
WA7FHU/7* 1248 B- 8-3868
Idaho Contest Conspiracy Group
K7TM/7 842 B- 6-3864
Soothing Libations Consumer Corps
KN8S* 1099 B- 7-3678
East Maui Ham Jam
AH6V 878 B- 3612
Union Parish Contestors
K5MC/5* 806 B- 3-3612
Northwest Ark. ARC
K5GO 1058 B-14-3602
Radio Telegraph Club of Antiquitas
NP4D* 824 B- 4-3596
Callaway AR League
WØDU 769 B-14-3524
Lebanon AR Klub
KØDEW 760 B-15-3440
Ten Four Gud Buddies
NN4A 945 B-10-3284
Ford Tin Lizzy Club
North Metro Chapter
AD8R 1385 B-12-3260
White Oak Lab ARS
W3WLH 794 B- 6-2978
Baltimore ARC
W3FT 735 B-18-2896
Mississippi River Rats
KB9S/9 899 B- 6-2882
York County ARA
K4YTZ/4* 863 B-20-2882
Canton ARC
W8AL 639 B-20-2836
Beldin Employee's ARS
N9AG/9* 918 B- 8-2796
Ogden ARC
KB7XO 1223 B-10-2732
Glen Gates Gang
W9MO/9* 680 B- 6-2674
Holiday Renegades
AJ4R 1045 B- 7-2630
Lake Superior DX Assn
KØGN 673 B- 6-2576
Denton Co. ARC
W5NGU 700 B-13-2562
Old Pueblo RC
W7GV 902 B- 9-2498
Explorer Post 73
WØMIK* 787 B-10-2474
The North Coast FD Group
KBØZ 942 B- 3-2462
Owensboro ARC
K4HY/4 631 B- 4-2428
QMARC
KC2Q 613 B- 4-2366
Rough Riders
KØMAT 712 B- 3-2362
McDonnell Douglas Astronautics West ARC
W6VLD/6 979 B- 6-2336
The Motley Crew ARC
AJ9W 974 B-10-2300
The Utah Liquor Commission
KC7O* 1026 B- 8-2252
Hereford ARES
KB5NO* 940 B-11-2236
Terrace and Kitimat ARC
VE7DRW 656 B- 8-2234
Wild Rivers ARC
AC8C 557 B-12-2178
Signal Propagators ARC
KB4E 736 B-15-2166
Guantanamo ARC
KG4FD 962 B- 8-2156
Southwestern Radio Group
KS8N 668 B- 8-2146
Imperial Valley ARA
WØNST 763 B-13-2130
Winona ARC
WØNE/Ø* 641 B-20-2124
Lake Nancy Amateur Operators
WA2QCY* 548 B- 5-2120
Stanly Co. ARC
K4DGB* 783 B- 9-2076
Murphy's Law-Yers
N6JF* 591 B- 3-2050
Captain America's Legal Manoeuvres
KB5CA 646 B- 3-2046
807 FD Group
WB8UCW/8* 829 B-12-2002
Non-Club Group
N5BST 828 B- 7-1980
K7DXD Roadrunner Relics
K7DXD 755 B- 8-1970
Sussex ARA
KJJL 530 B-11-1954
West Bank Breakfast Club
N5EH 729 B-10-1949
Tri-County Repeater Assn
WØYEK* 641 B-16-1932
.660 Simplex/RTTY Group
KB4ES* 897 B- 8-1894
Dr. Loomis Memorial Junior Mechanics League
WB4KSG/4* 661 B- 8-1894
Collier County ARC
WB4ZEU 607 B- 8-1846
Satellite Business Systems ARC
WA6RA 687 B- -1842
Chiggar Mtn. Scratchers
WA4BBN 856 B- 7-1802
Lockheed E.R.C. ARC
W6LS 474 B- -1794
Wolf Pit Mountain FD Expedition
KB4PV 556 B- 4-1776
The Louisville Area Non-Club Group
K4QMU 935 B- 6-1766
Chateauguay ARC
VE2CAR/2 500 B- 7-1760
Cabarrus ARS
W4PNY 509 B-14-1696
Pioneer ARC
W4QO 428 B- 8-1684
Metropolitan AR
W6SED 1152 C-14-1605
Signal Hill ARC
KØHP 521 B- 7-1596
Bristol ARC
WB4DKI* 391 B-20-1578
Indian Hill ARC
WD5/5 455 B-14-1576
Lamoine Emergency ARC
AG9Y* 604 B- 4-1550
Olathe ARC
KØKS 522 B-15-1514
Bismarck AR Klub
WØZRT/Ø 1182 C-30-1482
Non-Club Group
VE3HIR/3 410 B- 3-1464
Radio Amateurs of Texas Tech. Univ.
KC5W 450 B-10-1462
Sunset Empire ARC
W7BU 601 B- 9-1442
Kauai ARC
KH6LG* 1034 C-12-1434
Athens Co. ARA
WB8DOD 611 B-15-1428
Western Ky DX Assn
WA4QQV 650 B- 7-1407
L'Union Metropolitaine des Sans-Filistes do Montreal
VE2UMS 297 B-30-1388
Ramsey County ARC
KØPVG* 594 B- 5-1384
Bettendorf AR Federation
KB0XY 453 B- 7-1380
Clover Leaf Farms ARC
WD4IIO 303 B- 8-1372
Industrial Seven
AC7H 1263 C- 7-1364
Hastings ARC
WØWV 377 B-12-1332
Benicia ARC
K2GMY/6* 373 B-14-1318
Lewisville Texins ARC
WBØCGH/5 361 B- 5-1304
Baldwin Co. Amateurs
W4MHW* 296 B- 3-1296
Society Radio Operators
Chicago F.M. Club
W9EJ* 380 B-20-1290
Trons
AI4T 399 B- 4-1232
Sabine Valley ARA
N5ANN 445 B-18-1230
West Alabama ARS
KC4GS 522 B-20-1224
Non-Club Group
K2SM 318 B- -1180
Oral Roberts Univ. AR Outreach Club
N5EX 430 B- 5-1166
Spink AR Klub
WBØJBY 425 B- 5-1150
Stockton ARC
WA6YBG 418 B-12-1114
Plateau ARA
KN8D* 448 B- 8-1096
Wake Tech College ARC
WB4TOP/4 245 B-12-1086
Tioga ARS/Carroll & White Co. RC
WØVP/Ø* 288 B-10-1082
Hopkins County ARC
WB4JRO 381 B-15-1062
Bruce ARC
VE3TIV 339 B- 7-1060
First State ARC
K3QBD* 322 B-12-1048
Easter Nevada ARS
WB7WTS 339 B- 6-1038
Non-Club Group
KC4TX 930 C- 8-1030
ARC of Carrollton
KG5E 248 B-11-1022
Navarro ARC
WD5DWV* 460 B-14-1020
Non-Club Group
N8AQK 341 B- 5-1018
South Florida Ham-sters
N4AM 317 B- -1004
Winnipeg DX Club
VE4AA/4* 855 C- 8-1002
Douglas County ARA
K4PI* 337 B-12- 992
North Island ARS
VE7ARK* 354 B- 6- 968
Emerald ARS
WA7FQD 194 B-12- 944
The Chuprinko Family
WA3HQK* 419 B- 5- 942
Martys Marauders
K3MK 737 B- 4- 937
Sacrament ARC
W6AK 466 B- 4- 932
International Harvester RC
WB4HPC* 413 B- 8- 926
Severn School ARC
WA3WRC 262 B- 6- 924
Mason County RC
K8DXF* 295 B-13- 896
Wells County ARC
WØPPG/Ø* 277 B- 9- 896
Ozymandias's Despair
N8ALB* 198 B- - 892
Non-Club Group
W1GKJ 287 B- 9- 890
Hiawatha ARC
KØNL/Ø* 294 B- 7- 888
Pike County ARC
WØCZH* 367 C-12- 872
Last Mountain RC
VE5LM 246 B- 7- 828
Yellowhead ARC
VL6HV 307 B- - 824
Non- Club Group
VE2CMH 353 B-15- 806
Lima Area ARC
W8EQ* 242 B-15- 804
Non-Club Group
N2AUV 350 B- 4- 800
Society for the Preservation of Bird Kodiak
KL7Z* 373 C-18- 759
Blacktick Field Group
WB8YSB* 225 B- 6- 752
Cimaron Valley Amateur Ass
WDØEUE* 333 C- 9- 723
Carolina Communicators
WB4WDH 218 B- 5- 636
TCI Group
WB6WNI* 246 B- 6- 594
STARC
KB6NF 243 B- 8- 586
Twin Bridges FD Group
WA4SZSH 167 B- 4- 554
Georgian College ARC
VE3GCR 191 B-12- 542
Centralina ARC
KC4FH* 147 B- 9- 524
Communications Division New Orleans Police Dept.
KBSJM 143 B- 6- 518
Buckhorn VHF Society
W7AZU* 157 B- 5- 514
Puckerbrush Hams
W9DV 263 C- 7- 484
Ellis County ARC
WD5DDH 122 B- 8- 444
State-Line ARC
KAØBAW 114 C-10- 414
Livingston Amateur Repeater Society
W2XJ* 147 B- 3- 394
Arlington Civil Defense
KA1BTV* 82 B-10- 364
Wareham ARC
K1RSZ 94 B-12- 288

1A - Commercial

Radio Renegades
KBØXL* 850 B- 4-1992
Field Day Troopers
WAØGNO 719 B- -1868
Non-Club Groupies
W1OD 497 B- -1336
Highland Park H.S. ARC
WB9LDH* 360 B- 6- 730

2A - Battery

Connecticut Wireless Assn.
W1RM* (+KA1EPO) 1646 A-11-15,465
Arapahoe RC
KØNA/Ø* 1626 A-18-13,410
Meriden ARC
N1AN (+W1NRG) 1025 A-30-10,660
Fongo Hill ARC
N8UJ 1546 A- 8-9555
Eastern Iowa QRP Contesters
NØGA 984 A- 6-9060
QRP ARCI
K8BX* 854 A- 5-8295
Barnesville ARC
W8FYF (+WD8DAZ) 1032 A-15-6710
Bicentennial ARC
AE9N/9* (+KA9FAY) 826 A-30-6500
Walton Radio Assn.
W2LZ* 584 A- 8-6340
Great River ARC
WØOM/Ø (+NØCIH) 899 A-12-5495
Field-Day AR Telegraph Society
WA6EUZ 495 A- 4-5950
Fellowship ARC
ND4E/A* 745 A-18-5220
Fort Armstrong Wireless Assn.
W3SFA/3 (+KA3GXJ) 598 A-14-6125
Tri-State ARS
W9OG (+KA9KRE) 1635 B-61-5038
Wis. Rapids ARC
WDØQA/Ø 620 A-20-4760
Sticky and the QRP Mountain Boys
N2RI 555 A- 3-4710
Glastonbury ARC
K1EI 487 A-11-4580
Morton ARC
WBØEEB 1267 B-21-4430
Brandon ARS
K4TN (+WB4BIM) 1221 B-22-4330
Berry's Mountain ARC
W3TS/3 (+KA3AJH) 401 A- 8-4040
Salem ARC
W7SAA/7 530 A-20-3970
Associated Radio Amateurs of Southern New England
W1AQ/1 1187 B-15-3948
Shared Medical Systems
KE3C 400 A- 4-3685
Lookport ARA
W2RUI/2* (+N2BIC) 404 A-15-3595
TAARA
W3EEK 853 B-16-3290
Ringgold ARC
W4ABZ* 449 A-12-3230
Nanaimo ARA
VE7BA/7 990 B-30-3186
Splitrock ARA
K2RF (+KA2DEV) 788 B-20-3148
Lakeway ARC
KQ4I* 985 B-15-2954
Brewton AR Union
NI4V 893 B-10-2826
Lassen ARC
KS6R* 405 A- 6-2770
Anthill RC
N6BLH* 1022 B-11-2566
Issaquah ARC
AF7N* 741 A-15-2110
Sun City ARC
K5WPH 605 B-30-1852
Peel ARC
VE3PRC/3* 411 B-25-1600

VFW 5606 Northland ARC
N0BKE* 433 B-20-1576
The Three Rivers RC
WB0RCW* 191 A-15-1455

Delta ARC
VE7SUN/7 232 B-11-1112
Pecos Valley ARC
K5LWU (+KA5LMU)
321 B- 6-1022

Coon Valley RC
N0BD* 261 B-14- 990
Top of the Panhandle ARC
N5AE/5 (+WD5FLU)
64 A- 4- 855

Non-Club Group
WA6CFE// 87 B- 3- 370

2A

Prince Rupert RC
AA9A/9* 3709 B- 6-9186
Non-Club Group
N7ZZ 3268 B- 4-8454
Richardson Wireless Klub
K5RWK 2643 B-30-7870
Flyweight DX Group
W4JD* (+KA4RWC)
2555 B-26-7812
West Virginia DX Assn.
W8NR 2225 B- 7-7776

Heart of America RC
W0RR (+KA0GNA)
2305 B-15-7668
Motor City Contest Club
K8CC (+WD8RHO)
2284 B-11-7300
Desert DX Corps
AA7A 2239 B- 5-7204
Rockwell ARC
W8TFZ* (+KA8HFO)
2054 B-16-6840
Kanawha ARC
W8GK* (+WD4ALW)
1896 B-30-6782

Mobile ARC
K4ZM (+KA4IUS)
2046 B-40-6694
Mecklenburg ARS
W4BFB* 2225 B-35-6618
Ohio Valley ARA
W4FU/8* 2193 B-12-6508
Palm Beach DX Assn.
W4OD/4* (+WD4JSX)
2120 B-10-6502
Wisc. Valley Radio Assn.
W9SM (+WD9BKU)
2014 B-25-6440
Southern California Amateur Net
N6KN* (+KA6CSC)
2104 B-15-6306
Lynchburg ARC
K4HEX/4* (+KA4IOZ)
1887 B-30-6138

North ARK ARS
K5LG (+KA5EIA)
1763 B-10-6000
Ozarks ARS
K0FA (+KA0EML)
1807 B-15-5964
Keesler ARC
K5TYP (+KA5HVX)
2038 B-21-5890
Azalea Coast ARC
K4UWH 1732 B-20-5850
Overlook Mountain ARC
K2HA (+KA2KVZ)
1711 B-20-5834
Radio Amateur Tech. Society
K9CC 1892 B-12-5800
Butte ARC
W7FO* 1879 B- -5726
West Valley ARA
W6PIY (+KA6PRF)
1730 B-25-5588
Marcom
K3CZ 1577 B- 7-5602
Gallatin Ham RC
W7ED (+KA7HPD)
1752 B-27-5480
West Jersey DX Group
K2NT 1367 B- 9-5160
Lake Area AR Klub
K5KU 1761 B-26-5156
Motor City ARC
W8MRM (+KA8IKA)
1494 B-40-5126
W0 Question Marks
W0IZ/0 (+KA0LAE)
1562 B- 9-5066
Tampa ARC
W4DUG (+WD4REX)
1502 B-15-5046
N.I.A.R.C.
K9SA/9 (+WD9IFV)
1405 B-20-5024
Columbus ARA
W8IO (+KA8MCC)
1519 B-25-5022
Montrose ARC
W7XG/0 1507 B-24-4992
732 Communications Squadron
VE1ASJ/1 1299 B- 3-4932
Sterling Heights Independant Team
W8YO* (+KA8JBK)
1317 B- 9-4928

Kingsport ARC
W4TRC* (+KA4ICK)
1603 B-25-4862
Sevier County ARC
K4XU (+KA4TWO)
1516 B- -4856
Hoosier Lakes RC
K9RD/9 (+KA9JIX)
1503 B-12-4810
Fraternal Order of Radio Contest Enthusiasts
KJ1G/0 1375 B- 4-4792
Edison Radio Amateurs Assn.
W8ICN/8 (+KA8JSI)
1414 B-18-4734
Putnam Emergency and Amateur Repeater League
K2AV 1401 B-17-4696
Radio Amateur Megacycle Society
W9DY 1187 B-12-4622
The Rasta FD Group
KA1D 1557 B- 8-4610
The ARC of the Ohio State University
W8LI* 1148 B-12-4586
Shenandoah Valley ARC
W4RKC 1321 B-12-4510
Muncie Area ARC
K9NN (+KA9DHL)
1290 B-48-4496
Western Illinois ARC
W9AWE (+KA9IVM)
1336 B-25-4486

Prairie Dog ARC
W0OJY 1387 B-20-4462
Amherst RC
K1KA 1323 B-17-4444
Mid-Mo ARC
N0SS (+WB0TPN)
1252 B-25-4422
New Providence ARC
W2EME (+KA2HKD)
1189 B-18-4388
Milacron ARC
W8RSN* 1573 B-20-4384
Eastern Mich. ARC
K8DD/8 (+KA8KCN)
1181 B-15-4376
Beaches ARS
W4DU (+KA4JMU)
1401 B-30-4361
South Lyon Area ARC
N8AR/8* (+N8CPO)
1354 B-16-4330

Virginia Beach ARC
N4HQ (+KA4NME)
1191 B-40-4320
Escondido ARS
N6WB 1214 B-25-4278
Stoneman Lake FD Group
N7RK (+KA7JVZ)
1313 B- 7-4258
Livonia ARC
K8UNS 1267 B-40-4246
IBM San Jose RC
AA6Z 1325 B-13-4188
Los Alamos ARC
W5PIO* 1384 B-23-4160
Pottstown Area Repeater Team
N3WW (+KA3DRD)
1259 B-15-4156

Radio Amateur Club of Knoxville
W4BBB* 1423 B-11-4154
Morris County ARES/RACES
W2UH* (+WB2YGT)
1155 B-26-4124
Gore Range ARC
W0KEA 1151 B- 6-4060
Valley ARC
W0PI 1122 B-10-4016
Litton Data Systems ARC
W6OC 1804 B-23-4008
Central Washington ARC
W7GB/7 1239 B- 8-3986
Ski Country ARC
K0CL (+KA0KDR)
1176 B-23-3980
Yellowstone RC
K7EFA* (+KA7HUU)
1239 B-15-3968
Randallstown ARC
N3IC/3 1182 B- 7-3966
Northeast Georgia ARC
NB4X* (+WB4GYF)
1083 B-15-3948
Ellsworth Amateur Wireless Assn.
WITU (+KA1CIB)
1109 B-14-3928
Medina 2 Meter Group
W8RV/8 (+KA8DSP)
1462 B-38-3914
Tri-City ARC
W1BML (+KA1CMT)
1126 B-25-3894
Carmine A1 Group
K5DL/5 842 B- 4-3868
Mountaineer ARA
W8SP (+WD8EOG)
965 B- 7-3862
Madison County ARC
W8TK (+KA8MYN)
968 B- 7-3860

St. Louis Police ARC
W0FF* (+KA0HFE)
1116 B-10-3852
Decatur ARC
W4ATD (+KA4PSX)
955 B-30-3832
Conyers AR Group
N4CI (+KA4QVX)
1309 B-16-3828
Sandy River ARC
W1KX/1 (+WD4MDX)
1034 B-12-3822
Holmdel ARC
K2DR/2 (+N2CDC)
1127 B-20-3812
Mosquito Hill Contest Club
VE3LR 1456 B- 8-3804
Bartlesville ARC
W5NS/5 (+KA5LFD)
1075 B-50-3786
East Bay AWA
N1RI/1 1130 B-19-3772
W/k ARC of Greater Milwaukee
N9AW/9 (+N9AFR)
1158 B-11-3768
Brazosport ARC
N5FN (+KA5KRI)
1122 B-25-3710
Sweetwater ARC
KA7FIT (+KA7JWY)
1174 B-14-3676
Anoka County RC
W0EG (+N0CCI)
1141 B-13-3676

Goddard ARC
WA3NAN (+WB3JKE)
951 B-17-3672
Huron County ARC
KF8O* (+KA8LOL)
968 B-14-3622
Candlewood ARA
W1QI* (+KA1GSO)
1012 B-26-3620
Ham Assn. of Mesquite
N5DA (+KA5LEF)
1127 B-39-3612
New England Gypsy Moth Appreciation Society, New Hampshire Division
K1LG/1 1409 B- 7-3570
Twin City Hams
W5EA* 1328 B-30-3518
Lake County ARC
W9LJ (+KA9EXA)
1033 B-37-3498
Middlesex ARC
W1HEB (+KA1HAX)
1090 B-20-3498
Bunker Ramo AR
WB6OBQ/6 1260 B- -3492
Racine Megacycle Club
W9UDU 1126 B-30-3464
Faulkner County ARC
W5LL* 1099 B-10-3460
Cape Fear ARS
WB4YZF (+KA4LIH)
984 B-20-3438
West Georgia ARS
N4DX 1085 B-15-3410
Southern Ill. ARS
AA9D* (+WD9EEG)
1033 B-16-3410
Explorer Post 599
WA7SKJ 1479 B- 7-3408

Wallingford ARS
W1SY/1 929 B-20-3400
Gatineau Park FD Group
VE2CV* 1021 B-15-3346
Garden City ARC
W8WT (+N8CJQ)
997 B-18-3336
LADC and Alumni FD Club
N9PL/6* 980 B- 7-3320
Gulf Coast ARC
KC4MM 1134 B-22-3318
Gadsden ARC
K4JMC* (+KA4TER)
1003 B-21-3304
Lubbock ARC
K5LIB 961 B-45-3296
Ole Virginia Hams
N4FS 1014 B-20-3296
Coronado Wireless Assn.
K4HML* 1203 B- -3190
North Augusta - Belvedere RC
K4FR 932 B-15-3190
William Penn RC
W3FPC 745 B- 5-3180
Quad City ARC
N9OK 983 B-25-3178
Greater Fairfield ARA
WB1CQO 875 B-28-3160
Central Wis. Radio Amateurs LTD
W9NN/9 (+KA9ACE)
978 B-25-3160

Kan Ka Kee Area RS
W9AZ* 920 B-12-3156
Westpark Radiops
W8VM 849 B-53-3156
Clark County ARC
W9WWI (+KA9FDH)
881 B-34-3150
The Great Walenda +3
KJ8Y 685 B- 4-3140
Green Hills Field Dayers
W3MN 716 B- 3-3116
Grande Ronde Radio Amateurs
W7KVV (+KA7EJT)
903 B-22-3114

Grand Rapids ARA
W8DC (+KA8KVQ)
992 B-21-3086
Bell System of Indiana ARC
K9FG 937 B-17-3086
RATS
W4PQP* 902 B- -3080
St. Clair ARC
N9HH (+KA9KFR)
848 B-18-3060
Tupelo ARC
K5JG 995 B-18-3040
The Lake Country ARC
AE5B (+KA5FLO)
1248 B- 7-3034
Parsons Area ARC
W0RT/0 908 B-11-3034
Robious Road ARC
K4WHN* 1277 B- 6-3028
Washington Mountain RC
K8IW 869 B- 6-3028
Sand Hills ARC
W0MI (+WD0GSA)
943 B-20-3018

Humboldt ARC
K0GP (+WB0RKO)
957 B-20-3018
Ozone RC
N6SL/5* 807 B-20-3002
Sam Houston AR Klub
N5EE* 1186 B-19-3000
Indian River ARC
K4VS* (+KA4SLI)
976 B-25-2974
Ford AR League
K8UTT (+WD8QVY)
816 B-10-2966

OCARA
WA2MNA 807 B-24-2962
The 'Special K's'
KJ7K 1005 B- 5-2936
HOTARC
WD5IAF/5 1006 B-25-2936
Goose River ARC
W0PU/0 949 B-12-2936
Northeast Missouri ARC
W0CBL/0 (+KA0KFS)
778 B-16-2916
Kentucky Colonel ARC
AB4Y 779 B- -2914
Merrymeeting Repeater Assn.
N1MA 1153 B-10-2912
West Carleton ARC
VE3JQR 857 B-10-2902
Story County ARC
AI0Z (+W0PFP)
821 B-15-2898

Viking ARS
WA0CJU/0 679 B-15-2892
Johnson City RA
K4SE 841 B-14-2888
Central Columbia School Dist. ARC
WA3UDD 888 B- 6-2878
Calhoun County ARA
W4NTI (+KA4UMR)
1060 B-28-2878
Tippecanoe County ARA
W9REG (+KA9IHB)
967 B-30-2870
Tuscaloosa ARC
W4XI 830 B-40-2864
Indianapolis Red Cross ARC
WA9LGQ 1216 B-31-2832
Club Radio Amateur De Quebec
VE2CQ/2* 656 B-22-2812
Rankin County ARC
K8SDX (+KA5CSU)
1445 B-14-2808
Rip Van Winkle ARS
W2FSL (+KA2KSY)
845 B-37-2802
Indianapolis Power & Light ARC
K9FC 934 B-12-2790
The Neurotic Three Society Delegates
N3SD/3 711 B- 3-2776
Maui ARC
KH6RS 901 B- 9-2752
Smithtown RACES
W2NN 1957 C-10-2748
Tucson IBM ARC
K7KZ (+KA7IKI)
1011 B-21-2744
The Basement Bunch
WB9UAI (+KA9GCE)
831 B- 8-2740
Anoka County ARES
KC0H 828 B- 7-2728
Faquier ARA
K4MZ (+KA4MRS)
748 B-18-2714
Friendship ARC
W3GR/3 776 B-15-2662
Hannibal ARC
W0KEM (+N0BQL)
1459 C-20-2653
Montreal ARC
VE2BG 1039 B- 8-2650

Bastrop ARC
KE5L* 756 B- 7-2644
Straits Area ARC
WB0N/8 733 B-15-2640
WR9AMA FD Group
N9TI 752 B- 4-2620

Wilderness Ham Radio Operators
K9SG (+KA9EZD)
722 B-12-2614
Farmington ARC
W8NBN 1164 B-20-2610
Great Bay RA
WB1CAG/1 (+KA1FMR)
856 B-15-2606

Three Rivers ARC
W0BRN/0* 945 B-44-2604
Cullman ARC
KO4I* (+KA4TQH)
1116 B-18-2598
Pentagon ARC
K4AF 761 B-32-2576

Big Island ARC
KH6B (+WH6ALA)
840 B-15-2562

American Red Cross Emergency Communications Service
N2MH 731 B-16-2556
Green Bay Mike & Key Club
K9EAM (+KA9HOO)
888 B-15-2544
Univ. of Michigan ARC
W8UM* 659 B- 7-2540
Penn State ARC
K3CR 743 B-12-2534
Columbia ARC
AA4V/4 1002 B-20-2532
Miami County ARC
W8FW 1088 B-15-2516
COFARS
K6FI (+KA6PTN)
483 B-10-2514
Denver Labs ARC
KB0FD 829 B- 9-2508
Rideau ARC
VE3BRC 697 B-11-2500
River Cities ARA
KZ4G 663 B-18-2500
Irving ARC
WA5CKF 990 B-48-2498
Mountain ARC
W0JAW 762 B-13-2488
Lancaster County ARC
K4MR 700 B-12-2482
Grand Island ARS
AJ0A 862 B-25-2474
Maryland Mobileers ARC
K3WD* 761 B-10-2470
Great Falls Area ARC
W7ASW* 748 B-23-2464
Steubenville and Weirton ARC's
N8RH* 827 B-20-2422
Valley AR Activities Council
W5DX/5* (+KA5GKW)
667 B-25-2420

Lakes Area ARC
W2WOE/9 (+KA9EKG)
675 B-14-2408
Moose Jaw ARC
VE5MA/5* 641 B-10-2400
Non-Club Group
WB6PFJ 1048 B- 3-2396
South Platte ARS
W0XK* 991 B-14-2394
Albany ARC
W4MM 715 B-35-2392
Altamont ARC
KJ4X* 568 B- -2382
Iowa - Illinois ARC
W0LAC* (+KA9JNG)
665 B-20-2376

Mon Valley ARA
KB3S* (+KA3CQA)
842 B-12-2372

Carbon ARC
K3II 711 B-19-2352
Missouri Valley ARC
W0NH/0* 737 B-24-2344
Bullitt ARC
KD4BZ* (+KA4TET)
580 B-20-2324

Culpeper ARC
N4JR 700 B-11-2308
State Line RC of NY & NJ
K2LSA/2 738 B-17-2304
Coconino County ARC
W7YS/7 (+WB7EYU)
617 B- 9-2300

Mankato Area RC
W0WCL/0 (+WD0ECN)
667 B-15-2296
Moosehorn ARC
KL7IEI 791 B-16-2296
Hollywood Hills RG
N6FM 1006 B- 9-2290
Non-Club Group
KA1H 598 B- 4-2270
Comsat/IBM/Intelsat FD Group
AD3C/3* 627 B-11-2262
ARC of Central Wis.
N9BBN (+KA9GAT)
644 B- 8-2252

FAARA
K8YTE 679 B- -2250
Warrick ARC
W9MR 708 B-17-2218
Southern Counties ARA
K2BR (+WA2IAD)
627 B-40-2214
Farout ARC
WB8SMC 635 B-14-2208
Gaston County ARS
K4TP4 750 B-12-2196
Bay Area ARS
W3JW* (+KA3EOL)
749 B-15-2192

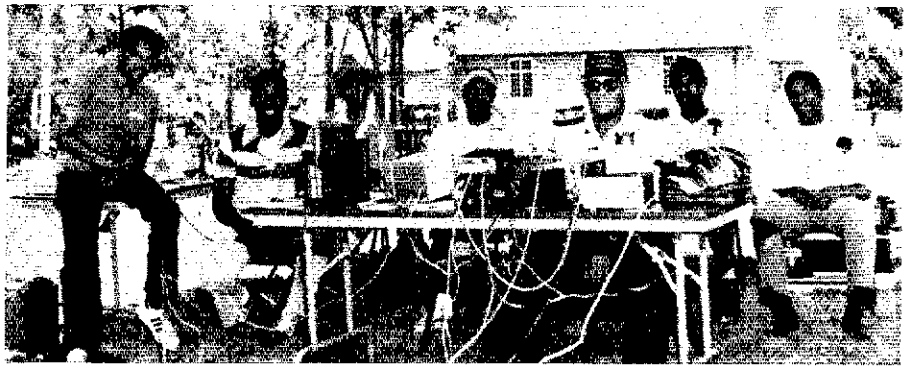
Sputh Milwaukee ARC
KC9N* 922 B- 8-2192
Flambeau ARC
AG9Q (+KA9IKR)
689 B-20-2178

Non-Club Group
KA9D 532 B- 5-2166
Fresno ARC
W6TO 661 B-20-2150
Auburn ARA
K2BF B 498 B-18-2146
Crawford Co. ARC
WA9DDS/9 708 B-20-2128
North Kitsap ARC
W1MT 653 B- -2128
San Angelo ARC
W5QX* (+KA5BMU)
618 B- -2120

Huber Heights ARC
NBTD (+KA8ILT)
523 B-19-2116
Ottawa Valley Mobile RC
VE3RAM 580 B-12-2100
Huron Valley ARA
W8KGG 529 B- 8-2094
Mercer County ARC
W3LIF 539 B- 6-2078

Enid ARC
W5HTK 737 B-11-2076
Kings ARC
W6(YY* (+WD6DRD)
710 B-23-2072
Granite State ARA
K1RD 525 B-11-2072
Socorro ARA
W5FZ 744 B- 6-2062
ARS of Tennessee Tech.
WA4UCE 503 B- 9-2054
Loveland Repeater Assn.
W0OSK/0 650 B-20-2054
Arlington ARC
W4WVP/4 788 B-15-2048
ARC of Mt. Vernon
W9BFO 823 B-20-2046
Non-Club Group
VE3LUR 559 B- 5-2044
Irvington RAC
K2GQ (+KA2EYH)
1262 C-25-2028
Santa Rosa ARA
NJ4I 836 B-14-2018
Mid-State ARS
NF4* 852 B- 4-2004
Logan Goaler S
WD8IGN* (+KA8MNO)
426 B- 3-2002

Old Field ARC
N4OH 690 B- 5-1994
Lower Yellowstone ARC
K7CDN* 600 B-13-1994
Saskatoon ARC
VE5AA/5 538 B-18-1992
Santa Clara County ARA
W6UW* 588 B-55-1986
Fox ARC
N0ND/0 (+KA0HHH)
421 B-16-1984
Non-Club Group
NE0C 621 B- 9-1978
Independent
WB0YKF/0 717 B- 8-1976
Turtle Mount ARC
VE4LB 595 B- 7-1972
Tewksbury ARC
N1HD* (+KA1GUV)
701 B-10-1968
Holland ARC
K8DA4 616 B-15-1966
Southern Penna AR Council
N3AIA (+KA3CST)
560 B- 6-1962
Wichita ARC
W0SOE 550 B-12-1958
Chehalis Valley ARS
WA7UHD 527 B- -1948
Fayette ARA
KB8GQ/8 573 B-13-1946
Limestone ARC
K4KJD 548 B- 9-1932
Longmont ARC
WB0VFN (+KA7FSW)
690 B-10-1924
Non-Club Group
K8DU 506 B- -1887
Unalaska Wireless Assn.
KA9BJO 676 B- 4-1882
Pioneer ARC
VE3NA 680 B-10-1880
Detroit ARA
W8ZA 696 B- 9-1872
Western Carolina ARS II
K4TDY (+WD4LQD)
592 B-18-1866
Southington ARC
WA1UFO* 663 B-10-1864
Borderline ARC
N7DF/7 1077 C- 7-1853
Athens ARC
W5CR* (+KA5AJK)
504 B-10-1846
Key West ARC
W4LLO 368 B- 8-1826
Extra Efforts
N9AX* 549 B- 3-1822
Smyth County ARS
KM4X 522 B- 5-1822
Beaumont AR and Repeater Club
W5RIN* (+N5CMM)
637 B-40-1816
Sheboygan County ARC
W9RF (+KA9KJI)
644 B-15-1798
Cedar Valley ARC
W0GG 956 C-12-1771
Non-Club Group
N4YX* 682 B- 3-1764
Midland ARC
KN5M* 566 B- 6-1754
Non-Club Group
KE9I 899 C- 5-1751
Delta County ARS
K8ZAS* 445 B-14-1750
Weconio ARC
W0IE 563 B- -1748
End-of-the Line ARC
KK0I 436 B- 6-1746
Telco ARC
W6MPH 667 B-15-1734
Huberts' Heroes
KB5PI/5 549 B- 3-1716
Amateurs for Better Communications RC
KB9DS 702 B- 9-1714
Jackson County ARC
W5WA 626 B-11-1692
Honolulu ARC
KH6WO 768 C-25-1679
Saunders Co. ARC
WB0ICY* 557 B- 7-1672
Dufferin ARC
VE3FS 448 B-14-1664
Non-Club Group
WB8VUX 432 B- 8-1658
Humbotdt ARC
N4EH* 1445 C-20-1645
Hiawatha ARC
W8MAR 453 B-11-1640
Lake Success RC
W2YK(VP 622 B-10-1610
Pocono AR Klub
W3PM 455 B-12-1606
TEARA
K2RB 413 B-12-1594
Explorer Post 204
WA2OYR 399 B- 9-1582
Spommulle ARC
WD2ADX 436 B-12-1574
Sarasota ARA
W4IE (+KA4KEQ)
412 B- 8-1568
Holmes County W.A.T.C.H. Group
KB8XB 453 B-11-1560
Echo Repeater Assn.
KC9R 485 B-19-1544
Eaton County ARC
K8PTZ 400 B- 8-1544
Central Pennsylvania DX Club
AF3T 477 B- 8-1534
Vermilion ARC
AA0U (+KA0ARP)
395 B-10-1530
Radio Amateurs of Skagit Co.
W7UF 447 B-15-1518



The Mid-State ARC, NF4S, made their debut as a club on Field Day in 1981. Left to right are NF4S, NG4C, WB4TIF, WB4EYT, W4JUJ, WA4TIA and N4DYI (2A).

Dick, WB2PEF (r) rolls up the QSO total on 20-meter cw with the help of logger, Ginny. Dick and Ginny were with the Otsego County ARA, K2CW (3A).

South East ARC
K8EMY 488 B-43-1518
Crawford Co. ARC
KD9E* 481 B- 6-1416
Eau Claire ARC
K9EC/9 553 B-15-1506
Intermod ARC
N9BTU (+KA9KXT)
431 B-14-1500
Caltech ARC
W6UE* 470 B- 4-1494
Speedy's Super Seven
WB9SRP (+KA9HEP)
384 B-15-1482
Osthemo ARC
K8TW* (+KA8MWF)
389 B- 1480
Ft. Dodge ARC
W9UL 631 B-14-1462
C.F.B. Trenton ARC
VE3YTR/3 618 B-16-1438
Hampton Roads Radio Assn.
N4SD 481 B- 7-1432
Ga. Tech. ARC
W4AQL* 463 B- 6-1426
Telephone Radio Amateur
Pioneer Society
K8GAK 512 B-24-1424
Best of Mount Baldy
NB6D (+WA6ZEF)
482 B-14-1418
Gonzaga Prep Ham RC
KA7AMN 519 B-15-1414
Easton ARS
WA3GVI (+KA3HGX)
338 B- 1410
Yukon ARA
VY1DX 553 B-14-1390
Alamogordo ARC
K5LRW 382 B-14-1384
Central Vt. ARC
W1BD* 513 B-10-1380
The Chippewa ARC
K9VEV* 328 B- 6-1378
University of Rochester ARC
K2ZW1/2 535 B- 4-1378
Blue Ridge ARA
W4NYK 361 B-10-1376
TRW ARC
WA8WSO/8 362 B- 9-1368
UCLA Bruins ARC
W6YRA* 242 B- 4-1360
Cumberland ARC
K3IEC 312 B- 8-1340
Rowan ARS
W4EXU 753 B-10-1336
Chattahoochee Valley ARC
K4DXZ* 464 B-13-1330
El Paso ARC
W5ES/5 341 B-52-1310
Van Isle ARC
VE7VCC 539 B- 1292
Shuswap ARC
VE7OK 389 B-12-1292
Willie Air Plane Patch Group
WB7WPN (+KA2MHT)
537 B- 1280
Tumbleweed ARC
W5SDP* (+KA5KKP)
358 B-20-1268
'WB8NSL's Same ones'
WB8NSL 553 C- 4-1268
Grand Mesa Repeater Society
and Western Slope ARC
KD0M 275 B-21-1266
Rock River RC
W9TCH (+WD9IGM)
384 B-12-1264
Mt. Baker ARC
K7SKW (+KA7ASP)
731 C-57-1264
Buffalo Grove High School
ARC
KA9F (+KA9KIM)
445 B-10-1250
Manorville Madmen
KK2E 290 B- 6-1230
York RC
W9PCS* 460 B-10-1220
Thompson ARC
VE4TRC/4 337 B- 6-1216
Mountain ARC
WA4OBL* 328 B-20-1182
South Canadian ARS
W5TC 391 B-10-1182
Chicago Citizens RC and Lake
View ARA
WD9GAD 477 B- 8-1173
Flathead Valley ARC
K1LYY* 350 B-15-1170
Victoria ARC
W5DSC 222 B-10-1136
Non-Club Group
KE8LI* 454 B- 6-1134
OCARE
WA5ZAA 305 B-12-1124
Hawkins County ARC
W4PTS 382 B- 1122
Bellbrook ARC
WB8TOG 437 B-12-1118
Warren County ARES
W8RPK 326 B- 8-1112
Free State ARC
K3IVO* 540 B- 7-1094
Chipola ARC
KB4L (+N4AXJ)
228 B- 8-1086
The Captain And Crew
K1DII* 369 B- 4-1086
Wilderness Road ARC
WD4DZC 265 B- 1058
Jackson ARC
K4EP* 198 B-24-1042
Pass Me A Beer FD
WA8WPI/8 243 B- 3-1028
Non-Club Group
K5ES* 290 B- 5-1026
Covington County ARC
KZ4S/4* 270 B- 5-1004
McKean County ARC
W3VV (+KA3HME)
257 B-12-1004
Fair Lawn ARC
WB2RLQ 778 C- 993
Shawano Area Amateurs
WA9BZW 663 C-14- 963
Knox Co. ARC
W9GFD 216 B-15- 962
Milwaukee School of
Engineering ARC
W9HHX* 231 B-10- 962
Desert Waves ARC
K6OLJ* 249 B- 5- 956
Valley ARC
KI2QB/1 326 B-12- 952
Hamilton County ARA
K9KWO (+WB9VLX)
307 B- 7- 928
Bluegrass ARS
K8KJQ* 339 B-12- 922
ISRA - BOISE, Construction
Group
WB7PFQ (+KA7JMB)
262 B- 918
Central Carolina ARS
K4JUO (+KA4HJR)
293 B- 8- 916
Smokey Valley Radio
N9CPI* (+N9AOF)
257 B- 7- 914
Albert Lea Spiderweb ARA
W9FIT/9 236 B-15- 906
Non-Club Group
WA3MQN 351 B- 3- 902
Back Forty Gang
KA9M* 241 B- 5- 892
Ky. Fried Hams
KT4I* 249 B- 4- 856
IMA RC
K9GFV/9* (+KA9KNI)
288 B-10- 836
Elgin VHF FD Group
WB9QWZ (+WB9VUQ)
182 B- 6- 830
Kennebec Valley ARC
AE1W/1 (+KA1FTL)
195 B- 6- 818
Mobridge Area RC
W9YMB (+KA9HLO)
169 B-10- 818
Defiance County ARC
K8VON* 151 B- 8- 808
CFB Gagetown RC
VE1JO 499 C-10- 799
Fairmont Area ARC
W9NQK 292 B-10- 786
Northland ARC
W9BCY 405 C-12- 785
Gypsy Moth Exterminators
WB3GOK/3 279 B- 3- 766
Lake Martin ARC
Tallacoosa ARES
W4AEM 231 B-10- 762
Non-Club Group
W7IFB 308 B-11- 762
Twin Cities ARS
KO5Q 123 B- 9- 760
Kentuckiana RC
W8ABK 270 B-10- 760
Baraga Co. ARC
N8BNC* 167 B- 4- 754
Hualapai ARC
WA7LAZ* 166 B- 6- 732
Holdrege Area ARC
K9TD* (+KA9IRW)
425 C- 7- 732
Mesabi Wireless Assn.
KA9MK* 203 B-10- 712
Stoughton Civil Defense
K1GRB 245 B- 6- 702
Totem ARC
VE7ES/7* 156 B- 5- 688
Valley of the Moon ARC
W6WXU* (+WD6BOR)
237 B- 5- 686
Non-Club Group
K1ET/3 224 B- 3- 648
Shawnee ARC
WB9OXJ* 202 B- 8- 626
Wheatstraw ARC
WA5IPE/5* 90 B- 6- 580
Elmwood Park ARC
K9YHB/9* 84 B- 5- 568
Honey Lake Hams
KA9ADJ* 229 B- 3- 429
Western Arizona RC
W7JU* 95 B- 5- 390
Tri County ARC
AJ9B* 68 C-14- 370

2A - Commercial

Rockingham County ARC
N4UPH 1290 B-16-4372
Spartanburg ARC
K4JLA (+WD4RNU)
1250 B-15-3914
Order of Boiled Owls
W2AO/2 2197 C-12-3058
Non-Club Group
K9JH/4 683 B- 3-2396
Rutherford County ARES
N4BBB* (+KA4SIO)
654 B-10-1960
Radio Assn. of Western NY
W2PE (+KA2MGE)
562 B-12-1724
Rappahannock ARA
K4MR 540 B-11-1594
Doc & Al's RC
K8GV1/6 (+KA8ENO)
381 B- 4- 926
Big Thicket ARC
N5BHB (+KA5AEK)
247 B-10- 516

3A - Battery

The Decaying Corpse of the Roasted Turkey Gut Group Fortified by the Loose Individuals DX Society in Coalition with the Rubber Circle Contest Club FD Clique
K7SS/7 2051 A-10-15,475
Bellflowers ARA
WA6SFM/6*
1164 A- 5-9025
Tektronix Employees RAC
K7AUO (+KA7KRO)
986 A-16-7835
North Florda DX Assn.
N4KE 782 A- 9-6410
Williamsburg Area ARC
K4RC* (+KA4FVB)
1650 B-37-6058
Univ. of Massachusetts ARA
N1XZ (+WB1CST)
577 A- 9-5605
Fusion ARC
W2PU/2 433 A- 5-4850
Oregon Tualatin Valley ARC
KI7F (+KA7EHS)
1450 B-100-4266
B.R.A. & P.A.W.A.
K1ME (+KA1GQR)
1326 B-20-4220
Wexatikee ARA
KB8GC 245 A- 2305
Seneca RC
W8ID/8 381 A- 8-2155
Radio Amateurs of Greater
Elbridge
N2DM/2 466 B- 7-1954
N.P.A.R. Club
WB8CTC 609 B- 7-1335
Field Day's Finest
N9DD* 156 A- 4-1295
Kansas-Nebraska RC
W9BBM* 242 B- 8-1020
Tri County ARC
W4AHI 126 B- 5- 818
Kennedy Family
W8ZCG 90 B- 4- 596

3A

Texas DX Society
K5DX/5 (+KA5KDO)
4368 B-27-15,332
Shenango Valley AR FD Group
and Mad River RC
K3LR (+KA3DWN)
4292 B-15-12,662
Northern Illinois Field Day
Society
K9NO (+WD9EJE)
3673 B-14-12,434
Albuquerque DX Assn.
N5RR (+KA5KRO)
2547 B-18-11,420
Columbia ARA
K3EF/3* (+KA3CJL)
2558 B-35-8766
Norwood ARC
K1JMR (+KA1FQT)
2501 B-23-8588
D.E.C. Field Day Club
W1IS (+N4ENF)
2269 B-15-8486
Non-Club Group
N8UM* 2653 B- 7954
Central Kansas ARC
KØWA (+KAØANR)
2438 B-30-7906
Orange Hill Contesters
K6CYX 2384 B-18-7798
Mississippi Coast ARA
N5WE (+KA5KYZ)
2816 B-40-7448
Puerto Rico ARC
KP4ID* 1660 B-12-7240
Nachaug ARA
W1TR 2617 B-12-6950
Kettle Moraine Radio
Amateurs
W9HE 1881 B-14-6910
Platinum Coast ARS
K4JX/4 (+KA4PNZ)
2355 B-30-6888
ARA of the Tonawandas
W2SEX (+KA2JAV)
2088 B-29-6772
Ponce DX Club
NP4A 2234 B-11-6520
Ampex Employees ARC
K6QEZ 1726 B-12-6324
'We Thought it was a Contest'
FD Group
K8MN 2268 B-15-6254
Gopher Creek Group
VE4GE 1817 B-20-6168
Austin ARC
W5KA 2000 B-75-6126
Aurora Repeater Assn.
KØKE (+KAØJTQ)
2016 B-28-6116
Centerville ARS
K8XY (+N8BQI)
1892 B-25-6014
Jackson ARC
W5PFC (+N5CSE)
2333 B-25-5986
Jet Propulsion Lab ARC
W6VIO (+KA6KCH)
1784 B-18-5944
Southern Peninsula AR Klub
N4DJ (+KA4INA)
1852 B-36-5870
Laurel ARC
W5NRU (+KA5IMT)
2085 B-32-5848
Supreme Contesters of Radio
Emissions
N9IA 1824 B-11-5798
Old Natchez ARC
K5OCM (+KA5AZI)
2500 B-26-5694
NCDXC Memorial Station
W6TI (+KA6PKW)
1854 B-17-5658
Sharon ARA
K1JNQ (+WA1ZFD)
1697 B-30-5610
Broken Arrow ARC
W5DRZ 1665 B-22-5582
Trident ARC
N4EE 2057 B-48-5524
Opequon RS
N8II/8 1823 B-10-5296
Enfield RA Group
N1SR/1 (+KA1CEB)
1760 B-28-5290
Chattanooga ARC
W4AM* (+KA4SMR)
1716 B-42-5270
Fort Smith Area ARC
W5ANR (+KA5ISQ)
1750 B-36-5196
Casual to Win
K8GR (+WD8SFB)
1535 B-18-5166
Delaware - Lehigh ARC
W3OK/3* 1842 B-15-5164
Utica ARC
K2IQ 1808 B-37-5156
Syosset High School
Ham and TV Club
WA2JAS* (+KA2ISA)
1528 B-15-5076
ARINC ARC
W3ZH/3 1810 B-11-5068
RC De La Vallee Du Richelieu
VE2CVR/2 1243 B-12-4902
South Georgia ARC
W4FGH* (+WD4ERN)
1484 B-15-4894
West Texas ARC
W5NW (+KA5LPS)
1800 B-18-4880
Southern California Ameture
Transmitting Society
WB6LRU 2220 B-21-4840
Redwood County Contest Club
NA6T 1736 B- 6-4830
Broward ARC
W4AB (+N4EZC)
1462 B-13-4808
St. Louis ARC
KØLIR 1679 B- 4774
Old Barney ARC
N2OO (+W2INN)
1406 B-16-4720
Springhill La ARC
N5II (+KA5FDI)
1686 B-16-4692
Davenport RAC
WØDC* (+KAØJOX)
1365 B-21-4690
Billerica ARS
KC1X 1316 B-27-4662
Goz's Gang
K2SA 1240 B-12-4640
Midsouth VHF Assn; Raleigh
Club; MARA
KA4P/5 (+KA4FOB)
1358 B-30-4578
Allen Co. AR Tech. Society
N9GT/9 (+N9BDA)
1425 B-22-4566
Great South Bay ARC
K2IV (+KA2HHO)
1248 B-15-4538
Monday ARC
AG9A* (N9BOR)
1184 B-16-4522
Cherryland ARC
W8GI (+KA8HIF)
1356 B-19-4516
Magillas Gorillas
KB2MG (+KA2MNJ)
1554 B-15-4510
Des Moines Radio Amateur
Assn.
WØAK* 1450 B-19-4506
Northern Virginia RC
W4PAY 1461 B-12-4450
Ashtabula Co. ARC
A18S (+KA8LNC)
1298 B-23-4408
Kaw Valley ARC
WØCET/Ø (+NØCBI)
1629 B-40-4406
Gwinnett ARS/Scientific
Atlanta ARC
NG4I (+N4CUJ)
2300 B-30-4404
HFEA ARC
K6QEH (+KA6PMT)
2598 B-30-4345
Surrey ARC
VE7SAR/7 1469 B-17-4322
Stockton ARC
W6SF 1182 B-35-4320
Jones Co. ARC
WØGN 1214 B-16-4250
Poway ARS
KC6S* 1286 B-52-4192
Boulder ARC
WØDK 1095 B-18-4170
Midland ARC
W8KEA* (+KA8HUV)
1166 B-25-4160
Harvard FM Repeater
W1WO 1144 B-35-4116
Acton-Boxboro ARC
AB1F (+KA1EEJ)
1116 B-25-4104
Tri-State International DX
Assn. and Delta ARC
W4BS 1290 B-21-4100
Communications Club of New
Rochelle
W2XV (+KA2KBW)
1325 B-40-4098
Mitre-Bedford ARC
W1FM 1382 B- 8-4076
Neenah-Menasha ARC
W9ZL (+WB9QFX)
1233 B- 4070
Robbinsdale ARC
KØLTC/Ø (+KAØKIY)
1157 B-17-4056
Fulton Co. ARC
W9JOO 1238 B- 9-4052
General Dynamics RC
AK5R 1549 B-20-4044
Douglas Co. ARC
KØRW* 1248 B- 4042
Independant ARC
NØII 1254 B-16-4034
Waterton ARS
WØNT (+KAØKMV)
1283 B-27-4008
Santa Clarita/San Fernando
Valley ARC's
W6JW 1419 B-25-3972
Southwest Dallas Co. ARC
AK5X 1567 B-37-3942
Holbrook Allstar Wireless Gang
W1PE (+WB1EXU)
1234 B-18-3930
Elkhart Red Cross ARC
AD9V/9 1173 B-10-3900
CRA Sud-Ouest
VE2CEV 831 B-16-3814
Bell Laboratories and Western
Electric CRES ARC
W8ZPF 1261 B-15-3814
Smokey Mountain ARC
W4OLB/4* (+KA4RUF)
1201 B-20-3804
Valley ARA
W4XD 1268 B-22-3790
Genesee Radio Amateurs
K2OS (+KA2DQA)
1095 B-28-3760
Fort Myers ARC
W4LX (+KA4A2E)
992 B-15-3716
Longview ARC
KR5G 1544 B-15-3690
Huntington Co. ARS
K9ZLU/9 (+KA9KFO)
1214 B-21-3676
Green Mountain Wireless
Society
N1VT (+WB1HHH)
2479 C- 3647

Redwood Coast ARC W6OS 981 B-10-3616
Umpqua Valley ARC KI7M 1303 B- 6-3610
Sioux Falls ARC WØZWY (+KAØKPY) 1132 B-20-3606
Tombigbee ARC AF5V (+KA5AJF) 965 B-15-3586
Luce - Mackinac Co. ARES Team W8GBR* 1354 B-10-3578
Eastern Ohio Amateur Wireless Assn. K8IP (+KA8AAV) 929 B-15-3566
Pennsylvania ARC WA3RCA 1394 B-16-3554
Virginia ARA W4FEG/4 (+N4EKD) 931 B-15-3504
Argonne ARC W9QVE 860 B-21-3500
Rochester ARC WØMXW (+NØBCB) 1901 C-50-3499
Lockheed Employees Recreation Assn. ARC WA6GFY 1054 B-14-3496
Lapeer ARC K8PW/8 (+KA8FIE) 1183 B-18-3490
Saline Co. ARC AE5L 999 B-19-3484
Lincoln Trail ARC NN4H 978 B-21-3346
Band Dit-Dahs K2UW* 998 B-16-3342
Huntingdon Co. ARC W3VI 968 B- -3286
Chatham County Group KX4G (+WD4CZJ) 1046 B- 7-3272
McDonnell - Douglas St. Louis ARC WAØCGV* 1205 B-20-3236
Evendale ARS K8LUC/8 865 B-21-3218
Calumet ARES W9EWC/9 778 B-10-3190
Aroostook ARA KA1B (+KA1ETN) 950 B-29-3180
North Hills ARC of Pittsburg K3GT* 846 B-23-3132
Arrowsmith ARC VE7EMO 876 B-20-3124
Pennyroyal ARS K1AO/4 (+KA4SKV) 814 B-15-3106
Cornell ARC W2CXM* 961 B-10-3096
Wellesley ARS W1TKZ (+K1OGF) 738 B-15-3091
Boeing Employees ARS K7NWS (+WB7SFO) 1203 B-62-3060
Anderson RC N4SZ 855 B-10-3058
Da Shed-House KD4OG* 866 B-14-3052
North Bay ARC VE3NBC 918 B-23-3040
Champlain Valley ARC W2UXC (+KA2IPT) 911 B-20-3036
Falls Radio Amateurs K9RHH (+KA9ICC) 1009 B-25-3036
Bedford Co. ARS K3NQT 1011 B-15-3014
Otsego Co. ARA K2CW (+KA2GXY) 714 B-10-3006
Southern Michigan ARS W8DF (+KA8JKC) 903 B-12-3002
Kootenai ARS N7AWE (+KA7DIR) 828 B-12-2996
Algoma ARC VE3SOO* 947 B- 9-2990
HDL RC K3TC 826 B-10-2988
Rappahannock Valley RC K4YS* (+KA4RJL) 821 B-17-2976
Tri-County ARC KBØSB (+NØAUY) 606 B-17-2966
Otter Creek Rebellion Phase II KI5P 959 B- 7-2960
Bethel AR Klub KD8M 795 B-15-2958
Detroit Metropolitan RC W8RJI 935 B-10-2936
Hopatcong Emergency Radio Operating System WA2PID (+KA2IGM) 939 B- 6-2930
San Mateo RC W6LMN (+KA6JIZ) 926 B-20-2922
Morongo Basin ARC KS6T 917 B- 9-2846
Coastside ARC WA6TOW* 1220 B-12-2840
Forsyth ARC W4NC* 802 B-20-2838
Allegany Highlands ARC W2SAM (+KA2FXO) 867 B-21-2830
Adams & Brown Cos. ARS KB8UN 889 B-27-2826
Burnaby ARC VE7BAR/7* 827 B-20-2816
West Seattle ARC W7AW 840 B-18-2800
Piqua ARC W8SWS 713 B-32-2766
Green Co. Chapter 10-10 Net W5NNL (+WB5OPG) 812 B-12-2760
Skylands ARC N2CS 872 B- 8-2758
Tidelands ARS KN5K 693 B-21-2720
Chas. E. Newton Jr. ARC K4HYB* 459 B-15-2704
Muskegon Area ARC W8ZHO 930 B-12-2662
La Porte Co. ARC K9JSI* 731 B-35-2636
Suburban RC of St. Louis Co. WØDCW 889 B-52-2634
Lincoln ARC K9KKV (+KAØJYZ) 872 B-25-2617
Naval Research Laboratory ARC W3NKF (+KA3HNH) 805 B-20-2610
West Jersey Radio Amateurs W2JUG/2 969 B-20-2572
Casper ARC W7VNJ* 659 B-25-2534
Adams County Peach Mtn. Group W8ON/8 627 B- 5-2534
Very Fine Operators N6KG/6* 609 B- 7-2504
Non-Club Group K9HZS 891 B- 6-2502
Bill Gremillion Memorial RC K4SEX 866 B-40-2490
Wantagh ARC N2EM (+KA2JEI) 794 B-14-2450
Westchester Emergency Communications Assn. N2SF* (+KA2GJI) 571 B-32-2432
North Shore RA N1BB 716 B-19-2400
West Allis RA Club W9FK/9 1243 C-13-2383
Tri-County ARC K6AGF (+KA6PVL) 546 B-21-2376
Iredell Co. ARS NG4X (+KA4HPW) 514 B-13-2360
Ogdensburg ARC N2MD (+KA2MUD) 651 B-17-2358
EDD-ARC N6SU 725 B- 6-2356
Central Iowa RA Society WØUG 654 B-13-2355
Everglades ARC W4SVI (+KA4TBL) 581 B-15-2350
Blossomland ARA W8MAI 616 B-18-2322
South East ARC N6AFZ 979 B-12-2316
Desert Rats DX Club AA7D (+KA7JUB) 658 B-12-2314
Portage ARC N8KW/8 789 B-14-2312
Central Oregon RA K7BY 852 B-11-2304
Kings Co. RA K2GJ* (+KA2KCV) 626 B-32-2300
Petalumh DX and Experimenter Society WB6EGE (+KA6JAF) 685 B-12-2288
Pleasants County ARC W8UI* (+WD8NHN) 531 B- 8-2226
Rockport AR Group W6NI/5 636 B-14-2186
Rome RC W2OFQ (+KA2JUR) 683 B-20-2182
South Huron ARC VE3DAR* 591 B- 9-2176
Six Meter Lovers Using Radio Propagation KB8TG 716 B-12-2166
Eastern Ozarks ARC WØQK 796 B-32-2156
PHD ARA WAØUGU/Ø 603 B-31-2150
Auburn ARA K2BFB 498 B-18-2146
Woodbine FD Group KBØY 618 B-10-2144
Chelmsford ARA W1LUS 682 B-10-2140
Williamson County ARC KB5KZ 711 B- 8-2114
Metro ARC VE3MRC* 718 B-13-2086
Sperrynet/Roseville KBØR 643 B- 8-2058
Wilderness Trail ARC KI4B* (+KA4SAA)
3M Scotch Hams ARC WBØBQG 580 B-27-2044
Port Lavaca ARC W5KTC (+WB5YRJ) 698 B-13-2026
Mt. Vernon ARC K8EEN (+KA8LUO) 551 B-15-2016
Carver Co. ARES & HTC RS KGØN (+KAØLCC) 655 B-16-2000
Egyptian RC W9AIU* 555 B-15-1992
Shiawassee ARA W8QQQ* (+KA8MII) 650 B-20-1988
Greensboro-Guilford Co. ARES W4GG 602 B-15-1958
Non-Club Group WBØBBN 701 B-23-1956
Queen City Emergency Net W8VVL/8 1030 B-35-1954
South Bay ARA K6OI 609 B-40-1952
Larkfield ARC W4SON/2 509 B-17-1898
Thumb ARC W8AX/8 487 B- 6-1892
Eielson/North Pole ARC KL7AJ 489 B-60-1884
Schuylkill ARA WB3INT 540 B-10-1872
Old Post ARS W9EDC (+KA9LED) 659 B-35-1860
Hillsborough ARS WA4GJJ 768 B- 7-1836
Parkland RC VE5PRC 456 B- 9-1828
Metter ARS W4TYM* 714 B- 9-1824
Goshen ARC K9TSM* 681 B-20-1822
Runestone RC WAØVVM 499 B-14-1808
Colonial Wireless K1BB* 619 B-15-1796
Minnesota Valley Hammers KBØHN 593 B-12-1796
Madison Badger ARS W9YT/9 497 B- 9-1792
Burlington ARC W1FP* (+KA1FBT) 527 B-33-1790
Chautaugua Co. FMA K2HE 1355 C-10-1755
Adirondack ARC KE2Q/2* (+KA2AEQ) 490 B-10-1748
Copper Country RA Assn. W8CDZ 581 B-10-1742
Walla Walla Valley RAC W7DP (+WB7FAB) 422 B-15-1672
Choctaw ARC K5UV 473 B-20-1638
Hardin Co. ARC W8VMV* 351 B-22-1634
Findlay RC W8FT/8 387 B-26-1618
Non-Club Group KA4EQW (+KA4SZY) 425 B-14-1614
North Suburban Wireless Assn. and North Star Hibanders and Ramsey Co. Emgy Services and Twin City Pub. Service Communications Assn. KØVPM 515 B-20-1606
Bay Area ARC N8AYF (+KA8LIU) 430 B-12-1594
Catonsville Comm. College ARS WA3EKL (+KA3GSN) 592 B- 8-1584
Pilot Knob ARC NØSF (+KAØDOP) 362 B-15-1584
Kankakee Co. ARES/RACES WD9EVV* (+KA9DTE) 405 B-13-1578
Harlan Co. ARC WD4NWW* 392 B- 8-1550
North Colorado ARC WØUPS 563 B- 9-1544
Over the Hill Gang W7EVI 396 B- 7-1522
Conneaut ARES K8BAR 985 C-15-1520
West Morris Wireless Society KB2IV* (+KA2EIA) 365 B-14-1500
Club Radio Station WDØAYA 487 B- -1498
New Ulm ARC NØBMA 321 B- -1496
Red Rose RC AI3L 504 B-14-1492
South Mount RA W3ND* 464 B-22-1480
Idaho Society of Radio Amateurs-Magic Valley Chapter WB7CYO* 479 B- 6-1458
North Peninsula Electronics Club W6PMK* 464 B-10-1444
St. Maurice Valley ARA VE2MO 311 B-14-1432
Tonto ARA N7XA* 434 B-13-1420
Xerox ARC WA2EKK 478 B-18-1394
Triangle ARC W4LEN 300 B-15-1390
Abington ARC K3CSG/3 429 B-19-1382
Cascades ARS WB8CSQ/8 473 B-26-1374
West Cumberland ARC VE1WRC 338 B-12-1368
South Bay ARS K6QHQ 242 B-12-1356
North Okanagan RAC VE7NOR 428 B- -1356
Shoreline ARC W1RCG 234 B-20-1354
Philadelphia ARC AK3Q 400 B-10-1344
Hub City ARC WBØSTR (+KAØKXM) 411 B-21-1344
Coastal Plain ARC W4PVW* 414 B- 8-1328
Emerson Electric ARC WØPEV 329 B-13-1322
Rancocas Valley ARA N2VW 310 B-11-1312
Prado People WB6DCC 473 B-14-1246
Spokane Radio Amateurs W7NBR* (+KA7FQB) 408 B- 8-1228
Gould RC West K6OR* 341 B- 6-1216
South Bay ARC KB6GN 394 B-15-1204
Tri-County RC WA9ABI* (+WD9CNA) 298 B- 7-1202
Jamestown ARC WØFX 304 B- 7-1192
Anchorage ARC KL7AA* 270 B-22-1178
Non-Club Group VE7CMR/7 431 B- -1162
Hoop Pole Ridge Runners KC8AT 491 B- 7-1160
Chippewa ARC W8BAA (+KA8FOH) 308 B-27-1138
Ebonaire ARS W2HJV* 364 B-12-1128
Green Fox ARC KB9WC* (+KA9BIK) 251 B- 9-1108
Indian Foothills ARC WBØWMM 304 B- 9-1108
Dublin GA ARC WA4HZX* 265 B-25-1094
Grant Co. ARC W9EBN* 254 B-10-1088
Bucks-Lahigh UHF Repeater Assn. WA3KEY 251 B- 3-1048
Livermore AR Klub W6OA 247 B-15-1030
Apple Valley RC AI1K 299 B-12- 998
Cascade RC W7EK 341 B- 8- 986
Quaboag Valley RA WA1ORT 291 B-12- 982
Solano Co. ARS N7CU/6 482 B-20- 964
Clinton Co. ARC W9LMP* 212 B-12- 960
Oroville ARS W6AF* 410 B-12- 938
Caravan Club WA5VKY 299 B- 8- 918
River City ARC's W6WAH 304 B-12- 908
Hazel Park ARC KI8V/8 232 B-12- 896
Steele Co. ARC K8ØVU 235 B-15- 878
Lake Huron ARC W8JC* 224 B-16- 878
National Trail ARC K9UXZ* 228 B-10- 842
Crawford ARS W3MIE* 171 B-12- 742
Non-Club Group AD7F 170 B- 5- 740
Southwest Mo. ARC WØEBE* 205 B-12- 726
Non-Club Group N1APN* (+KA1BRY) 140 B- 3- 680
Okaw Valley ARC WB9NEY* 111 B- 3- 664
Meach's Peaches KØKYZ/Ø* 650 C- 3- 650
Sierra ARC of the High Mojave N6BVP/6 226 B- 5- 626
Hinsdale Central H.S. ARC 'Raiders' N9BKX* (+KA9KOQ) 142 B- - 610
Non-Club Group KA8LRM* 67 B- 3- 568
Bemidji ARC KAØAJF 85 B- 3- 222

3A - Commercial

West Side RC VE3JJ/3 1125 B- 7-4048
Windsor Hights RC KM2E 730 B-17-2356
Shelby Co. ARC N4YZ (+KA4SWY) 730 B-14-2122
Brightleaf ARC W4AMC (+KA4TAU) 718 B-20-2012
Newton ARA WØJA* 671 C- 5- 932
Loudon Co. ARC W4WVJ 149 B- 5- 604

4A - Battery

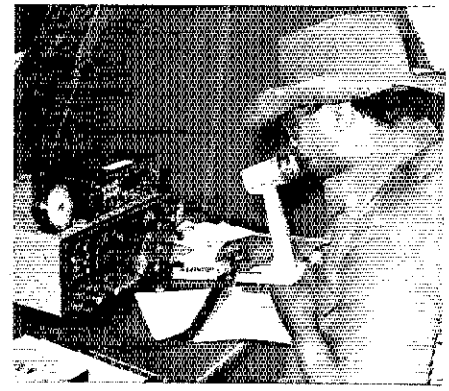
Anne Arundel RC W3VPR (+KA3AOM) 1405 A-30-11,045
Beach Cities Wireless Society K6WO 790 A-12-6555
Associated Amateur Wireless Society N9TW 624 A- 8-6060
Lower Columbia ARA W7DG 640 A- -4955
Naval Postgraduate School ARC K6LY (+KA6NVU) 1210 B-56-4922
Roanoke Valley ARC W4CA 1327 B-25-4436
Alliance Area RC KD8P 373 A-12-4070
Lake ARA K4FC* 913 B-74-3226
Elmore Co. ARC KB7XT* 236 A- 4-1680

4A

Palo Alto ARA K6YT (+KA6POV) 4889 B-42-14,596
Foothills ARS K6YA/6 (+WA6KVT/6) 4654 B-45-13,674
Oak Ridge ARC K4PJ* 3028 B-50-10,052
Fort Wayne RC W9TE (+KA9CZD) 3027 B-75-9410
Hamfesters ARC W9AA* (+KA9KBR) 3200 B-40-9274
Alamance ARC K4EG 3011 B-25-8990
Poughkeepsie ARC W2RI (+KA2KWY) 2907 B-40-8828
Northern Ohio ARS K8KRG (+KA8IYN) 2468 B-157-8368
Baton Rouge ARC W5KC 2230 B-25-8128
Portsmouth ARC W4POX* (+KA4LSO) 2479 B-28-7898
Carthage ARS NØES (+NØBHU) 2097 B-22-7818
Joliet ARS W9OFR (+KA9KMC) 2098 B-32-7426
St. Charles Mo ARC KØBM/Ø 2290 B-49-7056
Hughes Aircraft El Segundo Employees ARC W6DL/6 (+KA6ODO) 2384 B-25-7012
Northwest ARC W9LM 2248 B-36-6934
AR Transmitting Society W4CN (+NF4R) 2122 B-46-6878
Ozaukee RC W9LO (+KA9EXY) 1851 B-26-6516
Palomar ARC W6NWG 2562 B-25-6442
Santa Barbara ARC K6TZ (+WA6DQK) 2074 B-53-6398
Ottawa ARC VE3RC 1885 B-30-6225
Albany RACES/ARES KM2M (+WB2UTY) 1858 B-28-6094
Reading RC W3BN* (+KA3BHQ) 1922 B-30-5908
Chesapeake Bay RA N3ND (+KA3CQE) 1467 B-52-5728
Manchester RC W1KKS (+KA1CTP) 1853 B-12-5478
Johnson County RAC WØERH (+KAØILF) 1516 B-35-5398
Cherryville RA W5DTR 1616 B-15-5378
Intercounty ARC W2DMM/2* 1735 B-12-5292
Southern Maryland ARC W1ZX/3 (+KA3AHI) 1733 B-75-5286
Montgomery ARC N3BE (+KA3HEX) 1823 B-59-5282
Roservior ARA W8DN (+KA8IAF) 1674 B-30-5176
Kilocycle Club of Ft. Worth W5TI* (+KA5IQE) 1446 B-50-5042
Saginaw Valley ARA K8DAC/8 1335 B-25-5028
Citrus Belt ARC K6IG 1569 B-21-4972
Scottsdale ARC K7TR (+KA7AFW) 1829 B-90-4970
Fullerton RC W6ULI 2048 B-20-4964
Arizona ARC W7IO/7 (+KA7JRO) 1667 B-45-4888
Lake Gauga ARC N8BC (+KA8MLA) 1674 B-20-4808
Irwin Area ARA WB3JSI 1613 B-35-4776
Columbus ARC K4KS 1822 B-22-4722
Van Wert ARC W8FY/8 (+KA8AMV) 1523 B-26-4670
Parkersburg AR Klub W8VT (+KA8FUH) 1513 B-18-4652
Suffolk Co. RC W2DQ 1268 B-16-4554
Cow Chip Hill Gang WØLR 1460 B-15-4466
Cowichan Valley ARC VE7CVA* 1329 B-29-4446
Tri-Town RAC W9VT/9 1529 B-35-4244
Garland ARC K5QHD (+KA5KSS) 1644 B-50-4196
Rock River RC WD9COP* (+KA9HHC) 1377 B-28-4070
Tahoe ARA AF7I 1017 B- 9-4060
Massasoit ARA AE1P 1090 B-10-4056
Pilgrim Amateur Wireless Assn K1BL 1175 B-24-3956
Peoria Area ARC W9UVI/9 1455 B-20-3936
Chippewa Hills ARC KA8T 1159 B-12-3882
Texoma ARC K5GQD 1012 B-35-3878
Framingham ARA W1FY 1134 B-14-3840
Mound ARA W8DYY 1101 B-30-3724
Martin County ARA K4ZK 1217 B-22-3672
North Shore ARC VE3NSR 1223 B-29-3608
Catalpa ARS W8CQ (+KA8DBK) 1387 B- -3566
Hartford Co. ARA W1NEM 1322 B-30-3366
Boeing Employees ARS of Wichita AEØA (+WDØGLT) 905 B-22-3324
Paul Bunyan Wireless Assn. ADØS/Ø* (+KAØJSW) 1062 B- 9-3322
Foxboro Company ARC W1XA (+KA1EUP) 1003 B-25-3300
Hot Springs ARC WA5BRF 1205 B-25-3280
Stephen F. Austin State Univ. ARC W5HAJ (+KA5FQX) 789 B- 5-3276
Teays ARC K8ABI/8 996 B-17-3226
Thornhill RA Club VE3RAY 1211 B-10-3205
Marion ARC W8BS 807 B-36-3170
Orange County ARC KJ2V (+N2CGM) 1009 B-20-3160
New Bern ARC WD4JMS (+KA4SFF) 853 B-25-3148
Miami County ARC K9ZEV/9 772 B-12-3138
Marshall RC WØBMJ (+KAØHJR) 1066 B-23-3052
Wayne Co. ARA K4CYP/4 1031 B-14-3044
Falmouth ARA W1HQH 856 B-12-3034
Lawrence Co. ARA W3FI 883 B-12-3008
London ARC VE3LON 930 B-13-2868
East Whittier ARC W6VB* (+KA6IJX) 936 B-20-2826
Northeastern Indian ARC KB9SU* 1118 B-15-2822
Port City ARC W1WQM (+KA1GJV) 677 B-25-2786
Confederate Signal Corps W4VTA 1003 B-34-2746
Pocatello RAC N7ON 1117 B-14-2742
Laurel ARC KB3G 594 B-22-2720
Mount Tom ARA N1AUR 836 B-15-2714
Uvalde Area ARC and Border ARS KC5JY (+KA5LQR) 860 B-25-2714
Sourland Mountain ARC W2ANA 962 B- 5-2698
Lewiston-Clarkston ARC W7FM* 816 B-14-2642
Hope Valley RA KA1EE (+KA1FFY) 748 B-35-2638
Naymarcormars/East Texas W5USN/5 994 B-12-2614
Staten Island AR Communicators KA2CUS 853 B-12-2610
Johnson County ARES KG9K 777 B-20-2568
Stark RTTY Group WB8RVM/8 1295 C-25-2550
Associated Radio Amateurs of Long Beach W6RO* 955 B-42-2536
Branch Co. ARC WD8KAF 808 B-25-2494
Sturdy Memorial Hospital ARC K1ZZJ 939 B-14-2482
Kansas City ARC KØOKI 594 B-24-2482
Hyland Communications Assn WB1ADR 732 B-10-2460
Jefferson Co. ARC K2PNA 697 B-12-2440
Cinti Chapter OMIK Electronic Communications KO8E (+KA8KTF) 682 B-24-2438
Columbus ARC AC9L* 721 B-20-2394
Foothills ARC W3LWW 726 B-20-2356
Central Kentucky ARC WA4UXJ 645 B-15-2348

VE3KK cranking out the QSOs on the 20-meter station at VE3IC/3, the Kitchener-Waterloo ARC (5A commercial).

Dick, K6HRT, and daughter Theresa share a rig at the Anthill RC Field Day site. N6BLH (2A)



Rich, KA1CI, takes his turn at the microphone for the Nachaug ARA, W1TR (3A).

Pasadena RC
W6KA 1731 C-25-2290
Algonquin ARC
KA1MX 742 B-10-2248
Winnipeg ARC
VE4BB 519 B-20-2170
Rogue Valley ARC
W7OEK (+KA7EPL)
645 B-21-2152
Pano Rama Land ARC
K7OU 577 B-13-2070
Ashland Area ARC
N8DS 484 B-18-2030
Yuba Sutter ARC
AJ6M 752 B-15-2020
Lanierland ARC
W4IKR 662 B-15-2008
Alamo DX Amigos
AF5D 480 B-10-1998
Cape Ann ARA
W1RK 529 B-23-1974
Fargo CW Club
KI9E (+KA9LFH)
446 B-14-1884
Black River ARC
KM8E (+N8CSO)
482 B-30-1872
Kingston ARC
VE3KAR 734 B-10-1868
Rantoul ARA
W9ZK 568 B-10-1824
Fort Monmouth ARC
W2EM 589 B-10-1820
South Waterloo ARC
VE3SWA 334 B- 9-1820
Iroquois Ford ARS
WB9TAH (+KA9FMJ)
485 B-14-1820
Madison ARC
W9HFU 533 B-11-1768
Glasgow Site ARC
K3NI 332 B- 7-1680
Caterpillar Employees ARC
W9DDJ* 537 B- 5-1648
Southern Oregon ARC
K7LIX 515 B-11-1630
Hurst ARC
N5FL/5 430 B-11-1554
Mid Mich ARC
KI8W (+KA8JCJ)
449 B-15-1448
Peterborough ARC
VE3AEA 390 B-10-1424
Seneca-Sandusky VHFers
W8MVE* 326 B- 6-1412
Paynesville ARC
WD0BGS 369 B- 4-1382
Blue Valley ARC
WA9HUU* (+KA9HOD)
303 B-20-1376
Libby ARC
W7HAH* 255 B- 5-1320
Mobile Sixers RC
W3AWA/3 356 B- 8-1270
Briarpatch ARC
N4VL* 1135 C-20-1155
HI Desert AR Council
KB6SD 316 B-15-1132
Matanuska ARA
KL7JFU 602 C-16-1107
Sun Parlour ARC
VE3SPR 399 B-16-7098
Beloit ARC
W9QL 335 B-15-1070
Onataska ARC
W9UP* 186 B- 9-1020
Cedar Mt. ARC
W7PT/7* 189 B- 4-784
Anderson County ARC
W50RW* 52 B-11-604

4A - Commercial

Valley AR
WINHS* 1115 B- 8-2844
Flint Hill ARC
W9HT 440 B- 8-1038
Jefferson Co. ARC
KI0QPL 286 B-18-774
Edina TV/Waxy Cap, Smashers
KA0BZK* 237 B- 5-746
Islander ARA
KB4NW 533 C- 8- 533

5A - Battery

Northeast Iowa RA
W0MG* 1209 A-35-9750
Clark County ARC
W7AIA (+W87NDD)
439 A-16-4215

5A

Western ARA
N6ME* (+N6ATE)
4231 B-40-12,720
Nashua Area RC
W1YR/1 (+KA1DGM)
4082 B-45-12,032
Birmingham ARC
W4CUE (+KA4TSG)
4127 B- 11,830
North Florida ARS
W4IZ (+WD4ETE)
3265 B-33-10,504
Wayne AR Tech Society
W8IZ (+WD8ARN)
2988 B-18-9884
Schenectady ARA
K2AE (+KA2LEQ)
2757 B-50-8982
Schaumburg ARC
K9LW (+WB9UYR)
2463 B-35-8600
Ramapo Mt. ARC
WA2SNA 2603 B-54-8576
Whitewater Valley ARC
N9NC 2940 B-15-8574
Providence RA
W1OP* 2923 B-17-8428
Chicago Suburban RA
K9BV/9* (+KA9KZN)
2929 B-44-8152
Grumman ARC
WA2LQO/2 (+WA2RMN)
2177 B-64-7410
Anaheim ARA
K6SYU 2289 B-40-7120
SOARA
K6MJ 2279 B-49-7098
IRW ARC
W6TRW 2358 B-23-6878
Datapoint Amateurs and Technicians Assn.
K5CB (+KA5GAX)
2299 B-20-6688
Eastern Connecticut ARA
K1MUJ/1 1652 B-27-6568
Orange Co. ARC
WE2E 2405 B-36-6476
Nevada ARA
W7YN/7* (+KA7IFZ)
1622 B-20-6402
Staten Island ARA
W2CWW 1963 B-15-6394
Radio Central ARC
K2KI (+KA2DRB)
1886 B-38-6294
Bolingbrook ARS
W9JI 1612 B-31-6290
Polk Co. Civil Defense Amateur Comm. Society
W4TJM 1914 B-16-6002
AK-SAR-BEN ARC
W0EQU (+KA0KDJ)
2134 B-50-5916
Lake Co. ARA
K8BL 1741 B-17-5874
Warminster ARC
K3KT (+KA3ETE)
1751 B-40-5812
CRANOQ
VE2HG* 1656 B-18-5720
Delaware Valley RA
W2ZQ (+WA2GQP
1925 B-45-5714
Orange Park ARC
K4SP/4 2008 B-16-5670
Metuchen RC
K2YNT (+WA2YCL)
1719 B-26-5556
Twin Cities Repeater Club
W0BU/0 1568 B-30-5518
Monroe Co. Radio Comm. Assn.
WA8MTX/8* (+KA8GAG)
1888 B-27-5300
DuPage RC
W9DUP (+WD9AYR)
2053 B-20-5166
Chelsea Comm. Club
AJ8X (+KA8LLG)
1554 B-23-5158
Hazleton ARC
W3SJI (+KA3CAN)
1488 B-20-5124
McHenry County Wireless Assn.
K9XI 1898 B-25-5062
Indian Hills RC
W9ICS 1559 B-14-5038
SLAC ARC
W6CB 1639 B-22-4946
Capitol Hill ARS
W3USS 1578 B-17-4804
Capeway RC of Massachusetts
K1VV 1303 B-25-4782
Harrisburg RAC
W3UU (+KA3ESA)
1284 B-35-4648
Chestnut Hill RC
K1WW (+KA1EIC)
1497 B- 8-4614
Two Rivers ARC
W3OC 1249 B-34-4480
Corpus Christi ARC
W5MS (+KA5GQU)
1287 B-17-4356
SE Michigan ARA
K8BYI (KA8NEQ)
1431 B-35-4348
Moncton Area ARC
VE1EV 1451 B-13-4286
Whitewater Hills ARC
KB9JJ 1234 B-15-4262
Nutley ARS
W2GLQ (+WD2AHL)
1293 B-20-4248
Panhandle ARC
WB8WX/5 1310 B-12-4174
Oh-Ky-In ARS
K8SCH (+KA8NAH)
2648 C-51-4098
Kalamazoo ARC
W8VY 1210 B-31-4920
Elkgrove ARC
KF9M* 1541 B-15-3914
Quinnapowitt RC
W1EKT 955 B-30-3730
Albany ARA
K2CT 1128 B-10-3488
Raritan Bay Radio Amateurs
K2GE/2 1214 B-27-3470
Provin Mountain ARA
K1PKZ 947 B-16-3428
ARCEC
WA6BGS 1208 B-24-3266
Tioga Co. ARC
K3PSO/3* (+KA2KLF/3)
834 B-30-3226
Illiana Repeater System
KC9V (+N9BTC)
1129 B-15-3208
Vintage Radio Group
N6VY 950 B- 6-3186
Tulsa Repeater Organization
W5OK* 1054 B-33-3148
Chattooga & Walker Co. ARC
KX4C* 1241 B-12-3142
Marin ARC
W6SG 880 B-15-3140
W8MRE Group
W8MRE 768 B- 5-3024
Shasta County ARS
NC6A 1091 B-30-3010
Lebanon Valley Society of Radio Amateurs
W3EIA 809 B-20-2952
Willmar Area Emergency AR
W0SW (+KA0KHJ)
852 B-18-2946
Toledo Mobile RA
W8HHP 881 B-19-2902
Playground ARC
W4ZBB 719 B-22-2876
Tulare County ARC
WA6BAI (+KA6OWZ)
780 B-12-2876
Dial RC
W8BLV 771 B- 9-2824
Spokane Dial Twisters ARC
K7LKD 833 B-25-2818
Delaware Co. ARA
AK3M (+KA3EIP)
1004 B-26-2812
Santa Cruz Co. ARC
K6BJ 841 B-12-2746
Butler Co. ARA
W8UDX* 809 B-15-2680
Concord Brasspounders
W1OC (+KA1FFX)
542 B-18-2648
Twin Tier Amateurs
W2LT/3 872 B-26-2640
Olympia ARS
KD7N 702 B-37-2516
Muscatine ARC
KE0Y 800 B-15-2508
Morganton ARC
K4VLY/4* 574 B-20-2320
Waupaca ARC
W9IEM (+KA9EVZ)
743 B-12-2314
Radio Amateurs of Greater Syracuse
W2AE 651 B-25-2300
Corning Area Amateurs
W2GJ/2* (+KA2MLL)
564 B-12-2298
Champaign Logan ARC
W8EBG/8 680 B-20-2240
Rochester ARA
K2JD 625 B-24-2156
Fredericton ARC
VE1NDA 531 B-10-2150
Lake Cumberland ARA
AJ4O* 652 B-15-2128
Harmonic Hill Radio League
W2AAD 703 B-15-2098
Island County ARC
W7PN* 508 B-11-2076
Southern Sierra ARS
K6RL (+KA6PTH)
394 B- 7-2070
Sommerset Co. ARC
AK3J 698 B-14-2050
Stu Rockafellow ARS
W8NJH (+KA8JVI)
635 B-19-2040
Big Rapids Area ARC
K8SF* (+N8CSP)
522 B-18-1946
Alameda County Employees ARC
W6HOR* (+KA6OSM)
522 B-15-1940
Northwoods ARC
K9AQ* 557 B-23-1926
Western Carlonia ARS
W4MOE* 391 B-11-1852
NERD Net
WB8BGX 474 B-15-1788
Grays Harbor ARC
W7ZA 564 B-20-1752
6 Pack ARC
W9GPR 568 B- 8-1736
Highlands Co. ARC
KC4PJ 907 B-12-1696
Sabine Parish ARC
K5ABA* 420 B-22-1610
Bloomington ARC
W9INL/9* (+KA9IPQ)
260 B-11-1556
Western Washington DX Club
W7FR 690 B-10-1494
Soniand RA
K9AAR 350 B-12-1472
ARC Silverton
K7AII 519 B-12-1432
Hall of Science ARC
WB2ZZO* 370 B-20-1406
Southside ARC
WD9FGW/9 399 B-14-1404
Gantel Ham RC
WA6NNE (+KA6LRR)
323 B- 7-1180
Headwaters ARC
K8GUV* 331 B- 8-1088
Hazeltine Amateur Comm. Club
WB2YVY* 155 B-10- 948
Guadalupe Valley ARC
WB5LVJ 277 C-10- 777
Non- Club Group
WD9DBL 98 C- 5- 638

5A - Commercial

Kitchener-Waterloo ARC
VE3IC/3 1177 B-16-3458
Greater Lawrence AR
Fellowship
W1FW (+K1ICE)
867 B-25-2750
Telephone ARC of Manhatten
WP2WG 807 B-26-2550
Black Diamond ARC
KD8X* 781 B-15-1700

6A

L'Anse Creuse ARC
W8LC (+KA8EGP)
3599 B-48-11,658
Huntsville ARC
K4BFT (+WA4BCS)
3011 B-64-9460
Cary ARC
N4NC 2716 B-27-8372
Hoodview ARC
WB7QIW (+KA7IWH)
2885 B-54-8262
Lake Monroe ARS
AJ4L* (+KA4ATV)
2595 B-42-7886
Northrop RC
W6CN (+KA6JFL)
2416 B-45-6792
Mt. Diablo ARC
W6CX (+KA6JGP)
2510 B-50-6667
Sterling Park ARC
AA4II (+KA4OTI)
2014 B-15-6648
Tioga Co. ARC
K2QR/2 1647 B-20-5988
The Triple States RA Club
N8IF (+KA8KOI)
1791 B-40-5954
Adams Co. ARS
K3JHB 2214 B-26-5540
Long Island Mobile ARC
W2VL/2 1553 B-46-5508
Battleship Cove Group
W1ACT (+KA1CKE)
1551 B-53-5480
Garden State ARA
W2GSA (+KA2IYF)
1593 B-35-5152
NBS-Brass
K3AA 1502 B-15-5088
Rockford ARA
W9AXD 1487 B-35-4990
San Francisco Radio Club
W6PW 1458 B-25-4626
R.F. Hill ARC
W3AI 1246 B-12-4484
Central Michigan ARC
W8MAA/8 1148 B-40-4440
Simi Settlers ARC
K6KI 1448 B-28-4146
Stamford ARA
K1GFJ 1339 B-30-4062
Sonoma Co. Radio Amateurs
W6LF 1/6 1289 B-25-3924
Pine State ARC
K1CZ (+KA1DAM)
703 B-18-3902
Warren ARA
W8VTD 1152 B-25-3878
Niagara Peninsula ARA
VE3VM 1099 B-50-3626
Valley RC of Eugene
W7PXL 989 B-20-3284
Parma RC
K8UZW (+KA8MPN)
958 B-29-3272
Juniata County ARC
KB3ND 1041 B-18-2882
Tri-County Radio Assn.
W2LI/2 801 B-20-2882
Silvercreek ARA
WI8PNF 807 B-24-2684
Gratiot ARA
W8AWE 775 B-17-2486
Walton Hills ARC
WD8IRE 719 B- 8-2380
Vienna Wireless Society
K4HTA 691 B-15-2314
Tri-County RC of West Tenn.
W2YD* 560 B-31-2304
Fort Venango Mike and Key Club
W3ZIC 578 B- 8-2280
Jefferson Barracks ARC
K0FZK 540 B-15-1948
WA6ZUF and Gang
W6TB 450 B-13-1600
Lincoln County ARC
K7PQ 623 C-12-1455
Sierra Foothills ARC
K6CBP 303 B- 8-1258
Tioga ARS of White and Carroll Cos.
K9LJP* 464 B-33-1154

6A - Commercial

Keuwee-Toxaway ARC
AC4Q* (+WA4WXA)
612 B- 1910
Fountain Co. ARC
W9QAL 389 B- 8-1328
Indiana County ARC
W3BMD 183 C-13- 347

7A

United Radio Amateurs Club
K6AA (+KA6AAA)
4787 B-50-14,520
Penn Wireless Assn.
W3SK (+KA3EHL)
1473 B-45-11,000
Mike and Key ARC
K7LED* 3171 B-35-9830
Woodbridge Wireless
W4IO/4* (+N5CDE)
2692 B-64-8680
Twin City ARC
W9KQ (+KA9IMN)
2767 B-40-8338
South Hills Brass Pounders and Modulators
W3PIQ 1949 B-25-6926
Hamilton ARC
VE3DC 3374 B-27-6896
Middle Tennesee ARS
W4UQI 1860 B-70-5252
Bergen ARA
K2TM 1789 B-38-5762
The Cuyahoga Falls ARC
W8VPV* (+KA8GYN)
1417 B-25-5650
San Antonio RC
W5SC (+KA5IID)
1774 B-50-5460
Central Mich. Contesters
K8CA 1468 B-11-5224
Orlando ARC
W4PLB (+KA4GEH)
1582 B-45-5914
Fox River Radio League
W9CEQ (+KA9KDZ)
1656 B-28-5196
Middlesex ARS
N1AD (+WB1ARF)
1986 B-25-4872
Avco ARA
K1BJ 1084 B-12-4440
Michigan Robins 10-X
KM8I* (+KA8IBJ)
1709 B-25-4406
Gladwin Area ARC
K8BZ 1314 B-25-4102
West Branch ARA
W3AVK (+KA3HLS)
1061 B-38-3998
Sheridan Radio Amateur League
W7GUX (+KA7KRH)
791 B-16-3352
Jersey Shore ARS
KF2T/2 1011 B-17-3324
Motorola ARC
WA4LZR 1183 B-15-3014

Cenois ARC/Macon Co. ARC
KD9D (+KA9HYZ) 742 B-80-2940
Guelph ARC
VE3ZM 872 B-35-2864
Brazos Valley-TI Hams
N5HF 826 B- -2854
Greater Toledo ARA
K8ALB 685 B-17-2778
Tri-County ARC
W9MQB 754 B-20-2766
South Texas ARS
KL7Q* 684 B-15-2124
Barry ARA
KM8U* 328 B-18-1750
Antelope Valley ARC
K6OX 384 B-10-1630

8A

Gloucester Co. ARC
W2MMD/2 2956 B-35-9964
Morris RC
K2AZ (+KA2FPN) 2647 B-30-9092
RC of Tacoma
W7DK/7 (+KA7IBA) 2632 B- -7830
Crystal RC
W2DMC (+KA2EIM) 2229 B-21-7368
Scarborough ARC
VE3WE 2005 B-33-7318
Murgas ARC
K3YTL (+KA3CBG) 2442 B-30-6932
Mahoning Valley RC
W8QLY (+KA8LFY) 1965 B- -6698
Skywide ARC
VE3DRT 1939 B-36-6156
Adrian ARC
W8TQE 984 B-30-3766
Kern Co. RC
W6LIE/6 1105 B-28-3754
Rock Creek ARA
W3RCN 1064 B-28-3700
North Shores ARC
K6HAI* (+KA6IDX) 1072 B-25-3434
Metropolitan ARC
K8NOW (+N8CNH) 780 B-10-2992
Golden Empire ARS
W6RHC* (+WD6GTO) 488 B-12-2084

9A

South Jersey RA
K2AA (+N2BAZ) 4558 B-65-14,204
Hogtown Hams
W4WJ (+KA4HDQ) 4553 B-25-13,700
West Palm Beach ARC
W4HAW/4 3513 B-35-10,184
Genesee Co. RC
W8ACW 2030 B-38-7302
Delaware ARC
W3SL/3 1865 B-25-6764
North Hills RC
K6IS 2002 B-37-6554
South Pickering ARC
VE3SPC 1840 B-25-6144
Radio Assn. of Erie
W3GV/3 (+KA3GZR) 1736 B-22-5850
Silver Springs RC
K4GSO 1994 B-15-5522
Hampden Co. RA
W1NY 997 B-35-4280
Klamath Basin ARA
W7VW (+KA7HDA) 1343 B-41-4186
Binghampton (NY) ARA
W2OW/2 1257 C-22-2509

12A

Four Lakes ARC
W9JZ/9 (+KA9KKZ) 3070 B-51-9862
Toledo RAC
W8JI (+KA8BNQ) 1939 B-20-6062

15A

Yankee Clipper Contest Club/Wireless Inst. of the Northeast
W2RQ 11,201 C-30-16,437
Nortown ARC
VE3NAR/3 3119 B-50-11,188

21A

Englewood ARA
K2KX/2* (+KA2HNP) 285 B-20-1168

One or two person portable

1B - Battery

N4BP* (+N4UM) 999 A- -8355
KB8N* (+WA9IRV) 698 A- -7180
N6MI/6 (+N6VI) 852 A- -6605
W3MR/2 (+K2BK) 560 A- -5240
W1ECH 515 A- -4695
VE3VA (+VE3DAS) 487 A- -4380
WØOGJ/2 361 A- -3810
AB7E/7 (+AA7M) 367 A- -3770
N9NE/9* (+N9DJ) 318 A- -3405
WA6VPH (2 oprs) 317 A- -3220
AF5B/5* (+W5SOD) 397 A- -3090
WB6KQI* (+WA6OEY) 519 A- -2795
N5BF/5* (+WB5FID) 326 A- -2730
WØAA* 232 A- -2628
K2CQS* (+KA2EXW) 409 A- -2625
VE3EIE* (+VE3BIR) 290 A- -2615
WA4UQA/4* (+WB4UQI) 233 A- -2530
K5WNH/Ø 239 A- -2490
N5EM (+K5HGB) 208 A- -2180
K5BOT* (+N5AMQ) 208 A- -2180
WA6FUH/7 (+N6ERD) 372 A- -2090
K5CM (+N5KW) 923 B- -2082
WA9HCZ* (+N9CIQ, opr) 174 A- -1940
K7DQ/7 (+W7TS) 458 B- -1864
WAØRLY (+WBØGGM) 141 A- -1700
WBØRXF (+WAØZPT) 158 A- -1670
WAØSLU* (+WAØNLK) 147 A- -1670
KAØFPJ 282 A- -1610
K7RK/7 (+K7BFL) 199 A- -1565
N4PY* 156 A- -1560
VE2XL/2 (+VE2XS) 265 A- -1525
WA8REN* (+WA8RQU) 140 A- -1500
KJ7G 195 A- -1420
N3TO/VE3 (+N1BEZ) 470 B- -1420
WA9AQZ 120 A- -1255
WA2DFI/7 101 A- -1210
W9LNQ/9 110 A- -1200
WØRSR/7 (+WAØEIW) 145 A- -1175
WB7SVT (+WA4CPR) 295 B- -1160
WA6YEU (+WB6BDD) 118 A- -1140
NØAN 388 B- 1102
KL7JJA (+WL7ALN) 89 A- -1090
K6TG 84 A- -920
W3TB/3 90 A- -810
K2KGJ 58 A- -780
W9PNE* 104 A- -780
WB6AJZ* (+WB6LBR) 110 A- -750
KC5EL 126 A- -730
K1ZZ (+KA1EKY) 202 B- -704
WA1NDW 226 B- -698
KX4V* 58 A- -680
W7IO* 63 A- -670
VE7ARV* (2 oprs) 37 A- -565
K6GLF 111 B- -544
KA9FUG 32 A- -520
K1CGI* (2 oprs) 199 B- -498
WB6BYH 78 A- -460
WB2MBM/3 (2 oprs) 34 A- -440
KA1DUJ (+WB2RTA) 34 A- -440
AE6C (+N6CNY) 22 A- -420
N8CKH* 137 B- -374
WA6OWH 136 B- -372
VE2EGH/2 (+VE3HXF) 27 A- -365
KA3AVM 49 A- -345
KH6CP 14 A- -330
W6SVE* 44 A- -320
WA7PKH 19 A- -290
WA3LGG/3 (2 oprs) 25 B- -250
KA4PHV/8 3 A- -215
W6WR 6 A- -160
WA7NWP (+KA7HTC) 6 A- -160

1B

W7CB/7* (+W6OUL) 1392 B- -4390
K3ONW 1002 B- -3845
N2DC (+K2KIR) 957 B- -3470
KC4D (+K4OAQ) 726 B- -3004
N6KF (+WD6AWP) 1227 B- -2690
K2OID* (+K2LYV) 659 B- -2440
K3PL/4 732 B- -2358
AC8P/8 (+N8AAU) 544 B- -2342
N2AE (+N2RA) 567 B- -2188
W1WP (+AD1O) 448 B- -2108
WBØNCR (+WAØJYE) 876 B- -2052
N6DR* (+KA5AKY) 676 B- -2038
N6YJ (+K6HGF) 902 B- -1904
VE2QST (VE2s BP, EKC, oprs) 333 B- -1792
KB7CQ* (+KB7CR) 726 B- -1652
KC5GK (+KA5JJF) 492 B- -1546
K6YK/6 (+K6AYA) 392 B- -1438
WD5IOM (+KA5DIU) 450 B- -1354
WB7NNA* (+WB7QOY) 516 B- -1330
W7LTL/7 (+WA7LHZ) 520 B- -1240
KA7DBO* (+KA7DNY) 490 B- -1180
WA4FSP (+KA4FPB) 469 B- -1106
KAØJNX* (+WA7WDJ) 378 B- -952
WDØENU* (2 oprs) 208 B- -916
KD6X (+KG6JIQ) 389 B- -878
VE3AUI (+VE3GAM) 553 C- -844
K2RN (+N2ARD) 245 B- -784
WBØERN* (+KAØOPY) 254 B- -754
WA2OXZ (+KA2IXM) 261 B- -722
K1TH/9 (+KA9FSG) 308 B- -722
W1CPL (+K1OOY) 50 A- -565
NØCG (+WBØZCV) 214 B- -528
W1HBP (+WB1FAW) 209 B- -518
KØEVC 185 B- -470
KA1CPN* (+KA1CNI) 218 B- -468
WB1COB (+WB1DVO) 178 B- -456
WB4RJO (+WB2BCD) 165 B- -430
W6CUS 19 B- -376
K3PRP/3 (+WA3ODB) 127 B- -354
NØACH* (+WAØFDV) 127 B- -354
W9WKT* (+WB9RYG) 71 B- -342
K5QQ 28 B- -256
KØBNS (+KAØEBT) 72 B- -248

1B - Commercial

N4ARP/4* (+WB4YFF) 963 B- -3090
W3AS (2 oprs) 872 B- -2440
N4KG (+N1EE, WN4KKN, oprs) 2434 C- -2434
VE3NG (+VE3GX) 465 B- -2160
N3AUE (+N3AKD) 613 B- -1814
NØCKR (+KAØGKU) 335 B- -1340
KA5HSA (+WB5ZDP) 495 B- -1080
KF8K 388 B- -1036
WDØGZE (+WDØFMN) 153 B- -712
WA6SOK (+W6KEE) 176 B- -464
KI7T* 189 B- -382
KB9ZR/9 (2 oprs) 125 B- -250
WB2UHB* (2 oprs) 58 B- -116

2B - Battery

WB8JBM/8 (WB8DQP, WD8IJP, oprs) 953 A- -8965
N4FD (+WA4IYH) 799 A- -6605
KD2I (+WB2TSY) 627 A- -5130
AF5Z (+KB5HU) 432 A- -4545
WA6POC/6 (+W6TZA) 286 A- -2640
K2NH/2 (+N2BCF) 224 A- -2440
WB8HKK* (2 oprs) 201 A- -1960
W7KJ/7 (+W7KGQ) 206 A- -1410
NØCEP/Ø* (+KAØIQR) 145 A- -815
KB2WN (+WA2EKN) 287 B- -774

2B

KS5A* (+K2UFA) 1252 B- -3486
AK8A (+AK8C) 1015 B- -3188
K7BBO/7 (+KA7DEV) 666 B- -3164
WB9JDL/9 (+W9EI) 549 B- -2696
WA2EYA* (+WA2RXB) 499 B- -2299
KA8HOK (+KA8IFC) 413 B- -1952
WB5ZRD (+WD5CGC) 642 B- -1906
VE2CL/2 (+VE3MJX) 404 B- -1816
W7JOA/7 (+WA6IRN) 652 B- -1544
KA3BTG (+N3CDC) 365 B- -1322
VO1DK (+VO1HL) 208 B- -744
KA9GTR (+KA9BLS) 261 C- -718
WBØRWM/7 (+WB9NVB) 458 C- -669
NØAVV (2 oprs) 204 B- -628
KØJHL (+WB9BIN) 193 B- -586

2B - Commercial

KA4SPJ/4 (+KA4HOZ) 98 B- -394

Mobile

1C

K7NW (2 oprs) 430 A- -4370
K5TM (2 oprs) 1057 B- -3080
K6TQ (3 oprs) 708 B- -2932
WB2VYA/MM 263 A- -2775
K4OU/4 263 A- -2730
K5ME (2 oprs) 633 B- -2632
K7FC 166 A- -1760
K8MPF/MM (6 oprs) 529 B- -1626
W6MXO 162 A -1620
W7LQT/M (2 oprs) 792 B- -1584
K2SM 318 B- -1180
K9EEA/MM (6 oprs) 285 B- -1140
W7LNG 227 B- -866
VE3BMC (2 oprs) 360 B- -820
WA6SEN/MM (5 oprs) 344 B- -812
K8DT (2 oprs) 319 B- -768
WA4FYZ 269 B- -638
W7AFQ (3 oprs) 488 C- -588
N4ID (2 oprs) 41 A- -510
N5CQT (2 oprs) 174 B- -498
WA8ORP/VE3* 223 B- -446
N6AL/MM2 68 B- -372
W8VSK/M 67 B- -368
N9JZ 31 A- -255
KB6XU/6 77 B- -254
WD8RND/2 44 B- -196
KD4HY 31 B- -162
WB9NZN/AERO 12 A- -160
W2KB/2 29 B- -158
K9GDF 1 A- -105
KX4Q/8 2 B- -104
WB1CZX 25 B- -50
KA3T 24 B- -48
WB9FMU 13 B- -26

3C

N4NK/4* (3 oprs) 145 B- -802

Home station

1D

WA5ZUP (2 oprs) 2039 B- -4078
KP4VA (3 oprs) 950 B- -3800
W7TC 398 B- -1592
W6OKX 490 B- -1538
N9AZR (3oprs) 391 B- -1426
WB9AJZ/6 375 B- -1360
WB6WUW (2 oprs) 456 B- -1248
KA4LLN 262 B- -1048
W7ZMD 260 B- -1040
W1GOG 271 B- -1018
K9GDF 553 C- -1013
KI7W (2 oprs) 296 B- -976
W6PRI 322 B- -966
KC2CR 483 B- -966
K9RND/VE3 (2 oprs) 438 B- -876
WØAWB 215 B- -860
KA2ECV (2 oprs) 286 B- -844
WD9ARK (2 oprs) 413 B- -826
KI7I 205 B- -820
WDØFNI 204 B- -774
K4BAI 179 B- -716
KA6BIM 357 B- -714
KA5EVR 217 B- -706
N6BNO 164 B- -656
WØTIV 163 B- -574
WDØFLO 180 B- -518
W5UFA 250 B- -500
N8CPE 248 B- -496
N4EVC 121 A- -484
N4FY 163 B- -476
KA1DJI 117 B- -468
KA6L (4 oprs) 365 C- -462
VE3DZK 249 B- -448
N9JG 435 C- -435
WB1EGT (2 oprs) 202 B- -404
KA3EJG 157 B- -402
WB9VTF 102 B- -390
KB3LP 194 B- -388
KAØDGT (8 oprs) 179 B- -358
KA8MMQ 89 B- -356
WA5IYX 354 C- -354
KBØKE (2 oprs) 166 B- -350
KA8JCB 80 B- -320
W2DW 116 B- -312
WA4TNI 104 B- -292
AA6EE 70 B- -280
KC5AK 135 B- -270
AB1U 66 B- -264
W5UCY 130 B- -260
W9REC 89 B- -256
N4EVC 121 C- -242
WB6MTO (2 oprs) 110 B- -240
KA4MCM 98 B- -234
VE1BMN* 54 B- -216
K3MRT 108 B- -216
WD9ISG 58 B- -190
N4DLN 94 B- -188
WA4QHI 46 B- -184
W6RKX 87 B- -174
WØTSA 130 C- -146
KA8IIN/N 35 B- -140
WA6HAD 33 B- -132
WD8NHC 43 B- -130
W5NR 63 C- -126
K9VHF 62 B- -124
N6BGR 56 B- -118
KS6Q 58 B- -116
W2AUF 47 B- -116
W4KMS 57 B- -114
WAØAGM 33 B- -106
KAØKBH 21 B- -84
N9ANK 16 B- -64
KA1DSQ 30 B- -60
KA5BOU 23 B- -46
WD6CQH 11 B- -44
KA2FDY 11 B- -44
W9HR 17 B- -44
WA2EHV/1 16 B- -38
WD6DMV 16 B- -32
WB2OLA 9 B- -32
KS6D 8 B- -32
N6DSV 31 C- -31
KA5KHT 30 B- -30
KAØP 14 B- -28
WB2PTD 7 B- -28
KA6NZM 5 A- -20
KI8O 10 B- -20
W1XM 11 C- -11

2D

K2ITT (2 oprs) 683 B- -2668
WB2JQR (8 oprs) 746 B- -2206
N4EPS (8 oprs) 357 B- -1002
WB7QGH (3 oprs) 589 C- -786
WD9IRQ (4 oprs) 606 C- -688
WB2IKD (2 oprs) 241 B- -584
K9QHO (2 oprs) 220 B- -548
WBØNSA (2 oprs) 166 B- -374
KL7KE (2 oprs) 45 B- -132

3D

AE9R (11 oprs) 1159 B- -3326
W8VA (10 oprs) 712 B- -1948
W3TKQ (20 oprs) 636 C-20- 636
KB5CY 168 B-11- 356

8D

W3YA (8 oprs) 503 B- -1220

Home station - emergency power

1E

N2JB/5 515 A- -4680
N2US 412 A- -4120
W6PQZ 823 A- -4115
WA1UZH 759 A- -4075
WØWJ (9 oprs) 383 A- -3415
W3OJI/4 (2 oprs) 347 A- -3365
K7MM (2 oprs) 295 A- -2950
WD8KKF (11 oprs) 1390 B- -2780
WD4FAB (2 oprs) 452 A- -2475
WB5AZI (3 oprs) 824 B- -1948
KJØS (2 oprs) 474 B- -1896
AB4L (6 oprs) 619 B- -1548
W6FTJ (2 oprs) 154 A- -1440
WAØRPL (3 oprs) 272 A- -1360
WD8PUH 337 B- -1348
W6HDO 321 B- -1248
WB8YXU 131 A- -1200
N6BQA (2 oprs) 116 A- -1160
W3IA 114 A- -1140
KI8T (2 oprs) 273 B- -1092
K8LF (2 oprs) 740 C- -1087
KA4EMR 468 B- -936
K4FPF 234 B- -870
WB6QIH 190 A- -850
K3QQ 123 A- -725
W2CVW 70 A- -696
W5SSV 100 A- -675
N5CPO (2 oprs) 305 B- -610
WB5NCM 208 B- -480
NH6H 113 B- -452
WB4CKY (2 oprs) 153 B- -306
W1EWD 142 B- -284
W1SMO 195 C- -284
W6CPE 38 A- -260
W7DRA 57 B- -228
KA1JDI 20 A- -205
N6ART 101 B- -202
WD8OFB 92 B- -184
N8CBX 64 B- -128
WA5ZIB 35 B- -70
KA3EVI 7 A- -70
KA7EWL 5 A- -50
WA3EEF 19 B- -38

2E

W3LR (6 oprs) 1209 B- -4836
WB9NKH (6 oprs) 1365 B- -3708
AAØW (10 oprs) 911 B- -2720
K5OJI (14 oprs) 869 B- -2366
K3LHD (4 oprs) 1729 C- -1754
K5QBM (12 oprs) 701 B- -1554
K1BZ (9 oprs) 419 B- -1016

3E

W5GAD (16 oprs) 1435 B- -3422
VE7FG 2123 C-25-2632

4E

N5BHX (24 oprs) 916 B- -1854
W8RCC (10 oprs)
N5EK (22 oprs) 1232 C- -1611

Checklogs

K1KI, K1VOW, N1NN, W1BB, W1LUG, W2NRD, W3ARK, KC4ZT, WB4JBP, KB7YP, W7FO, W8IMZ, W8JF/3, W8OM, W9TAL, W9YDP, DF4CK/W9, VE3AWE, DA1OR, PAØPLM, PY2FNE

Late/Incomplete

KA1BSZ, W2SB, W3SGJ/3, K4CO/4, W4HBB, W4HKT, WB4AEG, KB5OU, N5AAV, W5URU/5, WA5CKF, W6GNS, W6TJ, KL7BUS, W7VPA, W8HID, WA8WSO/8, KD9P, W9KI, KAØGMY, KCØU, WØES, WBØBBN, WDØAYC,

Rules, ARRL 160-Meter Contest

The weekend of December 4-6 will bring the first 160-Meter Contest since the FCC relaxed the rules for the "top band" last June. This should be *very* interesting now that amateur stations are allowed to run a kilowatt in the 1800-1900 kHz segment of the band.

There is one rule change for this year's contest. At its September meeting, the ARRL Board of Directors adopted a band plan to encourage harmonious use of 160 meters. The Board voted that "Effective December 1, 1981, participants in ARRL contests and other League-sponsored operating activities will be required to adhere to this plan." Hence the new rule 5 that requires W/VE stations to transmit only in the segments 1800-1825 kHz and 1830-1850 kHz. Also, remember to avoid the DX window from 1825-1830 kHz.

Official entry forms are available for an s.a.s.e. from ARRL Hq. If you want logs for more than 300 QSOs, please put two units of first-class postage on the return envelope.

Plan on being there to help celebrate our new privileges on "the gentlemen's band."

Rules

1) **Object:** For amateurs worldwide to exchange QSO information with W/VE amateurs on 1.8 MHz **cw only.** DX-to-DX QSOs are not permitted for contest credit.
2) **Contest period:** 2200 UTC December 4 until 1600 UTC December 6. Forty-two-hour period with no time limitation.
3) **Categories:**

(A) **Single Operator:** One person performs all transmitting, receiving, spotting and logging functions.

(B) **Multioperator:** Single transmitter only. Those obtaining any form of assistance such as relief operators, loggers or use of spotting nets.
4) **Contest Exchange:**

(A) W/VE: Signal report and ARRL section.

(B) DX: Signal report and country name (or ITU Region if maritime or aeronautical mobile).
5) **Scoring:**

(A) QSO points: Two points for QSOs with amateurs in an ARRL section. W/VE stations count five points for DX QSOs.

(B) Multipliers: ARRL sections plus VE8/VY1 (maximum of 74) and DXCC countries (W/VE participants only).

(C) Final score: Multiply QSO points by multiplier. Example: W1ZM works 357 stations, including 13 DX stations, and has a multiplier of 67. His score would be 753 QSO points (344 × 2) + (13 × 5) multiplied by 67 for 50,451 points.
6) **Adherence to band plan:** W/VE stations may transmit only in the segments 1800-1825 and 1830-1850 kHz in conformance to the ARRL band plan.
7) **Reporting:**

(A) Official forms are recommended (available for an s.a.s.e. or one IRC from ARRL Hq.).

(B) Logs should indicate time in UTC, call and exchange. Multipliers should be clearly marked in the log the first time worked. Entries with more than 200 QSOs must include crosscheck sheets (dupe sheets).

(C) Postmark your entry within 30 days after the end of the contest (January 5, 1982).
8) **Awards:** A certificate will be awarded to the top-scoring single-operator station in each ARRL section and DXCC country, and to the top-scoring multioperator stations in each ARRL Division and continent.
9) **Conditions of entry:**

(A) Each entrant agrees to be bound by the provisions, as well as the intent, of this announcement, the regulations of his or her licensing authority and the decisions of the ARRL Awards Committee.

(B) Disqualifications: Excess duplicates and call-sign/exchange errors. See January 1981 *QST*, page 79, for complete details.

Rules, ARRL 10-Meter Contest

In the aftermath of the 1980 ARRL 10-Meter Contest, more than 1500 of the 28-MHz faithful submitted an official entry in competition for one of the many certificates offered. Since one can now choose a favorite mode (cw or phone), some combination of both or team up with friends and launch a multioperator effort, there is quite a bit of strategy involved in being in the right place at the right time to increase one's chances of emerging victorious in the ARRL section, DXCC country or the worldwide competition.

Remember! A complete and valid entry includes a log that has *all* the required QSO data clearly indicated in the log for each contact.

A set of official entry forms is available from ARRL Hq. for a self-addressed, stamped envelope (or a self-addressed envelope with 2 IRCs for DX stations).

Rules

1) **Object:** For amateurs worldwide to exchange QSO information with as many stations as possible worldwide on 28 MHz.
2) **Contest Period:** Second full weekend of December (December 12-13, 1981). Forty-eight-hour period, all stations operate no more than 36 hours. Starts 0000 UTC Saturday; ends 2400 UTC Sunday. Listening time counts as operating time.
3) **Categories:**

(A)**Single Operator:** One person performs all operating and logging functions. Use of spotting nets (operator arrangements involving assistance through DX-alerting nets, etc.) is not permitted.

(1) Mixed mode (phone and cw).

(2) Phone only.

(3) Cw only.

(B) **Multioperator:** Single transmitter mixed mode only. Those obtaining any form of assistance such as relief operators, loggers or use of spotting nets.
4) **Contest Exchange:** (A) W/VE stations (including KH6/KL7) send signal report and state or province. (B) DX (including KH2/KP4, etc.) transmit signal report and serial number starting with 001. (C) Maritime or aeronautical mobile stations send signal report and ITU Region (1, 2 or 3). Novice and Technician stations sign /N or /T.
5) **Scoring**

(A) QSO points: Count two points for each complete two-way QSO, except four points for QSOs with U.S. Novice or Technician stations (28.1 to 28.2 MHz only — signing /N or /T).

(B) Multipliers: Fifty U.S. states, Canadian call areas (VE1-8, VY1, VO1-2), DXCC countries (except the U.S. and Canada), ITU regions (maritime and aeronautical mobiles only).

(C) Final Score: Multiply QSO points by the sum of states/VE call areas/DXCC countries/ITU regions. Example: KØRF works 3100 stations, including 10 Novices, for a total of 6220 QSO points. He worked 49 states, 10 Canadian call areas, 53 DXCC countries and a maritime mobile station in Region 2 for a total multiplier of 113. Final score = 6220 (QSO points) × 113 (multiplier) = 702,860 points.
6) **Miscellaneous:**

(A) Call signs and exchange information must be received by each station for a complete QSO.

(B) No crossmode contacts; cw QSOs must be made below 28.5 MHz.

(C) Mixed-mode single operator and all multioperator stations may work stations once on cw and once on ssb.

(D) Your call sign must indicate your DXCC country (K6LL in Arizona need not send K6LL/7, but KL7JER in Ohio must send KL7JER/8).

(E) One operator may not use more than one call sign from any given location during the contest period.
7) **Reporting:**

(A) Official forms are recommended (available for an s.a.s.e or two IRCs from ARRL Hq.).

(B) Logs should indicate time in UTC, mode, call and exchange. Multipliers should be clearly marked in the log the first time worked. Entries with more than 500 QSOs must include cross-check sheets (dupe sheets).

(C) Postmark your entry within 30 days after the contest (January 12, 1982).
8) **Awards:** A certificate will be awarded to the highest scoring single-operator station (in each category) from each ARRL section and DXCC country. Top multioperator entries in each ARRL Division and each continent will receive certificates. Additional certificates will be awarded as participation warrants.
9) **Conditions of Entry:**

(A) Each entrant agrees to be bound by the provisions, as well as the intent, of this announcement, the regulations of his or her licensing authority and the decisions of the ARRL Awards Committee.

(B) Disqualifications: Excess duplicates and call sign/exchange errors. See January 1981 *QST*, page 79, for complete details.

Public Service

Conducted By Robert J. Halprin,* K1XA

Executive Action

Those of you who have read the chronicle of the ARRL Board Meeting (elsewhere in this issue) will notice at least two motions that are of interest to readers of this column — minutes 60 and 83, to be exact. Minute 60 reads as follows:

> On motion of Mr. Oubre, seconded by Mr. Nathanson, unanimously VOTED that the General Manager is instructed to proceed with development of procedural material containing guidelines for use by local clubs and other amateur groups in providing public service communications at local events such as walkathons, fairs, parades, motor car rallies and boat races, including activities that are permissible to radio amateurs, safeguards that should be observed, and acquiring proper publicity; further, that this material should be assembled, insofar as possible, employing input from sources within the membership, with proper credit being given to contributors.

Minute 83 reads as follows:

> On motion of Mr. Stevens, seconded by Mr. Sullivan, unanimously VOTED that the General Manager guide a study to develop a volunteer certification program providing for training, qualification and formal recognition of amateur achievement in the field of emergency communications; this program would be implemented through the local clubs and volunteer amateurs with the continuing support of ARRL Headquarters, and to be in accordance with recommendations outlined in the Phase II report of the Long-Range Planning Committee.

Again, the details of the Board Meeting (including information on the Phase II report of the LRPC) are contained elsewhere in this issue. The point of highlighting these two motions here, however, is simply to request your help and participation in these two projects, the first being the creation of a procedural manual for the handling of public safety events, and the second being the creation of an emergency communications training course.

As Southwestern Division Director W6EJJ has said, we need to "make more effective use of the wealth of volunteer talent which exists within our ranks." And the League is wealthy in talent, as evidenced by the abundance of emergency/public safety activity reports that have appeared in these pages. All these reports were submitted by active, involved amateurs. Both of these motions require input from those of you (groups or individuals) who have had the necessary firing-line experience and can convey that on paper. What would you want to see in a procedural manual? What methods have proven useful when your group handles a 'thon? As an experienced emergency communicator, what do you think the scope and content of the training course should be? These are only a few of the questions that need answering. The point is, your help is needed so that we can develop effective educational tools. We'd be overjoyed to have you participate.

While officials of the League's Field Organization, and the Emergency Communications Advisory Committee, will be consulted, assistance from individual amateurs is equally welcome. It's fun making things happen; that is, taking a concept and transforming it into a living, breathing program. Won't you help? All contributions should be directed to the conductor.

THE VHF NET LOGBOOK

Here's a new type of logging format that was designed for the net control station of vhf traffic nets. The logbook provides space for the NCS to record the basic information needed to operate a net efficiently.

The attributes of the log are simplicity and neatness. It's simple in the sense that the NCS has the info he/she needs to control the transactions on the net, and neat enough to keep as a permanent record in case of any discrepancies. Special consideration was also given to counting; that is, almost everything is in groups of five to make the counting of traffic and check-ins easier to report and control.

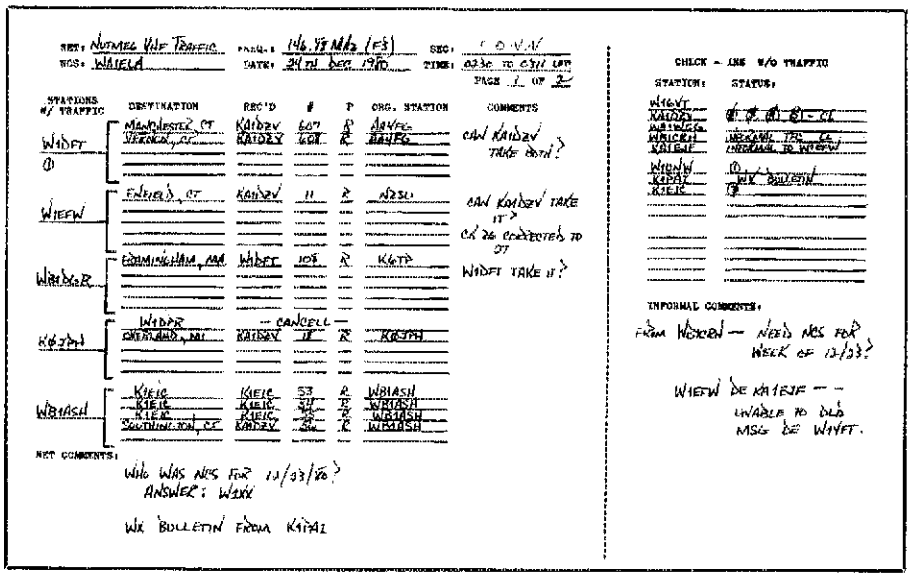
Obviously, if a station has more than five pieces of traffic, the NCS reserves another block for that station. The log may also be modified for the specific procedures used by a net or for the methods used by a particular net control station.

Using the actual example (see Fig. 1), the log works in the following manner: The prelude contains the standard net information. Stations with traffic, the destination of the traffic, the station who took the traffic ("received" column), the number of messages ("#" column), the precedence (P) and the station of origin are all recorded in the appropriate columns. The column labeled "comments" may be used by the net control to record personal or net notes, such as "Can KA1DZV take it?"

Check-ins without traffic are recorded at the extreme right. This appendage may be removed accordingly (along the dashed line). Besides being able to keep track of stations with traffic, the NCS is made aware of the status of the check-ins. Here are a few examples: KA1DZV took five pieces of traffic, then left the net. WA1WQG is on the sidelines. WB1CRH had informal traffic for the net, after which he secured. W1UNW received one message. K1EIC received three. W1DFT also took one. This is indicated by the (1) under W1DFT's call in the "stations w/traffic" column.

Adding the numbers in the "status" column, along with any other numbers indicated under "stations w/traffic," should equal the total number of formal messages handled by the net. There may be times when a piece of traffic can't be relayed; this should be noted under "net comments" and acted upon according to net procedures. Totals for each net session may be recorded under "net comments" as well.

In summary, this net logging format was designed for the NCS to keep track of stations in the net, totals and tracking down of any messages that were either lost or not delivered. — *Victor J. Nejfelt, WA1PKS, New Britain, Connecticut*



911 PROTOCOL

Pete de Bruyn, W3EXP, has just completed an information pamphlet titled *911 Protocol* that describes procedures used on the Montgomery (Maryland) Amateur Radio Club repeater for reporting emergencies on the 911 hotline. The information was prepared in cooperation with the Montgomery County Police Department to facilitate rapid communication between radio amateurs and the police, fire and rescue services. Those interested in obtaining a copy of *911 Protocol* should send a business-size s.a.s.e. to

*Assistant Communications Manager, ARRL

Civil Defense Director Mangum presents the keys to the ARES Communications van to Lauderdale County EC WB4NQH. From l-r are K4JXS, WA4HRV, WA4LBX (behind WA4HRV), WB4NQH, WA4JPK and Director Mangum. *(photo courtesy WB4NQH)*

W3EXP at 12907 Crookston La., A4, Rockville, MD 20851.

PUBLIC SERVICE DIARY

☐ Cuyahoga County, Ohio — July 18. While mobile on the Ohio Turnpike, WB4TDW and his family were involved in a one-car accident. WB4TDW's 10-month-old son sustained a bump on the head. Because he was unsure of the injury, which turned out to be minor, WB4TDW called for help over the LEARA repeater, WB8CQR. State Police arrived on the scene and transported the child to the nearest hospital. After the infant was released, WD8OYO, who had met the family at the hospital entrance, offered to put them up for the night. (N8DAD)

☐ Wyoming Co., New York — Aug. 25. KA2AFS was returning from a fishing trip when he came across a heart attack victim. He called for assistance over W2ZIA/R and was answered by AA2N who called for the state police and paramedics. (WB2TXK, EC Wyoming Co.)

☐ Genesee Co., Michigan — Sept. 1. An ambulance was enroute to a local hospital with a patient who had collapsed from apparent shock after a bee sting. The driver, WD8JJM, radioed ahead to obtain an advanced life-support unit but discovered that the roof-mounted antenna had been damaged and was unusable. He put a magnetic-mounted antenna on the roof as a temporary replacement and made an emergency call over the WB8UIN repeater, W8WN made contact with WD8JJM and put through the call to the hospital so the necessary arrangements could be made. (W8WN)

AMATEUR RADIO EMERGENCY SERVICE REPORTS

☐ Del Rio, Texas — Aug. 22. KC5RP and KA5IBI were working on the KA5IBI/R tower at the 200-foot level and noticed several suspected illegal aliens crouching in the brush not far from the site. From that height, KC5RP was able to access the W5LFG repeater in Brackettville, some 45 miles away. Fixed station W5LFG responded to the call and phoned the Brackettville Border Patrol who notified agents in Del Rio. The agents arrived and, with directions from KC5RP and KA5IBI still on the tower, were led to the exact hiding spot. (KC5RP, DEC Kinney, Maverick and Val Verde Cos.)

☐ Mauldin, South Carolina — Aug. 25. A nine-year-old girl was reported missing and became the subject of an intensive search during the evening. WA4UKX and WD4BJY were monitoring the vhf scanner and heard the announcement. Using a newly remodeled four-wheel-drive vehicle, they searched for hours before spotting the girl, who had been hiding in some roadside brush. (WD4BJY, AEC Greenville Co.)

☐ Lancaster, New York — Aug. 30. WA2ECV was mobile when he came upon a car accident with two people trapped inside by downed electrical wires. He used W2ZIA/R to call the proper authorities and stayed at the scene until help arrived. (WB2TXK, EC Wyoming Co.)

ARRL SECTION EMERGENCY COORDINATOR REPORTS

☐ For August, 37 reports were received denoting a total ARES membership of 20,207. Sections reporting were: Ala, Alta, Ariz, Colo, EBay, ENY, EPa, Ill, Ind, Kans, Ky, La, Me, Mich, Miss, Mo, Nebr, Nev, NH, NLI, NTex, Ohio, Org, RI, SV, SDgo, SCV, SC, SFla, SJV, Va, Wash, WMass, WNY, WPa, WVa and Wis.

COMMUNICATIONS SERVICE OF THE MONTH

President Reagan's Field Day Message [see Field Day results, this issue — Ed.] held a special importance for Section Emergency Coordinator Ed Gribi, WB6IZF, and other amateurs located in and around the Santa Clara Valley section in California. Little did they realize that they would be going from participation in an emergency-preparedness drill (Field Day) directly into a genuine emergency.

The request for communications help came from U.S. Forest Service personnel, who were fighting a stubborn fire in rugged terrain southeast of the Big Sur National Forest wilderness area in Monterey County. The fire started June 25; W6MSG was the first one in, followed by WD6EKR and WD6EKQ, who never even unpacked from Field Day. They just came in and went out again! (A fire official was heard to say, "Thank God you're here!"). Amateurs were operational within six hours of notification, and several circuits were set up for the firefighting crew.

An hf circuit (3895 kHz) enabled people in the fire camp (about three miles from the fire) to talk directly into National Forest Headquarters at Goleta. The 28/88 W6LIO repeater provided a link between the camp and Ranger District Headquarters at King City. Several other 2-meter links were used locally within the fire camp and at King City. The ARES-dedicated W1PW repeater (925/325) was used for coordination of Amateur Radio support — mobilizing cities and scheduling amateur teams. The Santa Barbara section, through Emergency Coordinator K6DZT, kept rotating amateurs so that there was a fresh team in the fire camp every 24 hours.

The amateur supplemental communications circuits were maintained for 3-1/2 days until the fire was brought under control. About 40 amateurs from coastal California, some traveling over 100 miles, participated. Before it was over, communications became totally dependent on Amateur Radio; temporary phone lines set up on the ground were run over by various vehicles and were knocked out of service.

"We handled about 110 'fire and release orders' working with the supply personnel," Gribi said. "Their own radio circuit was tied up with tactical and actual firefighting matters." About 1300 firefighters and support personnel were involved in the blaze before it was contained on the morning of July 1. It burned over 3800 acres, but there were no homes lost. The U.S. Forest Service put the "cost of suppression" at 1-1/4 million dollars. The amateurs were released by the U.S. Forest Service on July 3, once the fire was in "mop-up" status. — *Fred Maia, W5YI*

REPEATER LOG

According to reports received between August 21 and September 21, the following repeaters were involved in the delineated public service events.

	Weather Emergency	Criminal Activity	Medical Emergency	Vehicular Emergency	Search and Rescue	Fire	Public Safety Events	Drills/Alerts	Power Failures	Total
K1FFK								1		1
K1HF							1			1
W1KKF						1				1
WA1YHL						1				1
K1ZZN					5	1		1	1	8
KC2CY	1				2			2		5
WB2NQV			1	1	1		3			6
W2VL			1		10	1	1		1	14
WB2ZII					1		1			2
N3AIA					3		1	1		5
N3BFL					1			1		2
W3CWC				2	5	2	1	3		14
W3EEK					2			4	1	7
K3JSZ								5		5
W3UER					2		1	1		4
WA3ZXG	2							6	1	9
NN4N	1	1			4					6
WB5RDD						1			1	2
W5RVT					2				1	3
WB5VFF					5					5
WR6AEN				1	19	1				21
N6BAE							1			1
WA6EUZ					4	1				5
W6IYY				1	3	1		4	1	10
WB6PVS					2	1	2	4		9
WA6WTT			1		9		1	1		12
WR7ACE				1	1					2
K7IYN								1		1
K7NWS								1		1
W7WGW					4	1	1			6
WR8ADO								1		1
WR8AES							2	4		6
WR8ARB				1	1					2
W8NXD	2				4			3		9
WA8ULB					2		1			3
WR9ADU	1									1
WB9YJF	4				2		1			7
WR0AEV	1						1	1		3
W0DEJ							1			1
W0RGB	1							1		2
W0VQR					1	1			1	3
TOTAL	13		4	8	97	9	4	19	46	7	208

NATIONAL TRAFFIC SYSTEM

Our condolences to W7EP, PAN/c4 manager, on the loss of his son, K7NHK. Certificates: 1RN/c2 to K1AQE, K1GF, WB1CPF, K1EIC, W1EFW, WB1GZZ, N1AWX, N1BHH, W1EOF, KA1ON, KA1BTU, WA1TBY, KA1FE, WA9NEW, WB1GQS, AK1W, W1ISO, W1JTH, W1AHM, K1TVT, W1KX, WA1JZP, WB1BYR, WA1JCN, AK1E, W1TN, KA1BJ, WA1WRS, W1GUX, KB1A, WB1DKX, W1CUE, WIQYY, KA1CXP, K1BQB, WA1ITL, WB1HIH, W1KK, WA1YYW, W1YI, W1KUE, W1JP, W1UKR, WA1MJE. 8RN/c2 to WD8LRT, KA8CPS, AF8V, WD8DMF, KC8CR, WB8UBR, WB8MRL, WB8ZNS, K8OZ, K8AAZ. 2RN/c4 to W2QNL (2nd annual). The early session of 1RN/c2 has returned to 3950 kHz.

August Reports

1	2	3	4	5	6	7
Cycle Two						
Area Nets						
EAN	30	1108	35.7	.765	89.2	
CAN	31	1010	32.6	.365	100.0	
PAN	55	597	10.8	.337	81.7	
Region Nets						
1RN	55	197	3.6	.253	87.2	100.0
2RN	62	326	5.2	.278	93.9	100.0
3RN	31	139	4.5	.263	95.2	83.9
4RN	62	591	9.5	.348	71.5	96.8
RN5	31	374	12.1	.295	95.2	100.0
RN6	90	469	5.2	.220	66.1	96.8
RN7	62	523	8.4	.586	100.0	96.8
8RN	58	407	7.0	.393	67.2	90.3
9RN	61	364	6.0	.285	98.8	100.0
TEN	31	210	6.8	.207	60.9	100.0
ECN						87.1
TWN	55	160	2.9	.273	47.9	87.1

TCC						
TCC Eastern	109[1]	593				
TCC Central	77[1]	395				
TCC Pacific	85[1]	269				
Cycle Four						
Area Nets						
EAN	31	2088	67.3	1.657	94.1	
CAN	31	1118	36.1	.919	99.5	
PAN	31	1132	36.5	1.105	99.5	
Region Nets						
1RN	53	646	12.2	.601	90.3	90.3
2RN	93	743	8.0	.559	88.5	93.5
3RN	62	312	5.0	.578	97.8	83.9
4RN	58	587	10.1	.364	84.9	100.0
RN5	62	741	11.9	.484	92.9	100.0
RN6	62	657	10.6	.340	98.4	100.0
RN7	62	726	11.7	.932	96.5	100.0
8RN	60	802	13.4	.587	92.0	96.8
9RN	62	476	7.7	.375	98.0	98.4
TEN	62	312	5.0	.303	73.4	100.0
ECN						100.0
TWN	61	431	7.1	.352	90.3	98.4
TCC						
TCC Eastern	120[1]	1010				
TCC Central	83[1]	338				
TCC Pacific	113[1]	720				
Sections[2]	7451	30,734	4.1			
Summary	8955	51,307	5.7			
Record	8336	45,072	15.2			

[1]TCC functions not counted as net sessions.
[2]Section and local nets reporting (240): APSN ATN (AB), ABN ASN (AK), AENB AEND AENJ AENM AENQ AENR AENX (AL), APN ARN OZK (AR), ATEN HARC (AZ), NCN NCTN SCN (CA), HNN (CO), CN CPN NVTN RTN WCN (CT), DEPN DSSN DTN (DE), FAST FMSN FMTN FPON FPTN MEN PEN QFN QFNS SPARC SWFTN TPTN (FL), BSN IMN MTN (ID/MT), ILN (IL), ICN ITN QIN (IN), ICN ITEN I75MN TEN TLCN (IA), KPN KSBN QKS (KS), BARES CARN CCEN KEN KNTN KPON KRN KSN KTN KYN MKPN PAEWTN SEKEN TSTMN 4ARES 11ARES (KY), LRN LSN LTN (LA), EMRI EMRIPN EMRISS EM2MN HHTN NEEPN NENN WMFN WMN (MA/RI), MEPN MMN MTN WRIN (MB), MDD MEPN (MD), AEN MPSN MSN PTN SGN SPSN (ME), MACS MITN MNN QMN UPN (MI), MSN MSPN (MN), CAEN MN MSBN MSN MTN (MS), MNARES NCHN NE40 NE75 NMPN NQCN NSN PARC2MN PVTN WNN (NE), NSN (NV), GSFM GSPN NHN (NH), MCN NJN NJPN NJSN NJVN NWNJWN OBTTN SJVN UCETN (NJ), NMBC NMRRN SWN Y2MN (NM), CDN CNYTN EPN HVN NLIPN NYPON NYS OCTEN SDN STAR WDN (NY), CMN CN CNCTN CNN JFK MTMN NCSSBN PCTN RARS THEN 4CARES (NC), ALERT BN BNR BRTN CLARCEN COARES FRCN HCARES LCNWOARES MASER ONN OSN OSSBN 06MN TSRAC VWCEN (OH), OPEN OTWN STN (OK), KTN LN OLN OPN OSN (ON), BSN LARES LBLARES LCARES MPARES ORARES OSN PDXARES PTTN WCN (OR), D3ARES EPA LCARES MCARN NWPATMTN PFN PTTN WARCVTN WPA WPAPTN WPATMTN (PA), BR2MN CN CNN LC2MN SCNTN SCSSBN S2MN WSC2MN (SC), TNCW TNPN TNVN (TN), TEX TJN TSN TTN (TX), BUN UCN (UT), VLN VN VNTN VSBN VSN (VA), VTN (VT), PSTS WSN (WA), WINC WINS (WE/IN), BEN BWN NWTN WIN WNN WSBN WSSN (WI), WVFN WVHN WVMN WVN WVNN (WV).

1 — NET
2 — SESSIONS
3 — TRAFFIC
4 — AVERAGE
5 — RATE
6 — % REP.
7 — % REP. TO AREA NET

Transcontinental Corps

1	2	3	4	5
Cycle Two				
TCC Eastern	124	87.9	1173	593
TCC Central	93	82.8	693	395
TCC Pacific	124	68.5	535	269
Summary	341	79.7	2401	1257
Cycle Four				
TCC Eastern	135	88.9	2047	1010
TCC Central	93	89.2	656	338
TCC Pacific	124	91.1	1428	720
Summary	352	89.7	4131	2068

1 — AREA
2 — FUNCTIONS
3 — % SUCCESSFUL
4 — TRAFFIC
5 — OUT-OF-NET TRAFFIC

TCC Roster

The TCC Roster (August) *Cycle Two* — Eastern Area (N2YL, Director) — K1s CE EIC, N1BHH, W1s QYY XX, N2YL, K2PL, KO2H, W2XD, WA2SPL, K3JSZ, WB3GZU, WA4CCK, WB4PNY, AF8V, W8PMJ, WB8YDZ, VE3s GOL HTL QI. Central Area (W9JUJ, Director) — WD4HIF, K4VM, W5s CTZ KLV, KA5BSN, N5AMK, WA5s EQQ INJ, WB5s NKC OXE YDD, K5s BNH KJN, W9s HOT JIJ JUJ, WDØCID. Pacific Area (WØHXB, Director) — W5JOV, KA5DDW, WB6EIG, KM6I, KT6A, W7s DZX GHT TGU VSE, WA7GYQ, W0s EJD HXB, WDØAIT, KØDJ. *Cycle Four* — Eastern Area (W2CS, Director) — K1EIR, N1BHH, W1s EFW NJM TM, WB1CPF, K2PL, KB2KW, N2YL, W2s CS FR GKZ XD, WA2SPL, W3s FAF PQ, WB3GZU, W4UQ, K4s KNP ZK, KB4N, WB4PNY, AF8V, W8PMJ, WB8s ITT WTS YDZ, N8XX, VE3s ATU CWA GOL. Central Area (W5GHP, Director) — W4ZJY, W5s RB SBE, N5s BB BT RB TC, K5s GM TL, KB5W, W9s CXY DND WB9UYU, AEØR, WØs AM HI, KØEZ. Pacific Area (KØDJ, Director) — N5NG, W5KH, N6s GW PZ, W6s EOT OA VZT, WB6PVH, KN6C, KT6A, K7s HLR KSA, KB7JW, W7s DZX EP GHT LYA VSE, WA7GYQ, KØs BN DJ, KCØD, WØs HXB LB OGH, WDØAIT, VE7ZK.

Independent Nets (August 1981)

1	2	3	4
Amateur Radio Telegraph Society	31	582	325
Central Gulf Coast Hurricane	31	177	2303
Clearing House		174	368
Early Bird	31	823	388
Empire Slow Speed	31	64	329
Hit and Bounce Slow	31	163	322
Hit and Bounce Traffic	31	577	614
IMRA	26	392	1139
Midwest RTTY	28	108	139
Mission Trail	31	272	1207
New England Traffic	12	79	57
North American SSB Traffic	25	198	192
Southwest Traffic	30	118	1259
20-Meter ISSB	26	733	588
75-Meter ISSB	31	983	960
7290 Traffic	47	622	2944

1 — NET
2 — SESSIONS
3 — TRAFFIC
4 — CHECK-INS

Public Service Honor Roll August 1981

This listing is available to amateurs whose public service performance during the month indicated qualifies for 60 or more total points in the following nine categories (as reported to their SCM). Please note maximum points for each category: (1) Checking into cw nets, 1 point each, max. 30; (2) Checking into phone/RTTY nets, 1 point each, max. 30; (3) NCS cw nets, 3 points each, max. 12; (4) NCS phone/RTTY nets, 3 points each, max. 12; (5) Performing assigned NTS liaison, 3 points each, max. 12; (6) Delivering a formal message to a third party, 1 point each, no max.; (7) Handling an emergency message, 5 points each, no max.; (8) Serving as emergency coordinator or net manager for the entire month, 5 points, max. 5; (9) Participating in a public service event, 5 points, max. 5. This listing is available to Novices and Technicians who achieve a total of 40 or more points.

1007
KA9CPA
212
WP4AOH
192
N1BHH
183
WD8LRT
181
W7LRB
166
KA5CXW
164
NP4F
162
KA1ON
152
W9JUJ
WD4COL
148
W2GLH
147
KB2HM
131
WB3GZU
129
WD4HIF
WB4FVV
128
KY4K
127
W8GGX
125
KB2WI
W4GPL
WA4PFK
124
W9DM
121
W2XD
120
W4ANK
118
WA7LGN
WA1TBY
117
WB1HIH
116
WB5YDD
115
WØOYH
W1GUX
WD4ALY
WB2MCO
AD7G
KB2KW
114
WB5MMI
113
WB2EAG
KC5NN
N9BYK
112
K4JST
NJ4L
NG4J
N4EDH
W9YCV
111
WB2ZCM
W5DTR
KA4ASZ
K4SCL
110
W7VSE
W5KLV
109
KA1BTU
KA1FE
KA3CDQ
108
N8BJD
WB8JGW
WA4JDH
107
W5JOV
106
WA4STO
WA5RVT
W2MTA
105
W2YJR
AK1W
104
KA1BBI
W1EOF
103
WB3HTW
AA2H
102
WA4CCK
KA2GSL
101
AF8V
WA3WIY
N5BT
100
W6NTN
WD4AWN
KZ4K
WD4FDT
99
K7GXZ
WD8IBY
98
W1TN
W7LNE
97
WB8YDZ
AA4FG
WA4SRD
K3JSZ
KA4GFU
N6AWH
WB4WYG
96
WD4CNO
WD5JYI
AG9G
K4EV
95
K2GCE
KB7JW
94
WA3DUM
W5HMR
93
WB7OEX
KT6A
92
KA4ERP
KA4LNA
K3JC
WA4QXT
WA7IHS
KC9CG
91
K3CR
91
WB1GXZ
NP4D
W4NWM
90
W8VPW
VE3DPO
WB7DZX
K5CXP
89
W4CKS
KF8J
WA7MEL
W4WXH
WØFT
N2APB
88
WD8RHU
KAØAID
KB5NX
WA4EIC
87
N2CER
WA2ZJP
KA8CPS
KA4BBA
86
KA2JMH
WB8MTD
85
W2ACQ
N2XJ
WA2CUW
K8OZ
KA2CTU
WB4TZR
84
AC3N
W5VMP
N7BGY
83
KCØZ
W3VA
W7GHT
WØHXB
82
WØOTF
VE3HTL
VE3KK
KK2R
KBØMB
W5CTZ
KB4OZ
W4OGG
WØKJZ
KA7ELI
81
KB8MX
WD5AAH
WB2IDS
80
WA2KOJ
W7FJZ
W6RNL
N5RB
N1ARI
79
AFØO
K1BSO
N8BQK
WA4PIZ
78
WB3FKP
KA4MZY
N4PL
KA2BHR
77
N6DZQ
KP4DJ
KCØT
K4ZN
VE3GT
KØDJ
WB1ABQ
WB9YPZ
76
KAØJQG
VE3WM
WDØAIT
KM6I
75
NØBDG
KN6C
VE3GOL
KC1G
74
WD8KFN
WA8HGH
N6GW
73
K4VWK
K5TL
KC5FX
72
WA1VRL
WAØTFC
W6CPB
WB6QBZ
WA4EYU
KB5EK
WA2ARC
N2ARD
KD4DC
W9UMH
WB4AID
71
WA8GMT
70
VE3LDU
W3IPX
KA6A
W1TM
W9JIJ
69
WD8KBW
N1ALM
WA2MFU
68
WB2OWO
KK8L
W3DP
KB3DT
WA8DHB
WA4LJI
N4BZH
KB2GT
67
KA7JEX
N5TC
WB9YPY
66
VE2PJ
AA4EI
W2ZQ
WD4JJK
WA5KHE
W4HON
65
WA6LVO
K1NAN
KB6FC
N2BNB
KC5SF
KA5AZK
W4BSP
KI2D
VE2EDO
64
KØSI
WA8PIM
N2BDW
W8EK
W4YVG
63
WD8PUH
WA4LXP
KB1G
WA3WQP
WB3NTW
62
WØOUD
W9IEM
KA4DTE
KA8HGH
W1BJ
W5VMY
N9AZI
N9AUG
61
K6YD
WB9JSR
WA4GAL
W7JMH
WA7DPK
KA2BHB
60
N8DAD
W1RWG
VE3BVG
K4IWW
K5ZC
W4ZJY
KA5IWF
N4UF
56
KA9IKR/T
53
KA2HNQ/T
50
KA5KRI/T
N2CSB/T
49
KA8DEZ/N
KA5MAY/T
43
KA9GBG/T
42
KA4SAA/N
KA8IWW/N

Brass Pounders League August 1981

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	639	897	196	57	2852
KA9CPA	50	1132	254	943	2379
NØBQP	35	1237	242	731	2245
W9JUJ	1	841	889	36	1767
WAØHJZ	31	665	45	508	1249
WA4JDH	0	502	462	7	972
WD4HIF	3	394	394	33	824
WP4AOH	131	262	234	137	764
WA2SPL	74	279	376	15	744
WB3GZU	26	335	347	30	738
W7DZX	4	362	354	3	723
WB5YDD	3	349	292	57	701
W7VSE	11	358	308	21	698
W8GGX	3	317	327	51	698
WB6EIG	9	332	329	3	673
KA3DTE	295	36	332	3	666
KA4ERP	227	42	342	33	644
KCØAS	2	520	104	12	638
W3VR	263	98	264	10	635
WAØAUX	11	256	338	3	608
NP4F	149	149	181	125	604
N1BHH	0	265	251	86	602
W3ATO	1	301	279	6	587
AF8V	1	276	289	6	572
N4PL	8	260	277	24	563
K4JST	9	236	291	6	542
NG4J	29	255	217	32	533
WB8JGW	1	305	215	7	528
WB4FVV	1	261	221	28	511
Multioperator station:					
W6SG	380	0	380	0	760

BPL for 100 or more originations plus deliveries:

WP4BDS	214
W1YI	154
WØFIR	127
KA5CXW	119
W7LRB	117
K7NTS	106
WD8LRT	106
WD4COL	104
N4EDH	104
KAØAID (June)	159

1 — CALL
2 — ORIG.
3 — RCVD.
4 — SENT
5 — DEL.
6 — TOTAL

Operating News

Conducted By John F. Lindholm,* W1XX

So You Wanna Be An EC?

One of the most often-asked telephone questions that the Communications Department receives is from the enthusiastic amateur who wants to organize an emergency preparedness group in his/her area but is frustrated because the emergency coordinator (EC) is either comatose or has taken up butterfly chasing. He then calls Headquarters to find out what to do.

Fielding these inquiries requires a bit of diplomacy. On the one hand, this enthusiasm should not be dampened. But on the other, the existing appointment is still valid and fully in force. It must also be recognized that petty personality conflicts sometimes lie at the root of such innocent-sounding inquiries. Perhaps the incumbent EC is not dormant at all. But the caller seeks to depose the designated EC in a power play. Such Machiavellian plots are not always readily apparent over the telephone. So responses from Headquarters are sprinkled with a generous helping of caution.

Most such cries for help, however, are indeed genuine and the Headquarters staff tries to provide proper guidance. No doubt other similar situations warrant equal attention, but for whatever reason have not been pursued. The overall objective is to improve the emergency-response capability of radio amateurs. The effective implementation of an Amateur Radio Emergency Service (ARES) program is at the base of meeting this objective. A strong, effective local ARES organization requires an active, dynamic EC to provide the necessary leadership. Where such leadership is lacking something must clearly be done.

How the matter is pursued is definitely a local matter calling for the attention of the section communications manager (SCM), section emergency coordinator (SEC) and the incumbent EC. Headquarters' role is purely advisory and never one that interferes with the prerogatives of the elected SCM, who makes appointments as he or she sees fit. If such appointments do not satisfy the membership, the electoral process will soon enough take corrective measures. Therefore, callers to Headquarters are referred to the SCM and SEC to resolve the situation.

Oftentimes, this signals the SCM that an EC has not been doing the job. Or perhaps the EC has been carried on the books only because no one else has come forward to volunteer for such a thankless task. Under such circumstances, the EC is only too glad to give up the appointment to someone better able to cope with the organizational efforts and time required to do a good job as EC. Direct dialogue between the EC and the prospective EC, under the auspices of the SEC or SCM, is then appropriate.

As long as there is at least one amateur in each community interested in organized emergency preparedness, there is no reason that an EC cannot be appointed to organize the amateurs in that community. Where there is more than one so qualified and interested, it is the best judgment of the section leadership that designates the EC. In a local ARES organization where teamwork prevails, there is no shortage of responsibilities that cannot be assigned to assistant ECs. Functions such as repeater coordination, liaison to the National Traffic System (NTS), coordination with Red Cross chapters and so on, are but a few of the many opportunities open to the enterprising ARES group. But the EC is the overall boss. The EC coordinates the many activities of the local ARES group, and does this under the auspices of the section leadership so that local effort interfaces properly into section and statewide emergency plans. There is no place for competing efforts that fractionalize the Amateur Radio effort.

If you detect a total lack of emergency preparedness effort in your community, or what you perceive as a somewhat less than satisfactory effort, you have the prerogative as an interested member of the League to express your interest to your elected official, the SCM, or to his or her designated representative on emergency matters, the SEC. With everyone working harmoniously toward providing better emergency communications capability, the Amateur Radio Service thus better meets its basis and purpose.

SCM ELECTION NOTICE

To all ARRL members in the Eastern New York, Eastern Pennsylvania, San Diego, South Dakota, Louisiana, North Carolina, Virginia, Pacific and Maritime/Newfoundland sections: You are hereby solicited for nominating petitions pursuant to an election for Section Communications Manager. A petition, to be valid, must contain the signatures of five or more full ARRL members residing in the section concerned. Photocopied signatures are not acceptable. No petition is valid without at least five signatures *on that petition*. No member may sign more than one petition. It is advisable to have a few more than five signatures on each petition.

Petition forms (CD-129) are available on request from ARRL Headquarters but are not required. The following form is suggested:

(Place and date)

Communications Manager, ARRL
225 Main St., Newington, CT 06111

We, the undersigned full members of the . . . ARRL Section of the . . . Division, hereby nominate . . . as candidate for Section Communications Manager for this Section for the next two-year term of office. (Signature . . . Call . . . City . . . ZIP . . .).

An SCM candidate must have been a member of the League for a continuous term of at least two years and a licensed amateur of General class or higher (Canadian Advanced Amateur Certificate) immediately prior to receipt of petition at Headquarters.

Petitions must be received at Headquarters on or before 5:30 P.M. Eastern Local Time, December 4, 1981.

Whenever more than one member is nominated in a single section, ballots will be mailed from Headquarters on December 31, 1981, and returns counted February 16, 1982. SCMs elected as a result of the above procedures will take office April 1, 1982.

If only one valid petition is received for a section, that nominee shall be declared elected without opposition for a two-year term beginning April 1, 1982.

If no petitions are received for a section by the specified closing date, such section will be resolicited in April *QST*, and an SCM elected through the resolicitation process will serve a term of 18 months.

Vacancies in any SCM office between elections are filled by appointment by the communications manager.

You are urged to take the initiative and file a nominating petition immediately.

John F. Lindholm, W1XX
Communications Manager

REPEAT SCM NOMINATING SOLICITATIONS

Since no petitions were received for the Sacramento Valley section as a result of notices in April and May *QST*, nominating petitions for this section are herewith resolicited. See the above notice for details on how to nominate.

SCM ELECTION RESULTS

The following elections were conducted for two-year terms of office beginning October 1, 1981: In the Los Angeles Section, Stanley S. Brokl, N2YQ, received 641 votes, and T. F. "Doc" Nordland, WB6MOQ, received 477 votes. Mr. Brokl is declared elected.

In the San Francisco Section, Robert Odell Smith, NA6T, received 216 votes, and Arthur P. Samuelson, W6VV, received 146 votes. Mr. Smith is declared elected.

In the Southern Texas Section, Art Ross, W5KR received 603 votes, and Allen R. Guy, WA5RVT, received 517 votes. Mr. Ross is declared elected.

In the Washington Section, Joseph N. Winter, WA7RWK, received 973 votes, Donald Calbick, W7GB, received 349 votes and Steve Twiggs, WB7FGC, received 109 votes. Mr. Winter is declared elected.

In the British Columbia Section, H. E. Savage, VE7FB, received 83 votes, and Sydney T. Jones, VE7FDR, received 75 votes. Mr. Savage is declared elected.

The following were elected for a two-year term of office beginning January 1, 1982:

Uncontested

Delaware — Harold K. Low, WA3WIY
Michigan — James R. Seeley, WB8MTD
Western Massachusetts — William Hall, W1JP.

W1AW NOTE

The complete W1AW winter operating schedule appears in September *QST*, page 98. A W1AW schedule also is available on request from ARRL Headquarters. Please enclose an s.a.s.e. See the "Contest Corral" section of *QST* for times and dates of W1AW Code Proficiency Runs.

*Communications Manager, ARRL

OSCAR Operating Schedule

	OSCAR 9			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 Nov.	386	0056	155.3	18,644	J	0040	77.1
2 Nov.	401	0048	153.7	18,658	A	0045	78.3
3 Nov.	416	0040	152.5	18,672	A + J	0049	79.5
4 Nov.	431	0032	150.4	18,686	X	0054	80.7
5 Nov.	446	0024	148.7	18,700	A	0058	81.9
6 Nov.	461	0016	147.1	18,714	A + J	0103	83.1
7 Nov.	476	0008	145.4	18,728	J	0108	84.4
8 Nov.	492	0135	167.6	18,742	J	0112	85.6
9 Nov.	507	0127	166.4	18,756	A	0117	86.8
10 Nov.	522	0119	164.3	18,770	A + J	0122	88.0
11 Nov.	537	0111	162.7	18,784	X	0126	89.2
12 Nov.	552	0102	161.9	18,798	A	0131	90.4
13 Nov.	567	0054	159.4	18,812	A + J	0135	91.6
14 Nov.	582	0046	157.7	18,826	J	0140	92.8
15 Nov.	597	0038	156.1	18,840	J	0143	68.2
16 Nov.	612	0030	154.4	18,853	A	0006	69.4
17 Nov.	627	0022	152.8	18,867	A + J	0011	70.6
18 Nov.	642	0014	151.1	18,881	X	0015	71.8
19 Nov.	657	0006	149.5	18,895	A	0020	73.1
20 Nov.	673	0133	171.7	18,909	A + J	0024	74.3
21 Nov.	688	0125	170.1	18,923	J	0029	75.5
22 Nov.	703	0117	168.4	18,937	J	0034	76.7
23 Nov.	718	0109	166.8	18,951	A	0038	77.9
24 Nov.	733	0100	165.1	18,965	A + J	0043	79.1
25 Nov.	748	0052	163.5	18,979	X	0048	80.3
26 Nov.	763	0044	161.8	18,993	A	0052	81.5
27 Nov.	778	0036	160.2	19,007	A + J	0057	82.7
28 Nov.	793	0028	158.5	19,021	J	0101	83.9
29 Nov.	808	0020	156.9	19,035	J	0106	85.1
30 Nov.	823	0012	155.2	19,049	A	0111	86.3
1 Dec.	838	0004	153.6	19,063	A + J	0115	87.6
2 Dec.	854	0131	175.8	19,077	X	0120	88.8
3 Dec.	869	0123	174.2	19,091	A	0124	90.0
4 Dec.	884	0115	172.5	19,105	A + J	0129	91.2
5 Dec.	899	0106	170.9	19,119	J	0134	92.4
6 Dec.	914	0058	169.2	19,133	J	0138	93.6
7 Dec.	929	0050	167.6	19,147	A	0143	94.8

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 W1AW, AMSAT bulletins transmitted around 29.490 MHz on Mode A, 145.980 MHz on Mode B, and 435.160 Mode J, during O 7 and O 8 reference orbits, and AMSAT nets (East Coast at 0100 UTC Wednesdays; Mid States at 0200 UTC; West Coast at 0300 UTC, all on 3850 kHz lsb); (international net at 1800 UTC Sundays on 14,280 kHz usb and 1900 UTC Sundays on 21,280 kHz).

O 7 progresses an average of 28.7372° W. per orbit in a period of 114.9415 minutes.
O 8 progresses an average of 25.8006° W. in a period of 103.1874 minutes.

O 8 modes of operation are Mondays and Thursdays — Mode A. Tuesdays and Fridays — Mode A + J. Saturdays and Sundays — Mode J. Wednesdays are for experimental use on Mode A or J or recharge Mode D. Mode A + J is simultaneous operation of both transponders.

Mode J Club

Become a member of the Mode J Club. Complete eight Mode-J contacts. QSL cards are not required. Just list the call sign of each station worked, date, orbit number and station equipment used. Send this information along with $3 in U.S. funds, a one-time charge to cover the certificate and newsletter costs, to Mode J Club, c/o Larry Roberts, W9MXC, 3300 Fernwood, Alton, IL 62002.

OSCAR 8 QSL

To receive an OSCAR 8 QSL card, send a copy of the telemetry from the 29.402- or 435.095-MHz beacons. Please send your report, along with an s.a.s.e., to ARRL Hq.

Spacecraft Frequencies

Spacecraft	*Uplink*	*Downlink*	*Beacon*
O 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.
O 9 — See stray this page

OSCAR 8

Mode A x = uplink frequency − 116.458 MHz ± Doppler shift
Mode J x = uplink frequency − 581.106 MHz ± Doppler shift

Note: A minus sign in front of the downlink frequency indicates that the passband of the satellite is inverted in that mode. This means that signals transmitted up to the satellite at the low end of the uplink passband will appear at the high end of the downlink passband. Additionally, upper-sideband signals transmitted on the uplink will appear as lower-sideband signals on the downlink.

NOTE

OSCAR 7 has not been operational since June 1981. Orbital elements and only three reference orbits will be listed on this page until further notice. Reference orbits for November 1: 31,850—0029 UTC—90.0°; November 15: 32,026—0139—107.7°; November 30: 32,214—0148—110.3°.

Further information on the radio amateur satellite program can be obtained free of charge from ARRL Hq. The all-new OSCARLOCATOR package is now available: $7 U.S., $8 elsewhere.

Strays

A NEW AMATEUR RADIO SATELLITE—UoSAT OSCAR 9

☐ Britain's first satellite for Amateur Radio operators and educators was launched at Vandenberg AFB, California, on October 6.

In place of the communications transponders carried aboard OSCARs 6, 7 and 8, the new satellite sports many beacons and experiments that should be of interest to all Amateur Radio operators and science educators worldwide. The preliminary orbital parameters and operating data are as follows: period-95.458 min, height-540 km, inclination-97.46°, increment-23.89° per orbit, max. access time-12 min 20 s on overhead pass, max. slant range-2730 km, velocity-7.6 km/s. These parameters are for initial tracking. After the spacecraft has stabilized, more-exact data will be published.

Propagation Experiment Beacons: These beacons can be modulated (on-off a-m keying) with Morse code telemetry interspersed with a carrier or a continuous carrier. The frequencies are: 7050, 14,002, 21,002 and 29,510 kHz.

General and Engineering Data Beacons: These beacons will send telemetry in ASCII, Baudot, voice, afsk and Morse code from the primary spacecraft computer, speech synthesizer and camera imaging units. Both beacons will transmit nbfm with ± 5 kHz deviation. The General Data Beacon operating on 145.825 MHz will usually have different information than the Engineering Data Beacon operating on 435.025 MHz.

S-Band Experiment Beacon: This beacon will operate on 2401.0 MHz and will transmit the same data as the General beacon. Modulation will be nbfm with ± 10 kHz deviation. Polarization is l.h.c.

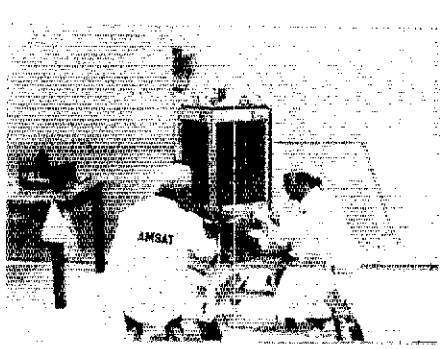
X-Band Experiment Beacon: A steady carrier will be transmitted on 10.470 GHz for tracking and propagation studies. Polarization is l.h.c.

Data Transmission Formats: High-speed data at 1200 bps from the telemetry, computer and video display experiments are transmitted as phase-synchronous afsk using 1200-Hz ("0") and 2400-Hz ("1") synthesized tones. This method lends itself to simple but effective decoding techniques. Data speeds other than 1200 bps are transmitted asynchronously using 1200-Hz ("1") and 2400-Hz ("0") tones, except Morse code, for which 1200 Hz is used.

CCD Camera Imaging Experiment: A two-dimensional, charged coupled device imaging array should give images of the earth's surface and other data that can be loaded from earth command stations. A complete image dump will take 3.5 minutes and will be sent by the General and Engineering beacons. If demodulating equipment is not available, the 1200-and 2400-Hz tones may be stored on a tape recorder.

Speech Synthesizer Experiment: A 120-word speech synthesizer based on the National Semiconductor "Digitalker" integrated circuit is under the control of the primary onboard computer. Telemetry, spacecraft status, programs, orbital data and general spacecraft news can be encoded in "English" and relayed via the General and Engineering beacons.

The microcomputer, magnetometer, telecommand, telemetry systems and other experiments will be covered in future issues of *QST*. Tune in the AMSAT nets (listed in *QST*'s OSCAR Operating Schedule) and W1AW bulletins for the latest Amateur Radio satellite news. — *Bernie Glassmeyer, W9KDR*



AMSAT's Vice President of engineering, Jan King, W3GEY (l), and Dr. Martin Sweeting, G3YJO, UoSAT Project Manager, ready the UoSAT spacecraft for flight. *(photo by Sharon O'Brien)*

Contest Corral

A Roundup of Upcoming Operating Events

Conducted By Mark Wilson,* AA2Z

NOVEMBER

1

RTTY Art Contest, sponsored by the Chicago RTTY Repeater Society from Nov. 1, 1981, until February 28, 1982. All entries must be original and must not have been transmitted before Nov. 1, 1981. For information, contact: Howie, WA9KEK, 1752 North Austin Ave., Chicago, IL 60639.

4

West Coast Qualifying Run (W6OWP prime, W6ZRJ alternate), 10-35 wpm at 0500Z Nov. 5 (9 P.M. PST Nov. 4). Frequencies are approximately 3590/7090 kHz. Underline one minute of the highest speed you copied, certify your copy was made without aid and send to ARRL for grading. Please enclose your full name, call (if any) and complete mailing address. A large s.a.s.e. will help expedite your award/endorsement.

4-5

YL Anniversary Party, phone, Oct. *QST*, page 100.

7-8

ARRL Sweepstakes, cw, Oct. *QST*, page 80.

International Police Association Contest, Oct. *QST*, page 100.

CHC International Contest, cw, Oct. *QST*, page 100. According to information received from KB7SB, President and General Manager of the International Amateur Radio Society, Inc., *there will be no official CHC contest on this date.* For more information, contact Scott R. Douglas, Jr., KB7SB, International Amateur Radio Society, Inc. — Certificate Hunters Club, P.O. Box 9990, Glendale, CA 91206-0990.

OK-DX Contest, Oct. *QST*, page 100.

Fall SMIRK Party, sponsored by the Six Meter International Radio Klub, from 0000Z Nov. 7 until 2400Z Nov. 8. All contacts must be made on 50 MHz. Single operator only; no crossband or repeater QSOs. Exchange SMIRK number and location (ARRL section for W/VE stations, province, prefecture, state or DXCC country for others; Washington, DC counts as separate multiplier). Count 2 points for SMIRK-member contacts, 1 point for nonmembers. Multiply by total sections/locations worked. Entries *must* be made on official Sept. 1981 entry blank available from KC5TK. Mail entries by Nov. 22 to: SMIRK Party, c/o KC5TK, 6821 West Ave., San Antonio, TX 78213.

11

W1AW Qualifying Run, 10-35 wpm at 0300Z Nov. 12 (10 P.M. EST Nov. 11). Transmitted simultaneously on 1.835 3.58 7.08 14.08 21.08 28.08 50.08 147.555 MHz. See Nov. 4 listing for more details.

14-15

European DX Contest, RTTY, July *QST*, page 84.

Delaware QSO Party, sponsored by the Delaware ARC, from 1700Z Nov. 14 until 2300Z Nov. 15. Work stations once per band and mode. Exchange serial number, signal report and QTH (county for DE stations, ARRL section or country for others). Suggested frequencies: phone — 3.975 7.275 14.325 21.425 28.650; cw — 1.805 3.560 7.060 14.060 21.060 28.160; Novice — 3.710 7.120 21.120 28.120. DE stations count one point per QSO and multiply by total ARRL sections and DXCC countries worked. Others count 5 points per DE QSO and multiply by total number of DE counties (3 total) worked on each band and mode. Awards. Mail logs by Dec. 14 (large s.a.s.e. for results) to: Charlie Scully, AE3H, 103 E. Van Buren Ave., New Castle, DE 19720.

North Carolina QSO Party, sponsored by the Alamance ARC, from 1700Z Nov. 14 until 0200Z Nov. 15, and 1200Z Nov. 15 until 0100Z Nov. 16. Work stations once per band and mode. No crossband or repeater QSOs. Exchange signal report and QTH (county for NC stations, ARRL section for others). Suggested frequencies: phone — 3.980 7.280 14.280 21.380 28.580; cw — 60 kHz up from lower band edge; Novice — 20 kHz up from lower band edge; vhf — 50.050 50.110 144.050 144.200. NC stations count 1 point per QSO and multiply by sum of ARRL sections and NC counties. DX contacts count only for QSO points. Others count 2 points per NC QSO and multiply by total NC counties worked (max. 100). Awards. Mail logs by Dec. 12 (large s.a.s.e. for results) to: Bob Wang, KQ4M. P.O. Box 777, Hillsborough, NC 27278.

CQ-WE Contest, sponsored by the Bell System Amateur Radio fraternity, with various sessions from 1400Z Nov. 14 until 0500Z Nov. 16. Open to present and retired Bell, Western Electric and AT&T employees. Contact local inter-works coordinator for logs and complete rules.

21

W1AW Qualifying Run, 10-35 wpm at 2100Z (4 P.M. EST) Nov. 21. See Nov. 11 listing for more details.

21-22

ARRL Sweepstakes, phone, Oct. *QST*, page 80.

VK CW QRP Contest, sponsored by the VK CW QRPp Club, from 0000Z Nov. 21 until 2400Z Nov. 22, 160-10 meters, cw only. Single operator, single or multi-band; QRP and QRO categories. Full- or half-period entries (48 hour or 24 hour). Work stations once per band. Exchange: VK CW QRPp members send membership number plus serial number; nonmember QRP entrants send signal report and serial number; QRO entrants work QRP stations only and send signal report. Multiply QSOs by 6 points if running 0-1 watt output, 5 points if 1-2 watts, 4 points if 2-3 watts, 3 points if 3-4 watts, 2 points if 4-5 watts, 1 point if more than 5 watts. Multiply QSO points by number of VK CW QRPp members plus DX stations worked per band. Log deadline Jan. 31, 1982 (s.a.e. and postage or IRC for results). Mail to: VK CW QRPp Club, 59 Collova Way, Wattleup 6166, Western Australia.

28-29

CQ Worldwide DX Contest, cw, Oct. *QST*, page 100.

DECEMBER

1

West Coast Qualifying Run (W6OWP prime, W6ZRJ alternate), 10-35 wpm at 0500Z Dec. 2 (9 P.M. PST Dec. 1). See Nov. 4 listing for more details.

5-6

ARRL 160-Meter Contest, this issue, page 100.

Connecticut QSO Party, sponsored by the Candlewood ARA, from 2000Z Dec. 5 until 0500Z Dec. 6, and 1200Z Dec. 6 until 0200Z Dec. 7. Work stations once per band and mode. Exchange signal report, serial number and QTH (county for CT stations, ARRL section or province for others). Suggested frequencies: phone — 3.927 7.250 14.295 21.370 28.540; cw — 40 kHz up from lower band edge; Novice — 25 kHz up from lower band edge. Count one point per QSO, 2 per Novice QSO and 3 per OSCAR QSO. CT stations multiply by sum of ARRL sections and provinces. One extra multiplier for working DX. Others multiply QSO points by number of CT counties worked (max. 8). Mail logs by Jan. 2, 1982 (large s.a.s.e. for results) to: Stephen Grouse, KA1ECL, 3 Queens Court, Danbury, CT 06810.

Telephone Pioneers QSO Party, sponsored by the Telephone Pioneers of America, from 1900Z Dec. 5 until 0500Z Dec. 7. Open to amateurs who are members of the Telephone Pioneers of America. For more information, contact Ted Phelps, W8TP, c/o Western Electric, Dept. 45150, 6200 East Broad St., Columbus, OH 43213.

EA-DX Contest, phone (this year's rules not received).

10

W1AW Qualifying Run, 10-35 wpm at 0300Z Dec. 11 (10 P.M. EST Dec. 10). See Nov. 11 listing for more details.

12-13

ARRL 10-Meter Contest, this issue, page 100.

HA-DX Contest

EA-DX Contest, cw.

27

Canada Contest

29

W1AW Qualifying Run

*Assistant Communications Manager, ARRL

Standard Contest Guidelines

1) Make sure your log details the date, time, band, call sign and complete exchange sent and received, for each QSO claimed for the contest credit.

2) Your summary sheet should indicate your score, including how you figured it, and a declaration that you followed FCC/DOC regulations and the contest rules. Your name, call sign and complete address should be typed or printed in block letters.

3) Crossband, crossmode and repeater contacts are usually not permitted. Contacts with the same station on different bands are usually permitted.

4) Your log should be checked carefully for duplicate QSOs, and, if more than 200 QSOs are made, dupe sheets should be included with your entry.

5) Your log may be considered a checklog or disqualified if it is incomplete or if too many errors are detected by the contest committee.

6) Avoid standard net frequencies.

7) International contests generally offer awards to top scorers from each U.S. call area and each country; state QSO parties to each state/province.

8) Your summary sheet should include the following statement: "I have observed all competition rules as well as all regulations established for Amateur Radio in my country." The declaration should be signed and dated.

Strays

I would like to get in touch with . . .

☐ anyone who worked anywhere, anytime, at a land-based tributary or relay station (government, military, commercial or whatever) that handled message traffic by means of cable, wire, wireless or radio, using a hand key, teleprinter, cable or any other device. Arnold J. Madiol, WD8JIV, 436 Orchard Ave., Grand Haven, MI 49417.

☐ maritime radio officers for correspondence and face-to-face QSO in Athens, Greece. SSG Gary S. O'Neal, HHD 558th USAAG, APO NY 09253.

QST congratulates . . .

☐ Henry Landis, N2GF, who was named Volunteer of the Year of the Juvenile Diabetes Foundation.

☐ Donald A. Shields, VE3BUD, who was recently appointed President of Sheridan College of Applied Arts and technology in Brampton, Ontario.

☐ Stan Owens, W2MT, who was recently elected chairman of the IEEE Marine Transportation Committee.

73 MAKES FINAL RUN

☐ An era ended on November 29, 1980, when *73* made its final run. *73* is, of course, the engine number of the last commercial, coal-fired steam engine in New Hampshire. So, for a time at least, the hot air and steam will bellow no more. — *Thomas W. Lafjin, WIFJE*

Section Activities

A-1 OPR ✗ EC ✗ DXCC ✗ RCC ✗ WAS ✗ STM ✗ OES ✗ ORS ✗ NM

SCM ✗ ARES ✗ OVS ✗ SEC ✗ OBS ✗ TCC ✗ OO ✗ NTS ✗ WAC ✗ CP ✗

CANADIAN DIVISION

ALBERTA: SCM, E. Roy Ellis, VE6XC — SEC: VE6XC, A/SCM: VE6AMM. STM: VE6ABC. NM: (ATN) VE6ABC (APSN) VE6AFO. Our postal strike is over at last. NARC supplied communications and first aid posts for the annual Molson Chasquis Marathon of 42 km with about 200 entries. Two Silent Keys will be missed, namely VE6FM who pioneered and was very active in repeater operations for this area, and VE6CJV. Planning for SET with Alberta Disaster Services involved. Traffic: (Aug.) VE6HO 107, VE6CHK 82, VE6ABC 34, VE6SA 25, VE6QN 8, VE6XC 3, VE6YW 2, VE6ARL 1. (July) VE6CHK 85, VE6BBL 42, VE6ABC 29, VE6HO 18, VE6QN 5. (June) VE6CHK 65, VE6BBL 53, VE6ABC 27, VE6HO 12, VE6AMM 5, VE6QN 3, VE6YW 3.

MANITOBA: SCM, Peter Guenther, VE4PG — Asst SCM: VE4JP. STM: VE4RO. SEC: VE4HK. NMs: VE4s TE ACX VJ NM. We welcome VE4ALX to the section. His abilities on nets is well known. The cw net, MTN, is now back to a daily schedule and traffic will no doubt get a shot in the arm. VE4HK, our new SEC, is planning a get-together with all the DECs to get a very active ARES reorganized. MEPN QNI 759, QTC 24, sess 31. MTN QNI 84, QTC 24, sess 16. MMN QNI 423, QTC 27, sess 31. WRIN QNI 115, QTC nil, sess 4. Traffic: VE4PG 158, VE4NE 151, VE4AJE 40, VE4TE 35, VE4ACX 18, VE4ID 18, VE4AAD 17, VE4JA 13, VE4CR 10, VE4FK 9, VE4AFO 7, VE4LB 6, VE4UM 4, VE4NM 3, VE4TL 3, VE4CF 2.

ONTARIO: SCM, Larry Thivierge, VE3GT — A/SCM: VE3GOL. SEC: VE3GV. STM: VE3QI. The decision to discontinue FMTs after the September 12 run has been made after a letter to all recent FMT participants. VE3ILN, after visiting the New England States, NY and NJ, is back on cw with a Century 21 and FT-207R. VE3WG and XYL celebrated their 60th wedding anniversary. The Grape and Wine Committee has printed a certificate for the Niagara Peninsula ARC to issue for contacting 5 amateurs in the Niagara Peninsula. Club station VE3VM counts as 2 contacts. Send log data to NPARC Inc., Box 692, St. Catharines, Ont., L2R 6Y3. Keep June 5, 1982 open for the Central Ontario Amateur Radio Flea Market in Guelph. Upgrades to Advanced: VE3IRQ and VE3MMB. New calls include VE3NAT and VE3MVR. Congratulations to the Ontario Trilliums who are celebrating their 16th anniversary this year. Their many achievements include the operation of the VE3 QSL Bureau and assistance to the Queen Elizabeth Hospital Radio Group. Watch for their weekend contest on November 6th through 7th. Elimination of VE3GFN's oil furnace and tank has provided him with a new basement workshop. Congratulations to VE3BMG on becoming a Life Member. With 55 watts input and a 135' long wire antenna, well known W2QHH has worked 362 countries. CJ3VM managed 1300 contacts from their Boy Scout Camporee. Traffic: (Aug.) VE3HTL 320, VE3GOL/3 305, VE3KK 304, VE3GNW 167, VE3GT 163, VE3WM 92, VE3AEA 88, VE3CYR 87, VE3DPO 87, VE3QI 85, VE3GFN 71, VE3LNN 43, VE3BVG 42, VE3KXB 41, VE3DVE 39, VE3EWD 39, VE3DUK 29, VE3BZB 28, VE3AYZ 22, VE3KCZ 22, VE3AJN 17, VE3LSJ 16, VE3WG 14, VE3KLX 12, VE3LDU 4, VE3IXB 2, VE3FGU 1. (July) VE3CYR 99. (Apr.) VE3DPO 162.

QUEBEC: SCM, Harold Moreau, VE2BP — SEC: VE2DEA. STM: VE2PJ. NMs: VE2PJ VE2FSA. New appts: VE2GAG as ORS. The Montreal Hamfest was the last activity of the season. Le Centre Radio Amateur Verdun Inc. is holding code and theory classes every Monday and Thursday from 1930 to 2200 local. Le club Radio Amateur de Thetford-Mines Inc, VE2CTM, qui a fait ses debuts en 1927 sous le nom de Radio Club Thetford, s'est vu accorder par le MDC un prefix special CH2 pour la periode du 1er au 15 Juillet, pour commemorer l'annee internationale des personnes handicapees. A la suite de cet evenment, 111 pays, 29 zones et pres de 3000 QSOs par VE2's AR BCC DPJ and FOU. Une carte QSL specialle est disponible. Traffic: VE2EDO 60, VE2PJ 46, VE2BP 45, VE2EKC 32, VE2FFE 31, VE2EC 23.

ATLANTIC DIVISION

DELAWARE: SCM, Roger E. Cole, W3DKX — SEC: W3PQ. STM: WA3WIY. PSHR: WA3WIY 101, WA3DUM 94, K3JL 92. Congrats to WA3WIY who will be our SCM on Jan. 1st. He and XYL, WB3DUG, are active in most modes of operation and are respected by all. The AWARE Club announces that ARRL Pres. Dannals, W2HD, Atlantic Div. Dir. Bieberman, W3KT and other League "Brass" will be at the Nov. 19th dinner meeting at the Tally-Ho in Wilmington. Further info is available from WB3DPJ or W3DKX. Field Day awards: DARC vhf 200 pts. and multi xmtr., 5964 pts; Sussex ARA Single xmtr 1954 pts. Congrats to all who participated in FD. (Aug.) DSSN QNI 42, QTC 2; DTN QNI 295, QTC 49.; DEPN QNI 63, QTC 9. (July) DSSN QNI 23, QTC 2. Traffic: (Aug.) W3QQ 68, WA3DUM 58, WA3WIY 49, K3JL 40, W3DKX 29, WB3DUG 28, WA3ZBI 11, N3AKC 10, K3ZXP 7, W3WD. (July) N3AKC 16.

EASTERN PENNSYLVANIA: SCM, Karl W. Pfeil, W3VA — SEC: WA3PZO. STM: WB3JYZ.

Net	Freq.	Time	QNI	QTC	Sess.
EPA	3610	7/10 P.M. Dy	379	120	54
EPAEPTN	3917	6 P.M. Dy	465	186	31
PFN	3958	5 P.M. M-S	252	309	26
PTTN	3610	6:30 P.M. Dy	182	46	29

Local and vhf nets reporting: D3ARES, LUZ CO ARES, MCARN, and WARCVTN with a total QNI 281, QTC 40 in 30 sess. OBS reports: KA3FKD K3EBZ W3AVJ W3CL W3VA and WB3FVJ. OO reports: KC3B K3RDT W3FAF and W3GVR. OVS report from N3BFL. PSHR reports: K3EBZ K3JSZ K3RHI KA3DZD N3AIA N3BFL W3DP W3IPX W3VA WA3TKU WA3WQP WB3FKP and WB3HTW. New appointments: OES & OO to N3AJO. EPA welcomes N3BPY and WA3EHD. EPAERTN welcomes KA3DZD KA3FQW W3HTJ WA3ZMC and WB3DLO. PFN welcomes KA3GJT and N3CGT. PTTN welcomes K3IW and WB3BSH. Upgrades: KA3DZD KA3FQW and WB3DLO, who is awaiting new call sign to "A." N2BSK/3 to Gen. Congrats. Also KA3EWR to Gen. KB3LF is back in cw nets with QRP rig. KA3BER/5 QNI EPA cw nets from Louisiana. New gear: K3ANT and N3AIA FT101ZD-MKLL1 and K3YD a LC-25A. Murgas ARC gave a demonstration on Amateur Radio at the Wyoming Valley Mall. Display included RTTY Slow-Scan hf and 2 mtrs. WB3CAI is temporarily QRT after recent operation. N3AIA reports FCC very impressed with "York County Plan" and they may use it as a model. York County hams have reason to be proud. W3EU reports Murphy struck his receiver. W3YZW, D6 DEC, reports D6ARES Net got off to a good start. N3BMC is leaving the section and is moving to California. W3EEK has rebuilt his 20-mtr beam and added an ICOM-701, now set for DX season. KB3TS and N2BSK/3 new hams in the Stroudsburg area and welcome to EPA. WB3FYT has 1296 gear ready for vhf contests. K3JSZ is new manager for the Luzerne Co ARES Net. WB3CVK is now N3CIX. N3ANX sporting a new tower and hopes to improve his CHC totals. Murphy struck WB3JTW's ant. so now he has a new 750 ft | W and reports results FB. K3QXC also a new 500 ft | W and sez reports very good. WA3EHD reports WARC's new repeater working FB. Frankford ARC preparing for a great DX contest season. WA3PZO reports 300 AREC members, 7 ECs reporting with 100 drills on 25 active nets, with 24 NTS liaison, in EPA Section. Notice to all NCS, please get net reports into NM before end of the month. Traffic: WA3WOP 436, K3JSZ 261, W3DP 174, W3FAF 161, WB3HTW 156, W3IPX 141, WA3EHD 88, AA3B 75, WB3FKP 70, W3VA 67, WA3OFD 54, N3CD 32, W3YZW 30, W3ID 22, W3ADE 18, K3QXC 18, W3CL 16, K3YD 13, N3BFL 12, WB3FVJ 12, K3RHI 12, WB3CAI 8, WA3CKA 8, W3AVJ 7, K3EBZ 7, KA3DZD 6, KA3FKD 5, K3EIP 3, N3AIA 1.

MARYLAND — DISTRICT OF COLUMBIA: SCM, Karl R. Medrow, W3FA — WA3TAI is SEC for MDC and have you sent him a word or two lately? WB3LTA had a great mobile signal from Ohio. WA3FYZ is 100% mobile with a home brew shakey antenna! W3CDQ gambled in Atlantic City! KS6X was 4.0 in the class in Calif., and may get on from the dorm back here! W6NZ/3 had a quiet month. WB3IVO puts out code drills 14,060 Mon thru Fri at 1930Z. KC3D is about to splash big! WB3KJT was visited by Murphy! KA3T is finding the return to college demanding. WB3GEJ keeps the Hagerstown boys moving. A father-son team, WA3VPL and KA3EFS, W3GDU joins the second hobby ranks with computers! A double goose egg for W3HVS. W3LDD is sneaking in some DX. KA3CDQ is doing yeoman service! W3FZV classifies DX condx as stinko. AK3X may be more active this fall. W3DQI is in the Laurel WAS contest. All participants must use the Novice bands and rules. N4DR/3 is very active repairing other folks burned out gear — lightning! WB3GZU is no longer a bachelor. KA3HIY interested in ORS-II. WB3BFK is a busy NCS on many nets. The new slate for the PVRC is K4PQL, pres.; WD4AXM, v.p.; K7SV, secy.; W3MR, treas.; K3NA K4FJ and W3LPL, dirs. Ham Arundel News, FAR minutes and GSFC notes appreciated. W3IK is seeing again and it's a trip to Greece. New repeater gear for the AARC. Look for their Chesapeake WX and TFC net next April first. With the nets: Net/Manager sessions/traffic/QNI average. MEPN/WB3GZU 31/182/24. Meets 6 P.M. local daily on 3920 kHz. Toppers none. Others: N3AGM WB3BFK and W3DKX. Pointers: W3DKX 64, KA3CDQ 55, W3FA 52, WB3GZU 51, KA3ARH 41. MDC PON/W3OYY 4/8/22.5. WR PON/W3DFW 22/23/16. PON's 5 P.M. local except Sun on 3905 kHz. WC 2-Mtr net/WB3GEJ 4/4/20, Hagerstown. July MDD/W3PQ 60/228/6.8 tnx to KA3T. 7 P.M. and 10 P.M. local daily 3643 kHz. Traffic: (Aug.) WB3GZU 738, WB3IVO 233, KA3CDQ 133, W3FA 129, WB3BFK 56, N4DR/3 49, W3DQI 34, W3FZV 32, WB3LTA 22, W3LDD 18, AK3X 12, WB3KJT 5, WA3VPL 4, KA3EFS 2. (July) WB3IVO 193.

SOUTHERN NEW JERSEY: SCM, Bill Luebkemann, WB2LCC — STM: WB2LCC. SEC: W2HOB. Most of you no doubt noticed my column did not apprear in the September QST. Due to the pressure of my schedule, I just did not get it done in time. My apologies. I wish some of you would give me more regular feedback on a monthly basis — it helps to write a better column. The West Jersey Radio Amateurs and Gloucester County ARC report very successful hamfests durling July and August respectively. Both days featured good weather, and much fun was had by all who attended. I must thank WB2JCE for entering the QLF contest at the WJRA affair with me. With her copying ability and my left foot we were unbeatable! First place was a breeze! GCARC liked the WJRA QLF contest so much they started their own. Now is the time of year when classes begin to get into full gear throughout the section. Is your club teaching? Get me info on how your fall term went by December 31 so I can include it in this column's December report (printed in March). Traffic: N2CER 199, KA2GSL 179, WB2IQJ 82, AA2H 78, WA2CUW 72, K2UL 66, W2ZQ 62, WB2GFM 40, KM2E 39, **KA2BKF 36**, WB2JCE 25, WB2LCC 20, WB2PKG 15, N2CNR 12, WA2PTQ 12, WA2GTJ 10.

WESTERN NEW YORK: SCM, William W. Thompson, W2MT — SEC: W2BCH. STM: N2APB. ASCM: W2GLH. Appointment: WA2KOJ (NM). NMs: N2APB KA2CTU KI2D W2FR KO2H K2KIR K2KQC WA2PUU WA2ZJP. ECs: N2ALI KA2AYZ W2BYO KA2CMQ K2CWD WA2DHB K2DUR KC2EU W2EWO W2FEY WA2GJI W2GLH WA2HSB WB2JWD K2LKH WA2MFU WA2NAC K2OIU WA2OVT WA2PHH WA2PUU WB2QZL WB2TXK WA2VAM WA2VCM WB2VSJ K2VTT KB2XI. Public Service Honor Roll: N2APB N2ARD KA2BHB KA2BHR N2CSB KA2CTU KI2D W2GLH KB2GT WB2IDS WA2KOJ WA2MFU W2MTA WB2OWO WA2ZJP. Sorry to report WA2LHM and WA2NVK are Silent Keys. WA2LWH is now KC3EU in Erie. Reports: (OO) WB2MMB (4). (OVS) WB2SGI K2QR Aurora 8/23 w/FB ducting to Michigan 8/26. (OBS) W2GLH K2KWK. No BPL.

Net	Freq.	Time/Day	QNI	QSP	QND
NYSCN	3677	1000/Su	45	10	5
THIN	3913	1600/Su	48	0	5
NYPON*	3913	1700/Dy	547	367	31
NYSTPEN	3925	1800/Dy	728	121	31
ESS	3590	1800/Dy	329	64	31
NYSRATT	3625	1830/Dy			
OCTEN	34/94	1830/Dy	633	106	31
QNET	31/91	1830/Dy	365	2	31
STAR/E*	325/925	1830/Dy	125	68	26
WDN*	04/64	1830/Dy	161	28	10
BSN	93/33	1900/Dy	(Rptr down)		
NYS/E*	3677	1900/Dy	445	200	31
JCARCN	10/70	2000/Dy	482	11	27
WNYECN	3955	2000/3rd Su			
OARCN	25/85	2000/Wed	82	0	5
SLVARES	31/91	2100/Su	43	0	5
CNYTN*	90/30	2115/Dy	438	79	31
WDN*	04/64	2130/Dy	885	177	31
STAR/L*	325/925	2130/Dy			
NYS/L*	3677	2200/Dy	362	309	31

*NTS nets. STAR/E will move to 147.99/39. CNYTN backup on 146.40/147.00. Support SKYWARN, contact W3AET, Central NY (Cayuga, Jefferson, Lewis, Madison, Oneida, Onondago, Oswego) or WA2AIV in Western; WATSAY other areas? Traffickers' picnic at W2MTA QTH, Newark Valley, say K1XA and 82 from Northeast, see you in '82. WA2PUU and the VOLS did it again, FB at Empire Games! ARE YOU PREPARED? Public service comms: Highlands RC Wellsville Great Balloon Rally; GRAM Batavia March of Dimes, K2ANN/W2GIR: Seaway Festival, WA2RXO et al; Lyons Sesquecentennial, Drumlins ARC/WB2MBO; NYS Archery Champs, Watkins Glen, WB2TGU et al; Susquehannock/Pony/Scotch Bonnet/Iron Man/ADA Bike-A-Thon/Canaltown Days, RARA/N2EH — THANKS TO ALL. PD#5 is humming. Traffic: W2MTA 466, WA2HSB 465, WA3ELD 325, KA2CTU 277, KO2H 261, WB2IDS 225, W2GLH 174, KA2CLT 120, N2APB 115, WA2MFU 112, WB2OWO 110, KA2BHR 103, WA2KOJ 88, W2FR 83, WA2ZJP 82, KG2D 71, W2PZI. 70, N2ARD 67, KA2BHB 51, WB2TXK 49, KB2GT 44, AF2K 42, N2CSB 35, KI2D 33, KA2HAB 32, WB2LJK 32, WA2RXO 32, WB2QIX 28, KA2GOH 21, K2RN 19, KB2YU 17, AF2A 13, WB2SGI 6, W2ZOJ 5, WB3CUF 4, KA2DBD 4, K2LKH 4.

WESTERN PENNSYLVANIA: SCM, Otto L. Schuler, K3SMB — Asst SCM & STM: N3EE. SEC: AB3Q. DECs: WB3JDI WB3EFQ WB3KJH. NMs: N3FM. W3NEM W3MML WA3PXA.

Net	QNI	QTC	Sess.	kHz	Time/Day
WPACW	352	149	31	3585	7:00 P/D
WPAPTN	506	125	31	3983	6:15 P/D
WPA2MTN	519	65	31	146.28/88	8:00 P/D
NWPA2MTN	413	7	31	146.04/64	9:00 P/D

As of September 1 the new manager for the WPACW Net will be AC3N and the WPAPTN will be N3ADU. I want to thank N3FM and WA3PXA for the excellent work done during their tenure as net managers of the above nets. I know the new managers will also keep up the high quality of operations. K3LGM is a Silent Key and our sympathies are extended to his family. I wish to thank the Horseshoe ARC for the fine reception I and my XYL received at their picnic. New Novices are KA3HTA, NARC members KA3s HRK HRN HRP HRO HRQ HRR HRS HRT HRU HRV HRW & HRX. General: KA3GCF (YL age 11), KA3GGR (12). Tech: KA3HJA & KA3EGE. Advanced: KA3FTW KA3EBF KA3BTH KA3ATQ & N3CFW. Congrats to all. WB3KNK is now KB3RV. The traffic nets do need cw and phone operators all over the section. Give the net managers a call and offer your services, it can be fun and is a rewarding service. After all public service is why we exist, please help. Traffic (Aug.) N3ADU 360, W3EGJ 242, N3FM 190, K3CR 137, AC3N 129, KB3DT 127, WA3GUK 109, W3UDX 100, W3YI 76, N3EE 54, KA3ETC 44, N3WS 39, KA3BMU 37, K3SMB 36, WA3QNT 34, W3MML 30, W3NGO 25, N3KB 24, WA3UNX 24, W3KUN 23, K3VOV 21, N3BPY 20, W3EXC 18, W3KMZ 16, W3RUL 15, KA3BGC 13, N3BKV 13, W3SMV 13, K3HOT 12, W3SN 12, W3ZX 12, WB3IAB 10, W3YCN 10, WB3EFQ 8, W3TTN 6, W3YQ 4, W3IA 2, W3LOD 1. (July) N3EE 41, W3NGO 23, KA3FTW 6.

CENTRAL DIVISION

ILLINOIS: SCM: Larry M. Keeran, K9ORP — SEC: W9QBH. Asst SCM: W9RYU.

Net	Freq.	Times/Days	QTC	Sess.
ILN	3690	2330/0300 Dy	173	59
Ill Phone	3915	2130 Dy		
NCPN	3915	1200/1700 Dy	125	44
IEN	3940	1400 Su		

D9RN 100% stations: W9HOT W9JIJ WB8WGD K9UZA K9BVE WA9FTB WB9ODN. CAND 100% stations: W9JIJ W9HOT WB9WGD WB9JQD. Dan Hoover Memorial Net had a QTC of 8 during 5 sessions. WB9MMP and WD9ARO did a fine job presenting the annual SRRC Hamfest Appreciation Dinner held at Gary's Supper Club in McNabb on September 26th. The Chicago Amateur Radio Club, 5631 W. Irving Park Road, Chicago 60634, club station W9CAF, is gearing up for technical seminars, round table discussions, RTTY operating and building, ham auctions, operating procedures (both technical and regulations), ham aid, code and theory, for this upcoming year. At the Danville Hamfest September 6th, an emergency communications forum was held by W9QBH, Illinois SEC. Seven counties were represented by their ECs. Intercounty frequencies were reviewed and procedures were discussed as to how to design a simulated emergency test for individual areas. W9HLX was presented his appointment, EC of Christian County, at the forum. Congratulations go to the following emergency coordinators for their recent appointment: WB9RGA Adams County, W9HLX Christian County, WD9FDB Jefferson and Marion Counties, KA9BYB Macon County, WD9GMZ McHenry County, W9KPT Sangamon County, WB9HLC Union County, KA9GGU Warren County. All interested hams should register with their local EC for participation in emergency communications. Sincere regrets to the family of W9BCQ who lost a fine operator on August 9th. (July) ILN QTC 173 and 58 sessions. Traffic: (Aug.) W9HOT 356, W9JIJ 234, W9OK 154, KB9X 141, K9BVE 116, WB9JSR 98, W9TLU 86, KN9BAM 68, K9EHP 54, W9KR 44, WB9QFO 34, WB9WGD 25, W9LNQ 22, KA9BYB 20, W4IZI 20, WD9HZF 12, WD9EED 8, WD9EBQ 2, W9SSP 1.

INDIANA: SCM, Bruce Woodward, W9UMH — SEC: W9UMH. STM: W9JUJ. NMs: ITN W9QYY, OIN WD9GXW, ICN N9AEI, VHF W9PMT, IWN K9DCX, IPN W9DLF.

Net	Freq.	Time/UTC/Daily	QIN	QTC	QTR	Sess.

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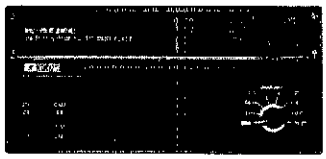

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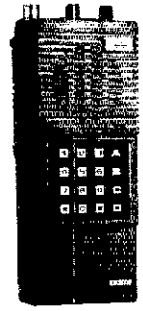

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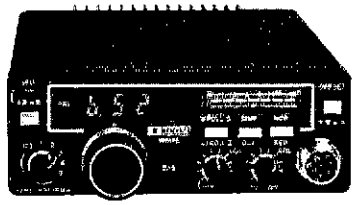

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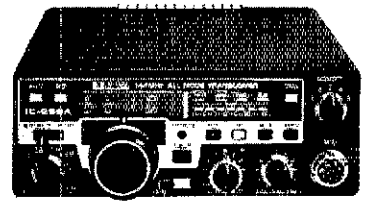

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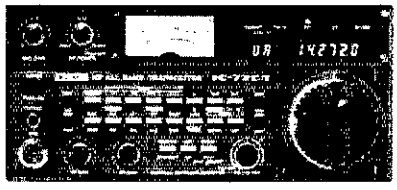

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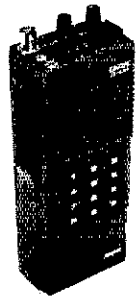

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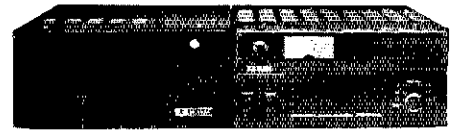

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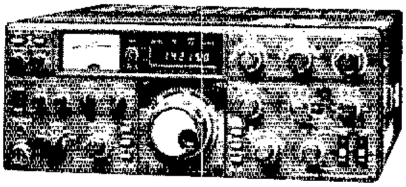

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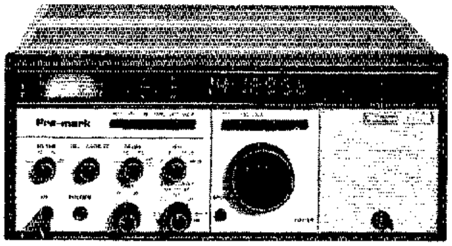

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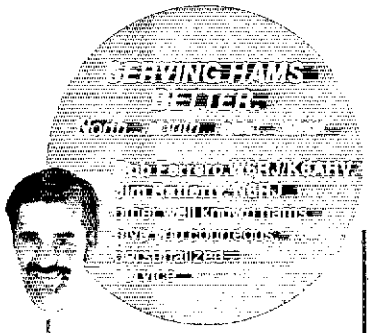

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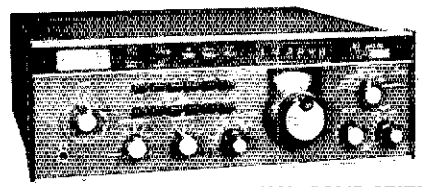

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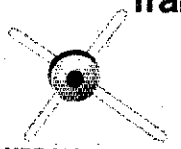

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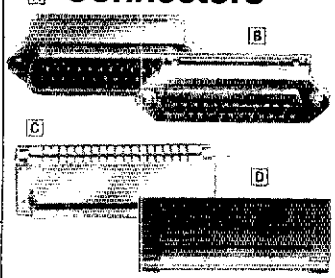

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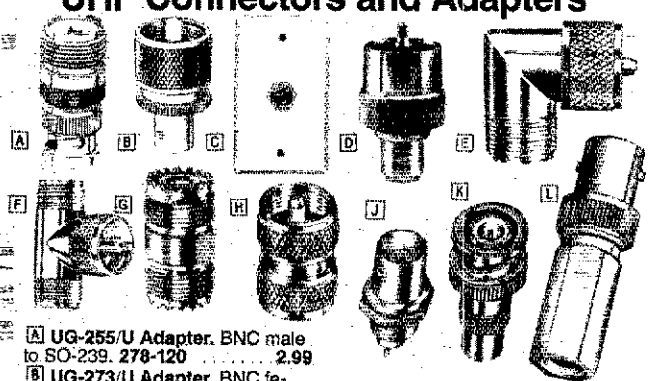

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J Female BNC. 278-105 ..... **1.59**

K Solderless Male BNC. For RG58/U cable. **278-103** **2.29**
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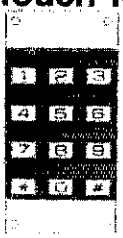

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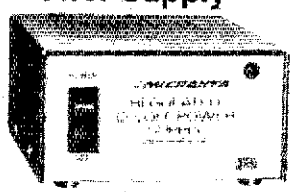

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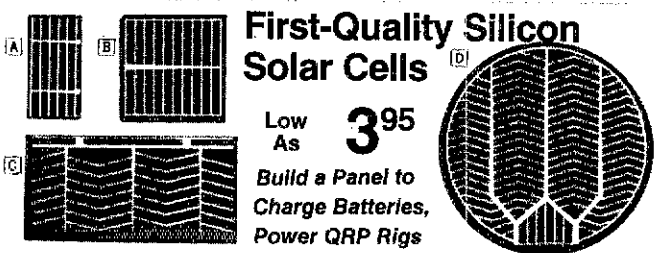

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IPN	3910	2130	1050	197	877	31
IWN	3910	1315	1361		432	31

Hoosier vhf nets reports: QNI 5858, QTC 259. Bulletins 28, QTR 6377 for 27 nets. 9RN QNI: W9JUJ W9QLW W9EI WB9UYU WD9GXW K9SFQ N9ACE WA9QCF N9AEI KI9R N9HZ W9XD K9WWJ. QTC 478 in 1215 minutes. D9RN QNI: W9JUJ WB9MIK W9DLF K9KTB K9CGS. QTC 384 in 61 sessions. CAND QNI: W9DLF, W9JUJ. QTC 1010 in 31 sessions. Silent Keys: WA9OAD W9EVK W9NTA K7NHK W9OSG W9GRN. Appointments: WB9CVU EC Bartholomew County; WB9RVN OBS. Indiana radio clubs by counties: Marshall — Marshall County ARC, K9ILU, pres.; Martin — none; Miami — Miami County ARC, K9SBW, pres.; Monroe — Bloomington ARC, K9DIY, pres.; Bloomington's Best System, K9KTH, pres.; Indiana University ARC, KB9HF, pres.; Montgomery — Sugar Creek Repeater Assn., N9BGB, pres.; Morgan — Morgan County ARC, K9JKJ, pres.; Newton — none; Noble — 21 Repeater Club, N9BCP, pres.; Ohio, Orange, Owen, Park, Perry none. We are pleased to hear W9URQ as NCS. He, like many of us, has some concern about net dicipline and procedures. It's a case of putting your time where your concerns are. The new ARRL Net Directory says it well. Our best wishes for a speedy and complete recovery go to the XYLs of K9WG and KB9UU, both recovering from recent surgery. Congratulations to all clubs who have started their fall Novice classes. A big pat on the back to all instructors. The Tippecanoe County Hamfest was a great success this year. Thanks to KC9C WB9TIB K9YLA and others for their hospitality. Sorry I did not make W9ASX's open house. N9AJM is the net manager of the Marion County ARES Net. Traffic: (Aug.) W9JUJ 1767, W9FC 273, K9KTB 171, K9FZX 170, WB9UYU 168, W9QLW 156, K9SFQ 144, W9QYY 136, W9EI 122, WD9GXW 113, WA9QCF 88, WB9WRC 88, K9DCX 71, W9XD 64, KA9EIZ 63, W9WKM 50, N9AEI 47, WD9ART 40, W9PMT 39, KI9R 35, W9DLF 34, WB9ZQE 31, W9WEI 30, W9URQ 29, WB9AWI 23, K9WWJ 23, W9UEM 22, WB9YAY 21, N9PS 20, W9RTH 20, N9AST 19, WA9OHX 19, W9QWI 15, WA9OKK 13, WD9DWD 12, KG9K 12, N9CDQ 11, WA9KWH 11, W8LKU 11, N9CBC 8, WB9AJY 7, K9DIY 7, K9OUP 7, W9DKP 6, N9BLK 5, N9BJX 5, KC9C 5, W9UPI 5, WA9JNC 4, W9BDP 2, WA9PKL 2, KB9WI 2, WD9CIV 1. (July) WA9KWH 19, KB9WI 3, WD9CIV 2.

WISCONSIN: SCM, Roy Pedersen, K9FHI — SEC: W9OAK. STM: K9UTQ. BWN 3985 1115Z QNI 1101, QTC 1242 WB9YPY. BEN 3985 1700Z QNI 705, QTC 193 WB9ESM. WSBN 3985 2200Z QTC 407 WD9ESZ. WNN 3722 2300Z QNI 215, QTC 43 KA9HPQ. WSSN 3845 M-F 2330Z QNI 87, QTC 23 N9BYK. WIN/E 3662 0000Z QNI 285, QTC 154 W9YCV. WIN-1 3662 0300Z QNI 291, QTC 125 K9LGU. EXPO 3925 1701Z QNI 406, QTC 33 WA9NIZ. NWTN 34/94 2330Z QNI 467, QTC 52 WB9YPY. GRN BAY 72/12 2330Z (Wed) QNI 20, QTC 1 WB9NRK. KA9JGI went from Novice to Advanced, West Allis Radio Amateur Club's 1982 Midwinter Swapfest, Sat, January 9th. KA9LLN and KA9LEZ have Technician licenses. KA9LAH has General. KA9JYG KA9JYH have Advanced. AJ9P has Extra. Are your Section Net Certificates up to date? These are good for one year from date of issue to endoresement. How about your ARRL appointments? These are valid for two years from date of issuance or endorsement. Mark your calendar next July 23-25 for ARRL National Convention to be held in Cedar Rapids, Iowa. Sorry to report W9GF a Silent Key. Monitor your local repeater, you may be able to help someone looking for directions or assist someone needing law enforcement or medical help. Please, fellows and gals, I need more input from you for this column. New Novices at WB9LKC QTH — WB9WDQ KA9KJW KA9IZN have General. OBS certificate to W9IAL. WSSN certificate issued to N9BYK. BWN certificate issued to WA9FFV. W9LZQ EC for LaCrosse County, reports an emergency drill was held in LaCrosse on August 29th in conjunction with the National Weather Service with 13 amateurs participating. KE9C reports that the special event operation for the 125th anniv. of the 1st kindergarten went well, with NBC news on hand. K9UTQ and N9BYK received 9RN endorsements on WIN/L certificates. WIN/L certificates issued to KG9B and KA9HPQ. Traffic: KA9CPA 2379, WD9ESZ 426, WB9YPY 331, W9YCV 284, N9AZI 208, W9CXY 183, N9BYK 167, K9FHI 154, WD9DHF 143, K9GDF 139, AG9G 138, W9IEM 135, KA9AKG 110, WB9YPZ 108, WB9ESM 73, N9AUG 66, K9JPS 63, WA9ZTY 62, WB9NRK 60, W9IHW 58, K9LGU 56, K9AQ 43, W9SO 43, WD9BKT 42, K9VSY 41, W9UCL 40, WA9UJK 40, W9FDY 37, W9UW 37, N9BDL 35, KA9GYD 35, WD9CYT 34, N9CP 33, K9UTQ 33, WA9WYS 33, W9BKT 32, WA9YVC 31, WB9JSW 30, KG9B 29, WD9FRI 29, W9SQJ/VE3 29, KB9NG 28, K9HDF 26, KE9C 22, KA9IHR 20, W9CJE 18, K9UU 18, KA9EMF 16, KB9FM 15, KA9GBG 15, KC9CG 14, WB9ICH 12, WD9IMZ 9, KA9IKR 6, K9ANV 4.

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MINNESOTA: SCM, Helen Haynes, WBØHOX — STM: AFØO. SEC: KAØALF.

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MSN/2	0300Z	3685 kHz	117	45
MSPN/N	1710Z	3945 kHz	671	58
NSPN/E	2245Z	3929 kHz	1188	297
MNAMWXN	2315Z	3929 kHz	VACATION	
MSSN	2215Z	3710 kHz	96	4

They say that no news is good news, but I'm sure that doesn't hold true when it comes time to write this column. Summer is taking its toll. We are still hoping for things to pick up in the fall. Our sympathies to the family of WØRKS who became a Silent Key on September 4th. He will be sadly missed by his many friends in the Arlington, VA, — Washington DC area, as well as his many friends in this section. The annual ham radio demonstration at the Lake County Fair in Two Harbors didn't go as well as usual this year. If anyone can come up with an effective filter *to filter out line noise* made by the Carnival's "bumper cars", maybe next year will be a success!! If you have any suggestions in this area, contact AFØO or KAØLAH, who struggled valiantly to overcome this problem, along with several other operators or soon-to-be operators. Traffic: WAØTFC 460, KBØMB 243, WØDM 192, AFØO 108, WØHZU 98, KØJCF 85, KCØT 62, KCØZ 52, WBØVYE 51, KAØEPY 38, WAØAIN 27, NØCLS 25, WBØNZB 25, KAØJUX 19, WØRIQ 14, WØOPX 13, WBØWXU 13, KAØFSM 12, KAØIAQ 12, WDØGUX 9, NØJP 7, KØFLT 4.

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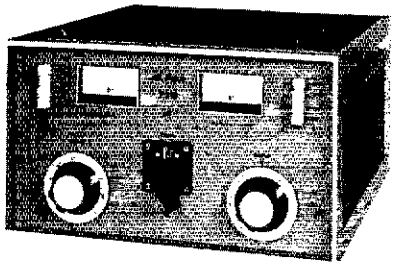

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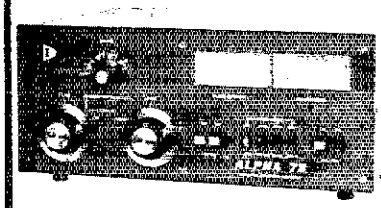

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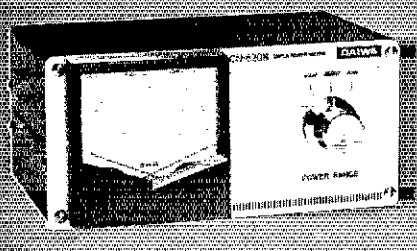
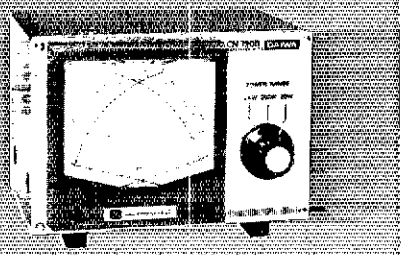
Connectors: SO-239

Model CN-620B (New 2 Kw Scale)

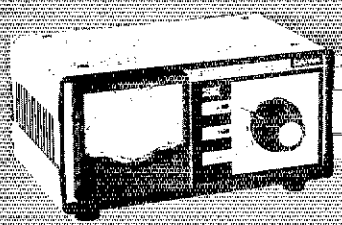


Frequency Range: 1.8—150 MHz
SWR Detection Sensitivity: 5 Watts min.
Power: 3 Ranges (Forward, 20/200/2000 Watts)
(Reflected, 4/40/400 Watts)
Dimensions: 165 x 75 x 97 mm;
6.5 x 3 x 4 in.

Model CN-720B (New 2 Kw Scale)



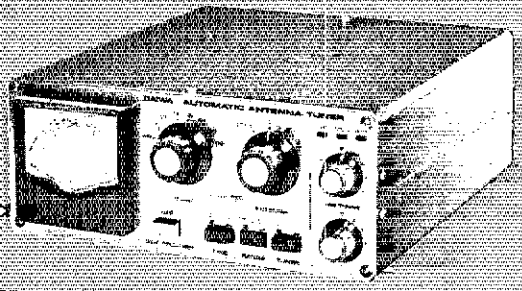
Frequency Range: 1.8—150 MHz
SWR Detection Sensitivity: 5 Watts min.
Power: 3 Ranges (Forward, 20/200/2000 Watts)
(Reflected, 4/40/400 Watts)
Dimensions: 180 x 120 x 130 mm;
7 x 4.75 x 5 in.



Model CN-630

Frequency Range: 140—450 MHz
SWR Detection Sensitivity: 5 Watts min.
Power: 2 Ranges (Forward, 20/200 Watts)
(Reflected, 4/40 Watts)
Dimensions: 180 x 85 x 120 mm;
7.12 x 3.37 x 4.75 in.

Automatic Antenna Tuner Model CNA-500

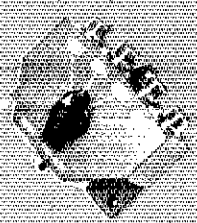


Frequency Range: 3.5—30 MHz (including WARC Bands)
Power Rating: 500 Watts PEP
Internal Dummy Load: 50 Watts/1 Minute
Impedance Matching: 15-250 Ohms to 50 Ohms Resistive
Input Power Required for Automatic Tuner: 1, 5 or 10 Watts (Set by rear panel switch)
Tune-up Time: 45 Seconds Max.
Power Requirement: 13.8 VDC/2 Amp

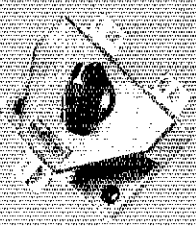
Coaxial Switches

Power Rating: 2.5 kW PEP, 1kW CW
Impedance: 50 Ohms
Insertion Loss: Less than .2 dB
VSWR: 1.1.2
Maximum Frequency: 500 MHz
Isolation: Better than 50 dB at 300 MHz; better than 45 dB at 450 MHz; adjacent terminal
Unused terminals grounded
Connectors: SO-239

4 Position/ Model CS-401



2 Position/ Model CS-201



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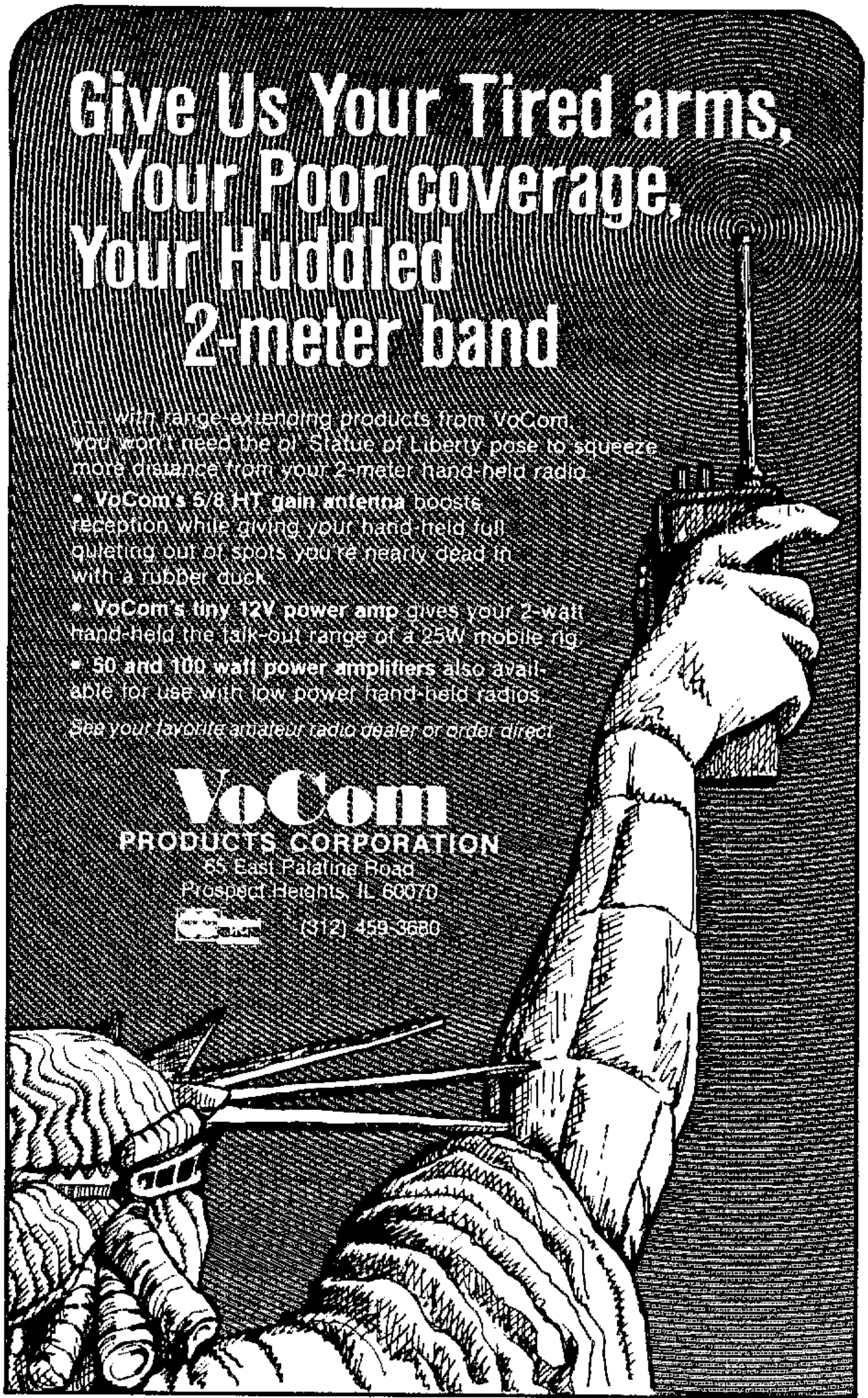

NORTH DAKOTA: SCM, Lois Jorgensen, WAØRWM — SEC: WBØTEE. OBS: WØDM. NM: WAØCRH. OO: KJØS. Congrats to those who updated: Tech KAØAPB; Adv. WØKZZ; Extra WBØTGJ KAØJUD and WØLHS. The ND QSO Party is scheduled for Jan. 23-24 so let's get our rigs and antennas tuned up — more details in QST later. YL WX Net will start again for the year on Nov. 1 on 3996.5 kHz at 1330 UTC. The KØPYZ Memorial Cornfeed was successful and the weather was cooperative for outside activities. Congrats to WDØATI and WDØEUV on their new harmonic. WAØVGJ and WAØRWM attend their son's WAØRWL graduation at Kent State University where he got Master of Business Adm. Traffic: WAØRWM 92.

SOUTH DAKOTA: SCM, Erwin C. Heimbuck, KØOTZ — It is always a sad occasion to lose a ham friend, but the untimely passing of KAØGGS was a shock to all who knew him. He will always be remembered as the enthusiastic one who pushed us to complete projects. He was very active in hf, vhf, was a builder and an experimenter and strived to bring out those activities in the rest of us. He was always ready to help anyone with any project large or small. His loss is a loss to Amateur Radio and especially to those privileged to know him. New hams: KAØHOR KAØIAL KAØLPB. Welcome aboard. Traffic: (Aug.) WDØBMR 145, KØAIE 109, WØDVB 81, WØHOJ 56, WAØVRE 52, WØKJZ 42, WBØOMF 29, WØRWE 17. (July) KØAIE 111, WDØBMR 111, WØMZI 89, WØHOJ 80, WØDVB 59, WAØVRE 50, WBØOMF 30, WØRWE 4.

DELTA DIVISION

ARKANSAS: SCM, Dale Temple, W5RXU — SEC: WB5IGF. Mockingbird Net, 3928, 2230Z M-F, WA5ZWZ Manager, 21 sessions, 524 checkins, 16 Traffic, 8 hrs 20 min. Arkansas Phone Net, 3937, 1200Z M-S, W5UAU Manager, 451 checkins, 29 Traffic, 15 hrs 8 min. OZK (cw), 3760, 0100Z, daily, W5MYZ Manager, 31 sessions, 161 checkins, 25 Traffic, 367 min. Arkansas Razorback Net, 3995, daily, KC5CE Manager, 964 checkins, 84 Traffic, 10 hrs 47 min. Arkansas needs representation on the RN5 traffic nets. CAREN club held Camp Out Petit Jean on Oct 17 & 18. In event of emergency communications needs, check your local repeater, if need is wide spread, between 1400Z & 2200Z 7237, from 2200Z to 1400Z, 3995. Traffic: WB5GQH 50, W9YCE 42, WA5UAU 23, N6AEN 21.

LOUISIANA: SCM, Jim Giammanco, N5IB — If you had trouble finding your SCM during Aug, it's because his antennas were down while a new roof was being installed. Congrats to WB5OCX on the arrival of baby girl. The False River Repeater Assn. has begun repeater operation on 146.655/055. Now is the time to register your repeaters for the new directory. Registration cards are available from ARRL or from SCM. Or send a radiogram to N5IB and it will be done for you. Comments have been running mostly negative regarding the "Plain Language" rules, with several clubs sending their response to the FCC. Traffic nets still need more people. With the return to CST and improving band conditions, why not check in occasionally and help out, especially when you have vhf outlets into traffic destinations. Don't forget hamfests in Hammond in Jan and Lafayette in Mar. Due to N5IB off the air, net and traffic reports below are abbreviated, complete totals will show next month.

Net	Freq.	Time	QNI	QTC
LAN	3615 kHz	7 & 10 P.M. Dy		
LTN	3910 kHz	6:30 P.M. Dy	62	18
LSN	3703 kHz	7:30 P.M. M-F	106	20
LRN	3087.5 kHz	6:30 P.M. Su, 8 P.M. W	12	1
LEN	3910 kHz	8:00 P.M. Su		

Traffic: (Aug.) K5TL 227, WD5FLM 138, N5BFV 108, N5RB 80, KC5SF 52, W5VMY 37, WD5CWK 27, KA5DLV 12, WB5LBR 8. (July) KA5DLV 28. (June) KA5DLV 40.

MISSISSIPPI: SCM, Paul Kemp, WB5SNB — SEC: WB5FXA. Congrats to upgrade to Adv WD5IKD. Our sympathy to the families of W5QAA and KA5EFT who became Silent Keys. N5AGV relayed vital info from Glomar Challenger at sea when the ship's radio would not get through. Correction to an upgrade in Sept, N5CIO should have been N5BIY upgrade to Extra. MSN still growing, need to graduate some of these to help on the MTN. KB5W now STM. CAND (W5KLV) sess 31 QTC 1010 MS rep 100% N5AMK W5EDT WA5OKI. DRN5 (WB5YDD) sess 31 QTC 374 MS rep 97% W5s BEV EDT K5ONE WA5OKI WB5s HAS SQL KD5P KB5W N5AMK. MTN (K5OAF) sess 31 QNI 90, QTC 26. MSBN (WS5EYM) sess 31 QNI 1964 QTC 39. MN (WB5RMW) sess 31 QNI 403 QTC 9. MSN (KA5GGG) sess 21 QNI 155 QTC 5. CAEN (KA5AGD) sess 5 QNI 119 QTC 4. GSEN (KB5W) sess 22 QNI 431 QTC 27. RACES (K5GEI) sess 5 QNI 214 QTC 0. Traffic: KB5W 169, K5OAF 118, WA5OKI 24, WD5EYM 12, KC5LK 7, KA5GGG 5, WB5HAS 2.

TENNESSEE: SCM, John C. Brown, NO4Q — STM: K4YOL. SEC: W4NZW. The Cedars of Leabnon Hamfest is now history. As usual, the fest was bigger and better than in previous years. The hamfest this year was sponsored by the Short Mountain Repeater Club. Will be looking forward to next year for another fine hamfest. The big news is the continued flow of upgrades: WD4NJR now NQ4Y, WD4SIG no change but to Extra, KC4KV now NQ4W after more than 25 years to Advanced class. I am sure that there are many more but in any case a big FB congrats to all. Continue the fine work. Looks like the 4th call area is fast running out of present cycle of calls. Section traffic for the month: cw — 62 sessions, QNI 630, QTC 255; phone — LF QNI 3723, QTC 250, sessions 113; vhf — QNI 2073, QTC 582, sessions 85. Honor Roll: TNCW — W4DDK KY4L NO4Q & W4WXH. TSN — NG4J WA4LXP N4EFB N4DZW KA4PWU WA4CMS KA4RJC KY4L WB4YSN WD4KCW KA4ODX KA4OVE. Not a record but a very fine showing none the less. TSN will be running their contest for months of Dec. & Jan. and it looks like there will be some kind of activity to behold there. Also their Top Twenty Club. Some of you old timers can surely learn something from that net. K4CMY K4KTC K4RCE K4ICH W5LVC WD4ARY WA4ZEL WD4CTP K4KBD WB4AZG WD4NZS all worked Sequayah long alert. The station activity reports for

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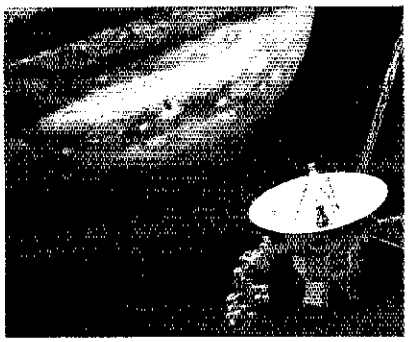

Pictures from Mars, Saturn and Jupiter.

Within seconds after these photographs were received on Earth from Voyager I and II, SSTV'ers all over the world were viewing and recording them on their own SSTV sets. As space exploration continues to expand, this phase of SSTV activity will become increasingly exciting.

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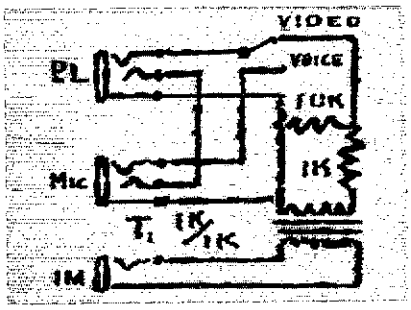
Ever try to describe a schematic or new circuit design by voice. With SSTV you can transmit pictures of the designs and changes you are making on your station and equipment, and they can be photographed on the receiving end. It's an ideal communication system for experienced hams involved in technical experimentation.



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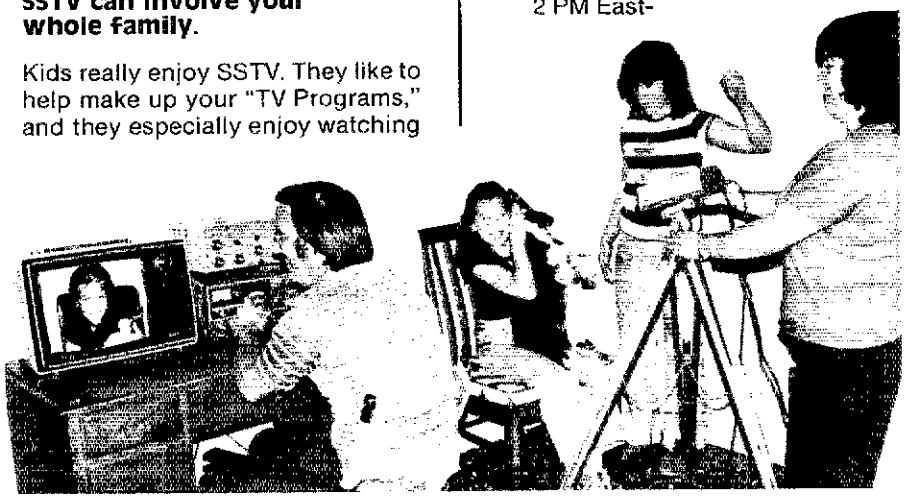

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*Logs to be verified

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1981 MIDWEST VHF CONFERENCE
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ANTENNA MEASURING CONTEST
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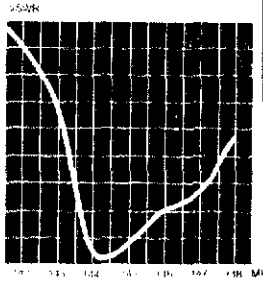
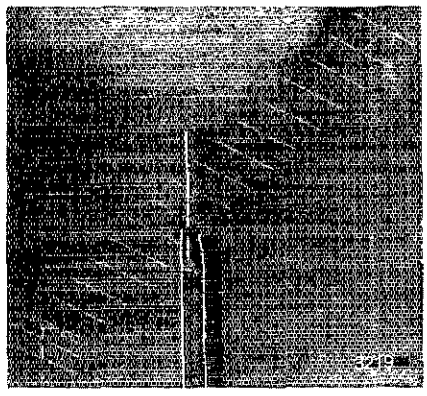
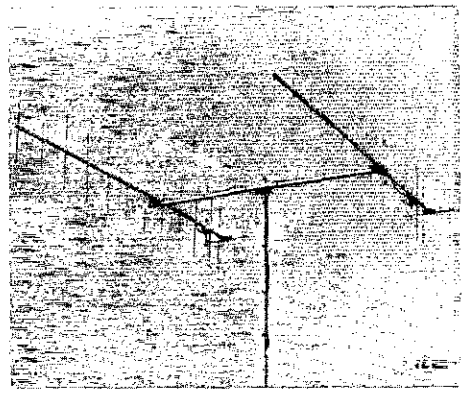


Boomer

6 and 2 meter High Performance Yagis



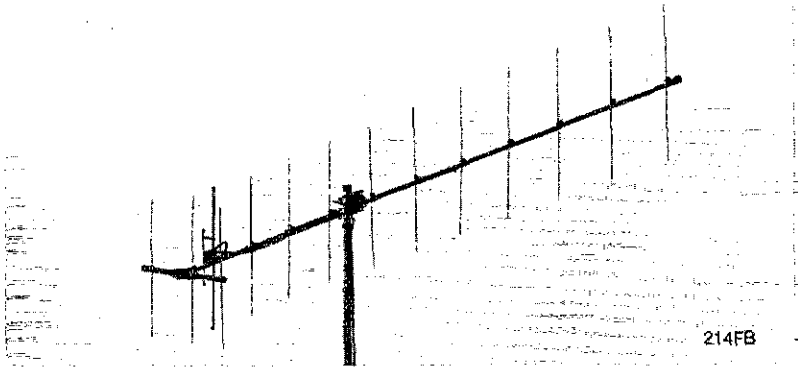


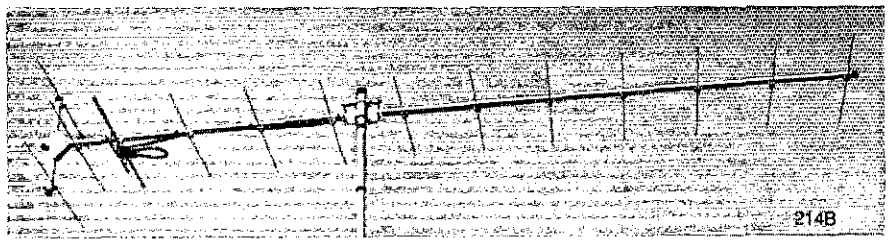
Two Meter Boomers

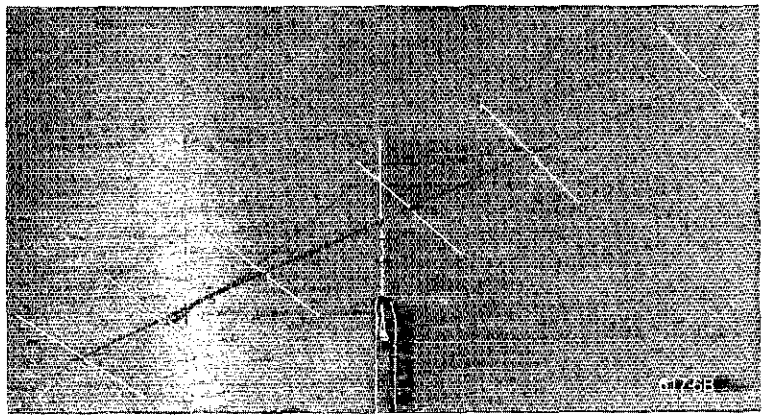
Whether you have the space for the 3.2 λ 32-19 or the compact 2.2 λ models, two meter Boomers are your best choice. They offer the maximum gain available for their boom length (See NBS no. 688). They feature trigon reflectors for additional front-to-back ratio and clearer patterns. All stainless steel 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) (kg)	12 5.44	8 3.63	8 3.63	22 9.98	26 11.79
Length (ft) (m)	22 6.71	15 4.57	15 4.57	15 4.57	34 10.36
Longest element (in) (cm)	40¾ 102.5	40¾ 102	39½ 100.3	39½ 100.3	113¾ 289
Turning radius (ft) (m)	11 3.35	7.5 2.29	7.5 2.29	9.5 2.90	17.7 5.39
Windload (sq ft) (sq m)	3.5 .33	1.7 .16	1.7 .16	4.0 .37	4.8 .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	2x214-B	2x32-19	2x617-6B	4x214-B	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) (m)	10 3.05	12 3.66	34 10.36	10 3.05	12 3.66
Horiz (ft) (m)	— —	— —	— —	10 3.05	14 4.27
Wt approx (lb) (kg)	18* 8.16	36* 11.79	62* 28.12	69 31.30	97 44.00
Turn radius (ft) (m)	9 2.74	11 3.35	18 5.49	9 2.74	13'4" 4.06
Wind Area (Ft2) (sq m)	3.4* .32	7.0* .65	9.6* .89	8.3 .77	15.2 1.41

*Support mast not included

The nominal dimensions and weights listed are for complete arrays. The antennas and stacking kits must be ordered separately

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The Antenna Company
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month is still growing. Traffic: NG4J 533, W4WXH 348, W4ZJY 247, N4EAM 164, WB4BKF 133, W4OGG 114, K4VM 71, WD4SIG 54, W4MRD 43, NQ4Y 42, K4WOP 41, W4DDK 41, W4CSY 40, KY4L 25, K4YOL 23, KA4OXT 19, W4NZW 18, W4RUW 18, W4TYV 16, K4ON 13, N4DZW 11, W4PEP 11, KA4BSG 8, WA4GLS 8, W4PSN 8, W4EWR 5, WB4YPO 5, NM4W 3, W4DPO 2.

GREAT LAKES DIVISION

KENTUCKY: SCM, Dave Vest, KZ4G — STM: KA4GFU. SEC: N4EEL.

Net	QNI	QTC	Net	QNI	QTC
KRN	463	36	MKPN	990	95
KTN	1051	155	KNTN	477	146
KYN	256	107	KSN	206	76
KEN	104	6	KPON	65	5
BARES	119	10	CARN	194	23
PAEWN	326	36	TSTMN	106	31
4ARES	41	1	5ARES	60	9
11ARES	43	5	SEKEN	35	0
CCEN	49	3			

D9RN/DCAN are 100%. New appts: OO & OVS — WA4JQS; EC — K4AXE WD4HAD. New repeater in Pike County, 145.19, has good East KY coverage. Upgrade to Advanced KD4UW. Congrats to KB4OZ, chosen best net manager of 1981. W4OYI is division vice director. KA4MTX is pres. of WTARC. Traffic: WB4NWS 123, KA4MZY 122, KC4VB 108, KC4AV 94, KB4OZ 93, WD4IYI 91, K4ZWB 90, KA4GFU 88, KS4V 84, K4JLX 82, KC4XM 72, WD4BSC 56, KZ4G 53, KC4WN 48, WA4SWF 42, WA4AVV 36, W4PKX 36, KA4SAA/N 34, WA4JTE 30, WA4GAL 29, WB4NHO 28, N4EZE 23, K4ZWB 21, WA4AGH 20, WA4EBN 20, KD4SN 19, KA4MBF/N 18, WD4CJQ 16, WD4CQF 14, N4EEL 13, WB4UQI 13, N4FFS 11, NN4H 11, K4AVX 10, WA4JAV 10, KA4GBZ 9, KA4BCM 8, WD4EKZ 8, WA4UIV 8, W4CDA 7, WA4UQA 6, WA4IGD 5, WD4RWU 5, N4GD 4, WA4YPO 4, K4HOE 2.

MICHIGAN: SCM, James R. Seeley, WB8MTD — ASCM: WA8DHB. SEC: WA8EFK. STM: AF8V. DECs: KC8DN K8RCT W8VWY. NMs: KA8DEZ WA8DHB K8LNE K8KMQ WD8LRT WD8NKT WA8PIM W8SCW WD8RNQ WB8YDZ WB8ZIY K8ZJU.

Net	Freq.	Time/Day	QNI	QTC	Sess.
MITN*	3953	1900 Dy	756	443	31
QMN*	3663	1800 Dy**	852	353	62
GLETN	3932	2100 Dy	1351	231	31
MACS*	3953	1100 Dy**	639	160	31
UPN*	3922	1700 Dy	638	95	36
MNN*	3722	1730 Dy**	378	86	61
WSSBN	3935	1900 Dy	563	37	31
BR	3930	1730 M/S	353	26	22
MEN	3930	0900 Su	181	9	5
VHF nets	8 reports		319	17	31

* NTS nets. Times local. **QMN late net, 2200; MNN late net, 2000; MACS Su 1300, 3932 kHz is MI emergency frequency. Traffic workshop Su 3953 kHz, 1600. ARES net Su 3932 kHz, 1730. UP ARES Thur 3922 kHz, 1800. 00 reports: K8JH AC8Y. OBS report: K8NKB. Silent Keys, with deep regret: W8HCW WB8DMB. New EC appointment: N8CHI, Mason County. Upgrades: to Tech, KA8DSJ KA8HDV; to General, WD8RKM; to Advanced, N8AOA N8AMU WD8RNQ; to Extra, KI7E. New ORS: KA8LHJ. ARPSC workshop in Lansing was a success by any measure. The Shiawassee County hams won a big one on Aug. 27. Part of a proposed county land use ordinance would have severely limited tower heights for any personal use, including amateur. The Shiawassee group mounted a massive campaign of protest — letters, personal visits, support from ARRL, ARC, NWS, etc. The zoning commission meeting on the 27th was a triumph for our side. Reasoned, logical, peaceful, well-organized protest did the job: the entire section pertaining to tower heights was thrown out. Good going, gang, and a fine example set for others to follow. Just learned (via W1AW, ARRL Bulletin NR 92) that I have been declared elected to be your SCM for another term, beginning Jan. 1 next. Thanks, gang — and believe it or not, Karen thanks you too! I pledge at least as much support and representation as I've given so far; more, if possible — and every bit as much fun! Michigan Traffic Awards (20 or more public originations): KB8GT K8SB. BPL: WD8LRT AF8V. Traffic: (Aug.) AF8V 572, WD8LRT 405, KA8CPS 324, WD8IBY 302, WB8MTD 275, WB8ITT 268, WB8YDZ 247, KB8MX 212, KA8AID 157, K8KMQ 154, WA8PIM 136, K8SB 130, WA8DHB 107, WD8MJB 107, WB8YRY 101, WD8RNQ 96, K8GXV 93, KC8K 88, KB8GT 86, W8IHX 82, WD8OEP 82, W8VIZ 73, WD8RHU 64, WD8EIB 61, AK8M 60, W8VPW 59, KC8DC 57, KA8DEZ 57, WA8TAQ 56, W8CUP 49, KA8LHJ 48, K8LNE 45, N8BJD 41, W8JXJ 40, WB8TTA 38, W8YIQ 38, N8BNC 37, WD8JRT 37, KA8HFS 36, WD8OSE 36, WB8SYA 35, K8OCP 28, KA8ICK 27, W7LVB 25, WB8YWA 25, KA8IWW 23, WD8RWR 23, WB8ZGP 23, KA8ECT 22, K8RV 22, WD8NKT 21, W8LDS 20, WB8HPZ 19, KI8Q 19, K8UPE 19, WD8JQL 14, W8JUP 12, N8CTI 10, WD8IXZ 10, WB8DJS 8, W8SCW 8, K8ZJU 8, KE8X 7, WD8IYA 6, KJ8T 6, WA8YBP 6, WA8AXF 5, K8DD 4, WD8BEN 3, WD8LIP 3, W8WVL 1. (July) WA8TAQ 45, KA8IWW 37, WB8SYA 35, K8ZJU 34, WB8HPZ 14.

OHIO: SCM, Allan L. Severson, AB8P — Asst SCM: W8MOK. SEC: K8AN. STM: K8OZ. NMs: W8EK KF8J WB8JGW WD8KFN WD8QMP WB8YGW.

Net	QNI	QTC	Sess.	Time (local)	Freq.
BN	503	583	62	6:45/10 P.M.	3.577
BNR	123	57	30	6 P.M.	3.605
ONN	62	42	31	6:30 P.M.	3.708
OSN	266	255	31	6:10 P.M.	3.577
OSSBN	2610	2393	93	10:30 A.M. 4:15 & 6:45 P.M.	3.9725
O8MN	454	67	31	9:00 P.M.	50.160

Good news from Cincinnati: looks like the next Ohio Convention is planned for February 27 and 28. This will fill a woeful mid-winter void for us cold weather amateurs. Thus, the amazing feats of organizational magic will continue. Watch here for more details and specifics. I was a most fortunate ham this weekend. For the third straight year I spent four days assisting with communications for the annual Cleveland International Air Show, the World's oldest air fest. I say "fortunate" because I could again observe a nucleus of experienced amateurs bringing order out of near chaos caused by weather, divergent nationalities and objectives, and all the other problems and crises attending any event of this magnitude. In addition, newer amateurs and those with no show experience were absorbed and trained to function like veterans. A tremendous "Well done!" to all and to those considerate area amateurs who allowed "their" frequencies to be used with no interference. Appointments: KC8CJ to EC, Perry County. Upgrades: WB8MRL and WD8PEI to Advanced.

The Standard for Comparison

New AZDEN® PCS-300

2-M Handheld FM Transceiver

6 MHZ COVERAGE • 142 to 148.995 MHz in 5 kHz steps, including CAP and MARS.

IDEAL SIZE & WEIGHT DISTRIBUTION • 2.3" high by 2.5" wide by 1.8" deep, 1.4 lbs.

MICROCOMPUTER CONTROL • All frequency operations are done by means of a microcomputer keyboard with acquisition tone.

LCD DISPLAY WITH TIMED LAMP • Draws almost no current. Lamp times out automatically after 20 seconds.

16 KEY AUTOPATCH • Keyboard works as a Touchtone® pad while transmitting.

PL TONE SWITCH • Actuates optional subaudible tone module.

PROGRAMMABLE "ODD SPLITS" • Transmit and receive on any possible frequency combination. Reset in seconds.

9 CHANNEL MEMORY WITH SCAN • Eight addressable channels and one externally accessible up/down channel retain frequency and standard offset. Backup drain is a scant 10 microamps!

AUTOMATIC INCLUSIVE OR EXCLUSIVE PROGRAMMABLE BAND SCAN • Limits may be reset in seconds. Scans either inside or outside the limits.

BUSY AND VACANT SCAN MODES • Scan for either an occupied or empty frequency.

KEYBOARD LOCK • Prevents accidental change of frequency or scan status.

TRANSMIT LOCK • Avoids unintentional transmission.

DIGITAL S/RF AND MEMORY ADDRESS METER • Shows relative signal strength on receive, relative power on transmit. Also shows memory address.

HIGH OR LOW POWER • 3 watts high, 1 watt low. Low power is continuously adjustable from 0.5 to 3 watts.

TRUE FM • Not phase modulation – Unparalleled audio quality.

AUTOMATIC FRONT END TUNING • RF stage is varactor tuned for superior sensitivity and selectivity.

RUGGED COMMERCIAL-GRADE MODULAR CONSTRUCTION • The PCS-300 is built to take years of the toughest operating conditions.

SUPERIOR RECEIVER • Sensitivity is 0.25 uV for 20 dB quieting, 0.2 uV for 12 dB SINAD.

BNC ANTENNA CONNECTOR •

STANDARD ACCESSORIES • Heavy duty NICAD battery pack (500 mAh), belt clip, hand strap connector, flexible rubber antenna, earphone, ac charging unit, and special stand for table-top operation.

OPTIONAL ACCESSORIES • Deluxe leather case, mobile dc charging cord, external speaker/microphone, and PL tone module.

MANUFACTURER: AZDEN — JAPAN PIEZO CO., LTD. No. 12-17, 1-chome, Kami-Renjaku, Mitaka, Tokyo, Japan. Telex: 781-2822452

EXCLUSIVE DISTRIBUTOR: AMATEUR-WHOLESALE ELECTRONICS, INC. 8817 S.W. 129 Terrace, Miami, Florida 33176 Telephone (305) 233-0651 Telex: 80-3056 Toll-free (800) 327-3102

TS-130S/V

"Small wonder"...speech processor, N/W switch, IF shift, digital display

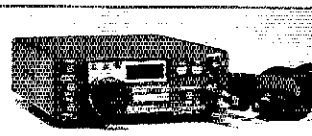
The compact, all solid-state HF SSB/CW mobile or fixed station TS-130 Series transceiver covers 3.5 to 29.7 MHz, including the three new bands.

TS-130 SERIES FEATURES:

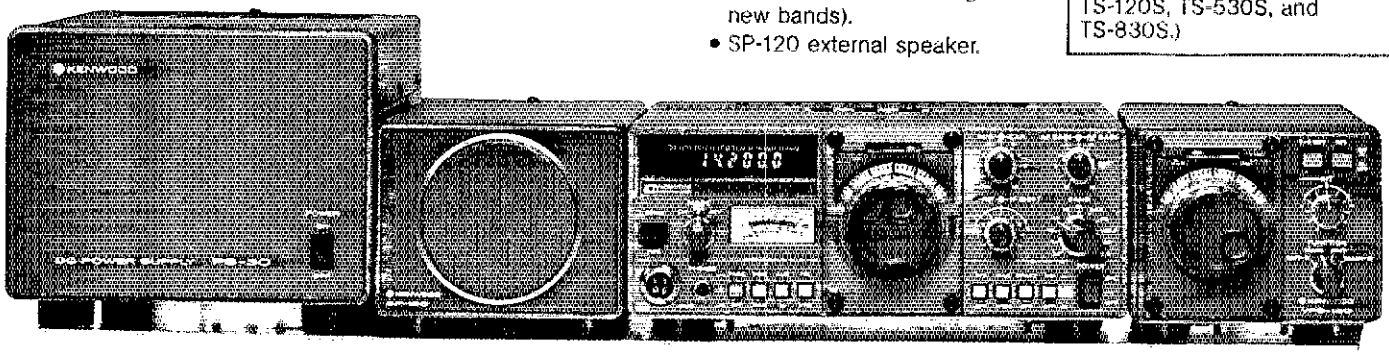
- 80-10 meters, including the new 10, 18, and 24-MHz bands. Receives WWV.
- TS-130S runs 200 W PEP/160 W DC input on 80-15 meters and 160 W PEP/140 W DC on 12 and 10 meters. TS-130V runs 25 W PEP/20 W DC input on all bands.
- Built-in speech processor.
- Narrow/wide filter selection on both CW (500 Hz or 270 Hz) and SSB (1.8 kHz) with optional filters.
- Automatic selection of sideband mode (LSB on 40 meters and below, and USB on 30 meters and above). SSB REVERSE switch provided.
- Built-in digital display.
- Built-in RF attenuator.
- IF shift (passband tuning).
- Effective noise blanker.

OPTIONAL ACCESSORIES:

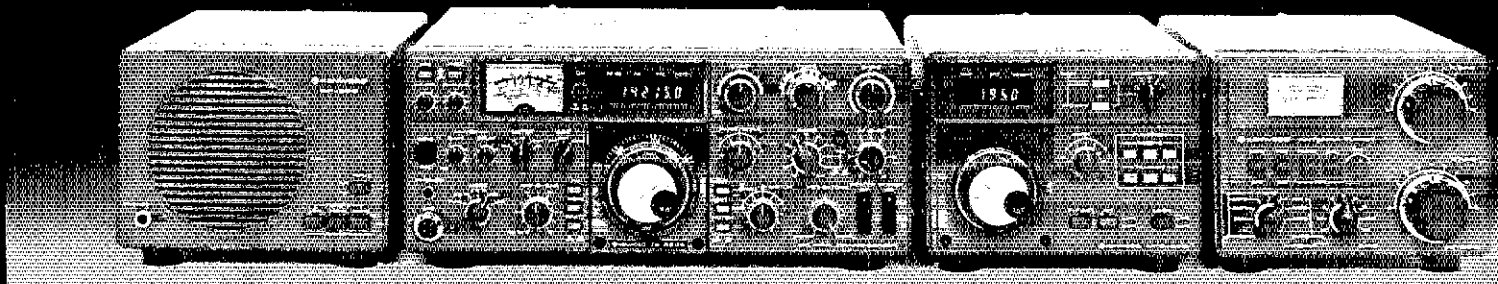
- PS-30 base-station power supply.
- YK-88C (500 Hz) or YK-88CN (270 Hz) CW filter.
- YK-88SN (1.8 kHz) narrow SSB filter.
- AT-130 compact antenna tuner (80-10 meters, including three new bands).
- SP-120 external speaker.
- VFO-120 remote VFO.
- MB-100 mobile mounting bracket.
- PS-20 base-station power supply for TS-130V.



Optional DFC-230 Digital Frequency Controller
Frequency control in 20-Hz steps with UP/DOWN microphone (supplied with DFC-230). Four memories and digital display. (Also operates with TS-120S, TS-530S, and TS-830S.)



PS-30 SP-120 TS-130S VFO-120



SP-230 TS-830S VFO-230 AT-230

TS-830S

"Top-notch"...VBT, notch, IF shift, wide dynamic range

The TS-830S has every conceivable operating feature built-in for 160-10 meters (including the three new bands). It 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:

- LSB, USB, and CW on 160-10 meters, including the new 10, 18, and 24-MHz bands. Receives WWV.
- Wide receiver dynamic range. Junction FETs in the balanced mixer, MOSFET RF amplifier at low level, and dual resonator for each band.
- Variable bandwidth tuning (VBT). Varies IF filter passband width.
- Notch filter (high-Q active circuit in 455-kHz second IF.
- IF shift (passband tuning).
- Built-in digital display (six digits, fluorescent tubes), analog dial, and display hold (DH) switch.
- Noise-blanker threshold level control.
- 6146B final with RF negative feedback. Runs 220 W PEP (SSB)/180 W DC (CW) input on all bands.
- Built-in RF speech processor.
- Narrow/wide filter selection on CW.
- SSB monitor circuit to check transmitted audio quality.
- RIT (receiver incremental tuning) and XIT (transmitter incremental tuning).

OPTIONAL ACCESSORIES:

- 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/antenna switch. 160-10 meters, including three new bands.
- YG-455C (500 Hz) or YG-455CN (250 Hz) CW filter for 455 kHz IF.
- YK-88C (500 Hz) or YK-88CN (270 Hz) CW filter for 8.83 MHz IF.
- KB-1 deluxe heavyweight kno
- (VFOs for TS-830S, TS-530S, TS-130 Series, and TS-120S are compatible with all four series of transceivers.)

KENWOOD

TRIO-KENWOOD COMMUNICATIONS
1111 West Walnut, Compton, California 90220

TR-2500

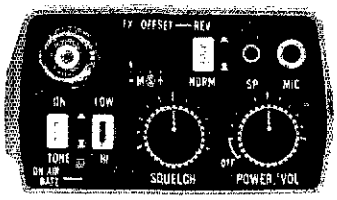
BIG performance, small size, smaller price!

The TR-2500 is a compact 2 meter FM handheld transceiver featuring an LCD readout, 10 channel memory, lithium battery memory back-up, memory scan, programmable automatic band-scan, Hi/Lo power switch and built-in sub-tone encoder.

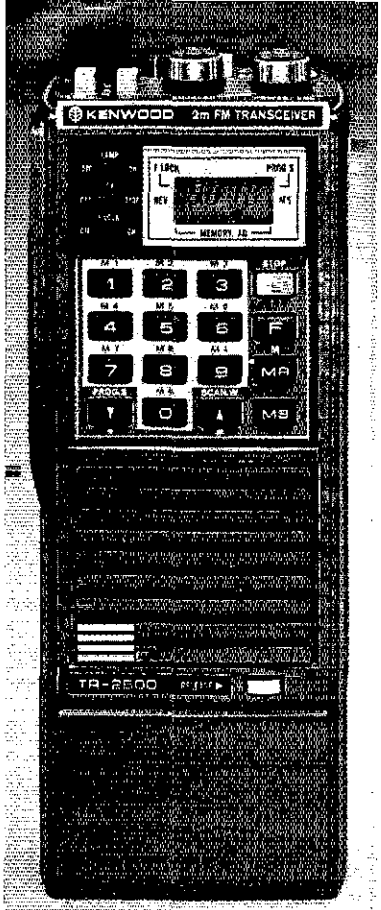
TR-2500 FEATURES:

- Extremely compact size and light weight 66 (2-5/8) W x 168 (6-5/8) H x 40 (1-5/8) D, mm (inches), 540 g, (1.2 lbs) with Ni-Cd pack.
- LCD digital frequency readout, with memory channel and function indication.
- Ten channel memory, includes "M0" memory for non-standard split frequencies.
- Lithium battery memory back-up, built-in, (estimated 5 year life) saves memory when Ni-Cd pack discharged.
- Memory scan, stops on busy channels, skips channels in which no data is stored.
- UP/DOWN manual scan in 5 KHz steps.

CONVENIENT TOP CONTROLS



- 2.5 W or 300 mW RF output. (HI/LOW power switch.)
- Programmable automatic band scan allows upper and lower frequency limits and scan steps of 5 KHz and larger (5, 10, 15, 20, 30 KHz...etc) to be programmed.
- Built-in tuneable (with variable resistor) sub-tone encoder.
- Built-in 16 key autopatch encoder.
- Slide-lock battery pack.
- Repeater reverse operation.
- Keyboard frequency selection across full range.
- Extended frequency coverage; 143.900 to 148.995 MHz in 5 KHz steps.



- Optional power source, MS-1 mobile or ST-2 AC charger/ power supply allows operation while charging. (Automatic drop-in connections.)
- High impact plastic case.
- Battery status indicator.
- Two lock switches for keyboard and transmit.

STANDARD ACCESSORIES:

- Flexible rubberized antenna with BNC connector.
- 400 mAH heavy-duty Ni-Cd battery pack.
- AC charger.

OPTIONAL ACCESSORIES:

- ST-2 Base station power supply and quick charger (approx. 1 hr.).
- MS-1 13.8 VDC mobile stand/ charger/power supply.
- TU-1 Programmable "DIP switch" (CTCSS) encoder.
- SMC-25 Speaker microphone.
- LH-2 Deluxe top grain cowhide leather case.
- PB-25 Extra Ni-Cd battery pack, 400 mAH, heavy-duty.
- BH-2 Belt hook.
- WS-1 Wrist strap.
- EP-1 Earphone.
- RF power amplifier. (To be announced.)

TR-7850

40 W, 15 memories/offset recall, scan, priority, autopatch (DTMF)

Kenwood's remarkable TR-7850 2-meter FM mobile transceiver provides all the features you could desire, including a powerful 40 watts output. A 25 watt version, the TR-7800 is also available.

TR-7850 FEATURES:

- 40 watts output, with selectable high or low power operation.
- 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 non-standard offset. M0...priority channel, with simplex ±600 KHz or non-standard offset operation.

- Internal battery back-up for memories. Requires four AA Ni-Cd batteries, (not supplied).
- Extended frequency coverage, 143.900-148.995 MHz in 5 or 10 KHz steps.
- Priority alert, Beep alerts operator when signal appears on priority channel.
- Built-in autopatch encoder (DTMF). All 12 plus four additional DTMF signaling tones. (With simultaneous push of REV switch.)
- Autoscan of memories and entire band. Scan resumes automatically.
- Front panel keyboard.
- Compact size.
- UP/DOWN manual scan of entire band and memories, using UP/DOWN microphone (supplied).
- Repeater reverse switch.
- Separate digital displays for frequency and memory channel.
- LED S/RF bar meter.
- Tone switch.

Matching accessories for fixed station operation:

- KPS-12 power supply (for TR-7850)
- KPS-7 power supply (for TR-7800)

SP-40

Compact mobile speaker
Only 2-11/16 W x 2-1/2 H x 2-1/8 D (inches)
Handles 3 watts of audio

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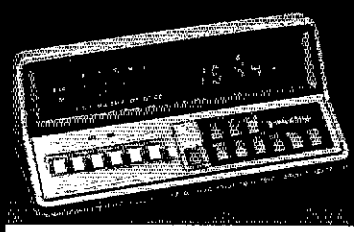


Digital world clock with two 24-hour displays, quartz time base

The HC-10 digital world clock with dual 24-hour display shows local time and the time in 10 preprogrammed plus two programmable time zones.

R-600

"Now hear this"... digital display, front speaker, easy tuning

The R-600 is a high performance, general coverage communications receiver covering 150 kHz to 30 MHz in 30 bands, at an affordable price. Use of PLL synthesized circuitry provides high accuracy of frequency with maximum ease of operation.

R-600 FEATURES:

- 150 KHz to 30 MHz continuous coverage, AM, SSB, or CW.
- 30 bands, each 1 MHz wide, for easier tuning.
- Five digit frequency display, with 1 KHz resolution.
- 6 kHz IF filter for AM (wide), and 2.7 kHz filters for SSB, CW and AM (narrow).
- Up-conversion PLL circuit, for improved sensitivity, selectivity, and stability.
- Communications type noise blanker eliminates "pulse-type" noise.
- RF Attenuator allows 20 dB attenuation of strong signals.
- Tone control.
- Front mounted speaker.
- "S" meter, with 1 to 5 SIMPO scale, plus standard scale.
- Coaxial, and wire antenna terminals for 2 MHz to 30 MHz. Wire terminals for 150 KHz to 2 MHz.
- 100, 120, 220, and 240 VAC, 50/60 Hz. Selector switch on rear panel.
- Optional 13.8 VDC operation, using DCK-1 cable kit.
- Other features include carrying handle, headphone jack, and record jack.

OPTIONAL ACCESSORIES:

- DCK-1 DC Cable kit.
- SP-100 External Speaker.

R-1000

"Hear there and everywhere"... easy tuning, digital display

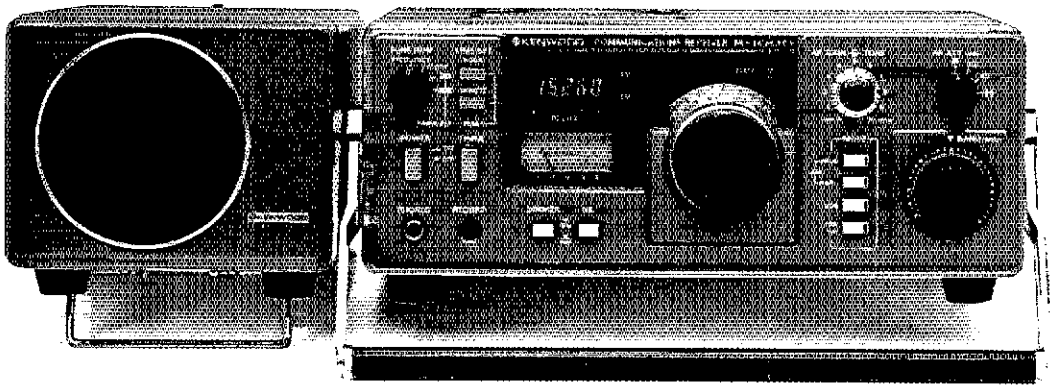
The R-1000 is an amazingly easy-to-operate, high-performance, communications receiver, covering 200 kHz to 30 MHz in 30 bands. This PLL synthesized receiver features a digital frequency display and analog dial, plus a quartz digital clock and timer.

R-1000 FEATURES:

- Covers 200 kHz to 30 MHz continuously.
- 30 bands, each 1 MHz wide.
- Five-digit frequency display with 1-kHz resolution and analog dial with precise gear dial mechanism.
- Built-in 12-hour quartz digital clock with timer to turn on radio for scheduled listening or control a recorder through remote terminal.
- Step attenuator to prevent overload.
- Three IF filters for optimum AM, SSB, CW. 12-kHz and 6-kHz (adaptable to 6-kHz and 2.7-kHz) for AM wide and narrow, and 2.7-kHz filter for high-quality SSB (USB and LSB) and CW reception.
- Effective noise blanker.
- Terminal for external tape recorder.
- Tone control.
- Built-in 4-inch speaker.
- Dimmer switch to control intensity of S-meter and other panel lights and digital display.
- Wire antenna terminals for 200 kHz to 2 MHz and 2 MHz to 30 MHz. Coax terminal for 2 MHz to 30 MHz.
- Voltage selector for 100, 120, 220, and 240 VAC. Also adaptable to operate on 13.8 VDC with optional DCK-1 kit.

OPTIONAL ACCESSORIES:

- SP-100 matching external speaker.
- HS-6 lightweight, open-air headphone set.
- HS-5 and HS-4 headphones.
- DCK-1 modification kit for 12-VDC operation.



SP-100 R-1000

HS-5

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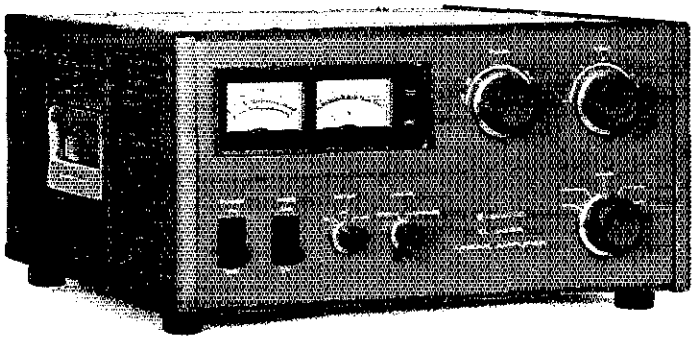


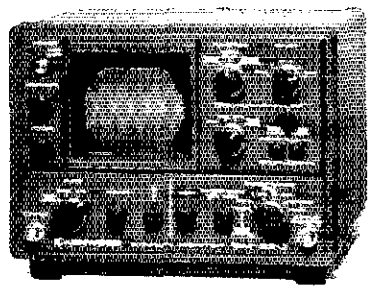
TL-922-A

Maximum legal power on 160-15 meters

The TL-922A linear amplifier provides maximum legal power on the 160-15 meter Amateur bands.

TL-922A FEATURES:

- 2000 W PEP (SSB)/1000 W DC (CW, RTTY) input power on 160, 80, 40, 20, and 15 meters, with 80 W drive.
- Excellent IMD characteristics.
- Pair of EIMAC 3-500Z high-performance transmitting tubes.
- Safety protection.
- Blower with automatic turnoff-delay circuit.
- Variable threshold level type ALC.
- Two meters, one indicating plate current, and the other indicating grid current, relative RF output, and high voltage.



SM-220

High-performance oscilloscope for various monitoring functions

The SM-220 Station Monitor provides a variety of waveform-observing capabilities, and an optional pan display.

SM-220 FEATURES:

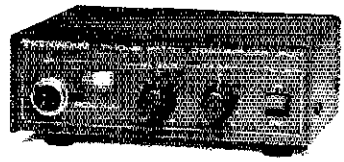
- Monitors transmitted SSB and CW waveforms from 1.8 to 150 MHz.
- Monitors signal waveforms in receiver's IF stage.
- Functions as high-sensitivity, wide-frequency-range (up to 10 MHz) oscilloscope.
- Tests linearity of linear amplifiers (provides trapezoid pattern).
- Allows observation of RTTY tuning points (cross pattern).
- Built-in two-tone (1000-Hz and 1575-Hz) generator.
- Expandable to pan-display capability for observing the number and amplitude of stations within a switchable ±20 kHz/±100 kHz bandwidth.

OPTIONAL ACCESSORIES:

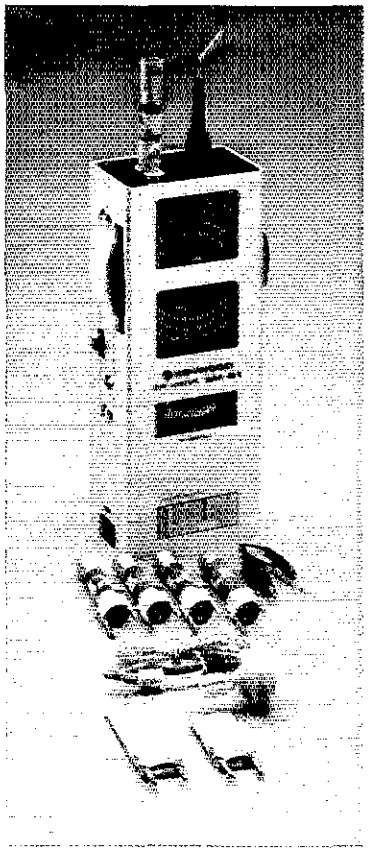
- BS-8 pan-display module for TS-180S, TS-530S, TS-830S, and TS-820 Series.
- BS-5 pan-display module for TS-520 Series.

ACCESSORIES

A wide selection of optional accessories is offered for optimum operating flexibility. In addition to the optional items listed with each piece of equipment described in this catalog, the following accessories are also available:



PC-1 phone patch with hybrid circuit and VU meter for null and audio gain measurements.



DM-81

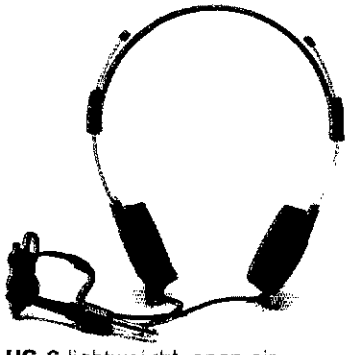
Dip meter performs many RF measurements

The DM-81 dip meter is highly accurate and features, in addition to the traditional inductive-coupling technique, capacitive coupling for measuring metal-enclosed coils and toroidal coils.

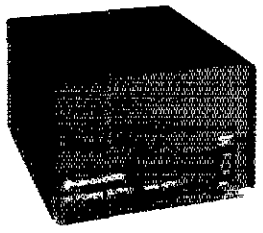
DM-81 FEATURES:

- Measuring range of 700 kHz-250 MHz in seven bands.
- Built-in storage compartment for all seven coils, capacitive probe, earphone, and ground clip lead.
- All solid-state and built-in battery.
- HC-25U and FT-243 sockets for checking crystals and marker-generator function.
- Amplitude modulation.
- FET for good sensitivity.
- Absorption frequency meter function.
- Earphone for monitoring transmitted signals.
- Capacitance probe for measuring resonant frequencies without removing coil shields, and also for measuring resonant frequencies of toroidal coils.

MC-60 deluxe dual impedance (50KΩ/500Ω) desk microphone with 4-pin connector. Also available with UP/DOWN switch, in 6 or 8-pin connector versions.

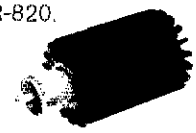


HS-6 lightweight, open-air headphone set.

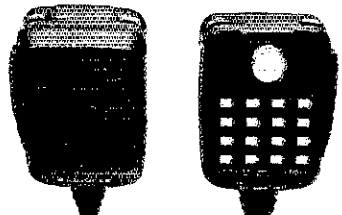


KPS-21 13.8 VDC fixed-station power supply, 21A intermittant, 16A continuous.

KB-1 deluxe, heavyweight, aluminum knob for TS-830S, TS-530S, TS-180S, TS-820S, and R-820.



RD-20 50Ω RF dummy load, (DC-500 MHz) 50 W intermittant, 20 W continuous.



MC-46 16 button autopatch (DTMF) UP/DOWN microphone.

OTHER ACCESSORIES:

MC-50 dynamic dual-impedance (50 kΩ/500Ω) desk microphone.
MC-30S (500Ω) and **MC-35S** (50 kΩ) dynamic noise-canceling hand microphones.
HS-5 deluxe 8Ω headphone set.
HS-4 8Ω headphone set.

NOTE: **Prices and specifications of all Trio-Kenwood products are subject to change without prior notice or obligation.**

KENWOOD

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1111 West Walnut, Compton, California 90220

TR-7730

Miniaturized, 5 memories, memory/ band scan

The TR-7730 is a very compact 25 watt, 2-meter FM mobile transceiver, reasonably priced.

TR-7730 FEATURES:

- Dimensions: 5-3/4 W x 2 H x 7-3/4 D, inches. Weighs 3.3 lbs.
- Extended frequency coverage, 143.900-148.995 MHz, in 5 or 10 KHz steps.
- 25 watts RF output power, with HI/LOW power switch.
- 5 memories for operation in simplex or repeater modes.
- Memory scan, plus automatic band scan.
- UP/DOWN manual scan on microphone (supplied).
- Four digit LED frequency display.
- S/RF bar meter, LED indicators for BUSY, ON-AIR, REPEATER offset.
- Tone switch for internal tone encoder (not Kenwood supplied).
- Offset switch, ±600 kHz. Non-standard offset uses fifth memory.

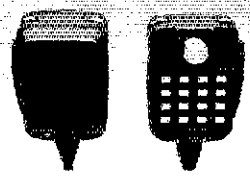
OPTIONAL ACCESSORIES:

- MC-46 16 button autopatch (DTMF) UP/DOWN microphone.
- SP-40 compact mobile speaker.
- KPS-7 fixed station power supply.

TR-8400

Synthesized 70-cm FM mobile rig

- Covers 440-450 MHz, in 25 KHz steps, with two VFOs.
- Transmit offset switch for ±5 MHz. Non-standard offset uses fifth memory.
- HI/LOW power switch selects 10 or 1 watt RF output.
- Similar to TR-7730 in other features, including five memories, memory scan, automatic band scan, UP/DOWN manual scan, four digit display, S/RF bar meter, LED indicators, tone switch, and same optional accessories.



- MC-46 16 button autopatch (DTMF) UP/DOWN microphon

TR-9000

"New 2-meter direction"...compact rig with FM/SSB/CW, scan, five memories

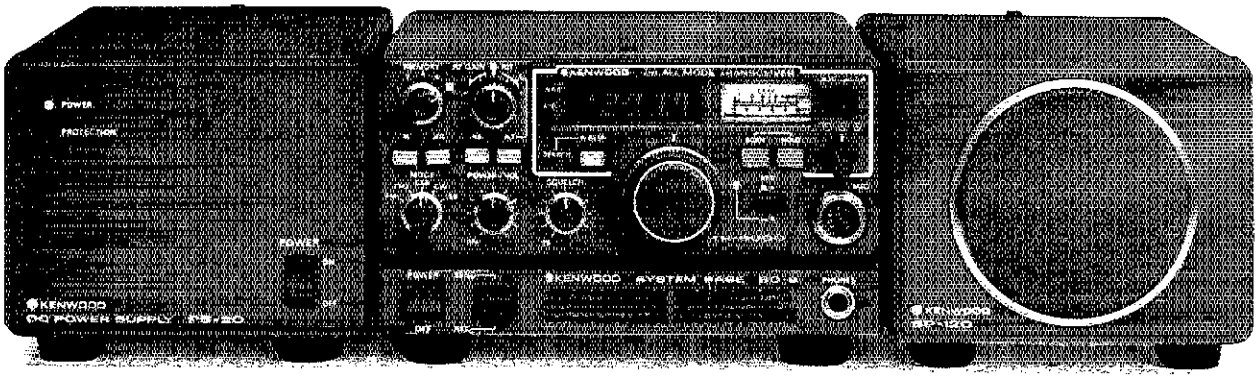
The TR-9000 combines the convenience of FM with long distance SSB and CW. It is extremely compact . . . perfect for mobile operation. Matching accessories are available for optimum fixed-station operation.

TR-9000 FEATURES:

- FM, USB, LSB, and CW.
- Only 6-11/16 inches wide, 2-21/32 inches high, 9-7/32 inches deep.
- Two digital VFOs, with selectable tuning steps of 100 Hz, 5 kHz, and 10 kHz.
- Digital frequency display. Five, four, or three digits, depending on selected tuning step.
- Covers 143.9000-148.9999 MHz.
- Band scan . . . automatic busy stop and free scan.
- SSB/CW search of selectable 9.9-kHz bandwidth segments.
- Five memories . . . four for simplex or ±600 kHz repeater offsets and the fifth for a non-standard offset (memorizes transmit and receive frequency independently).
- UP/DOWN microphone (standard) for manual band scan.
- Noise blanker for SSB and CW.
- RIT (receiver incremental tuning) for SSB and CW.
- RF gain control.
- CW sidetone.
- Selectable RF power outputs . . . 10 W (HI)/1 W (LO).
- Mobile mounting bracket with quick-release levers.
- LED indicators . . ON AIR, BUSY, and VFO.

OPTIONAL ACCESSORIES:

- PS-20 fixed-station power supply.
- SP-120 fixed-station external speaker.
- BO-9 System Base . . . with power switch, SEND/RECEIVE switch (for CW), memory-backup power supply, and headphone jack.
- MC-46 16 button autopatch (DTMF) UP/DOWN microphone.



PS-20 TR-9000 BO-9 SP-120

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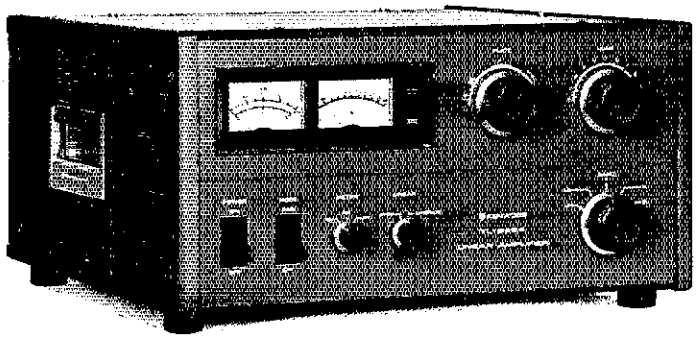
1111 West Walnut, Compton, California 90220



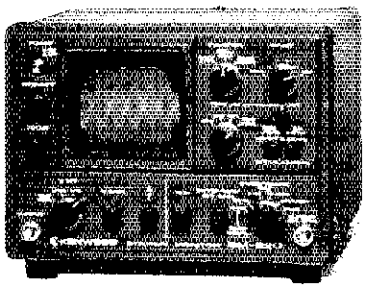
TL-922-A

Maximum legal power on 160-15 meters

The TL-922A linear amplifier provides maximum legal power on the 160-15 meter Amateur bands.

TL-922A FEATURES:

- 2000 W PEP (SSB)/1000 W DC (CW, RTTY) input power on 160, 80, 40, 20, and 15 meters, with 80 W drive.
- Excellent IMD characteristics.
- Pair of EIMAC 3-500Z high-performance transmitting tubes.
- Safety protection.
- Blower with automatic turnoff-delay circuit.
- Variable threshold level type ALC.
- Two meters, one indicating plate current, and the other indicating grid current, relative RF output, and high voltage.



SM-220

High-performance oscilloscope for various monitoring functions

The SM-220 Station Monitor provides a variety of waveform-observing capabilities, and an optional pan display.

SM-220 FEATURES:

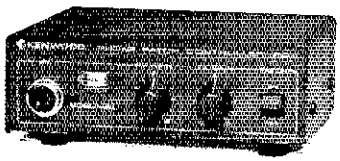
- Monitors transmitted SSB and CW waveforms from 1.8 to 150 MHz.
- Monitors signal waveforms in receiver's IF stage.
- Functions as high-sensitivity, wide-frequency-range (up to 10 MHz) oscilloscope.
- Tests linearity of linear amplifiers (provides trapezoid pattern).
- Allows observation of RTTY tuning points (cross pattern).
- Built-in two-tone (1000-Hz and 1575-Hz) generator.
- Expandable to pan-display capability for observing the number and amplitude of stations within a switchable ±20 kHz/±100 kHz bandwidth.

OPTIONAL ACCESSORIES:

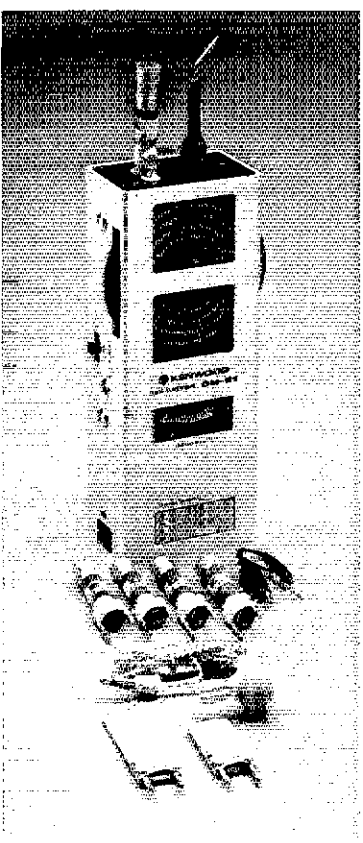
- BS-8 pan-display module for TS-180S, TS-530S, TS-830S, and TS-820 Series.
- BS-5 pan-display module for TS-520 Series.

ACCESSORIES

A wide selection of optional accessories is offered for optimum operating flexibility. In addition to the optional items listed with each piece of equipment described in this catalog, the following accessories are also available:



PC-1 phone patch with hybrid circuit and VU meter for null and audio gain measurements.



DM-81

Dip meter performs many RF measurements

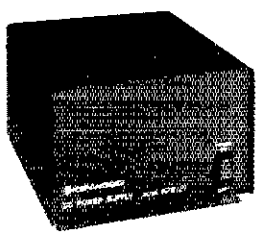
The DM-81 dip meter is highly accurate and features, in addition to the traditional inductive-coupling technique, capacitive coupling for measuring metal-enclosed coils and toroidal coils.

DM-81 FEATURES:

- Measuring range of 700 kHz-250 MHz in seven bands.
- Built-in storage compartment for all seven coils, capacitive probe, earphone, and ground clip lead.
- All solid-state and built-in battery.
- HC-25U and FT-243 sockets for checking crystals and marker-generator function.
- Amplitude modulation.
- FET for good sensitivity.
- Absorption frequency meter function.
- Earphone for monitoring transmitted signals.
- Capacitance probe for measuring resonant frequencies without removing coil shields, and also for measuring resonant frequencies of toroidal coils.

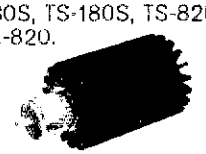
MC-60 deluxe dual impedance (50KΩ/500Ω) desk microphone with 4-pin connector. Also available with UP/DOWN switch, in 6 or 8-pin connector versions.

HS-6 lightweight, open-air headphone set.

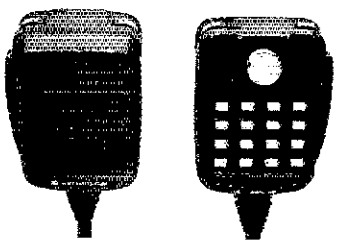


KPS-21 13.8 VDC fixed-station power supply, 21A intermittant, 16A continuous.

KB-1 deluxe, heavyweight, aluminum knob for TS-830S, TS-530S, TS-180S, TS-820S, and R-820.



RD-20 50Ω RF dummy load, (DC-500 MHz) 50 W intermittant, 20 W continuous.



MC-46 16 button autopatch (DTMF) UP/DOWN microphone.

OTHER ACCESSORIES:

MC-50 dynamic dual-impedance (50 kΩ/500Ω) desk microphone.
MC-30S (500Ω) and **MC-35S** (50 kΩ) dynamic noise-canceling hand microphones.
HS-5 deluxe 8Ω headphone set.
HS-4 8Ω headphone set.

NOTE: **Prices and specifications of all Trio-Kenwood products are subject to change without prior notice or obligation.**

KENWOOD

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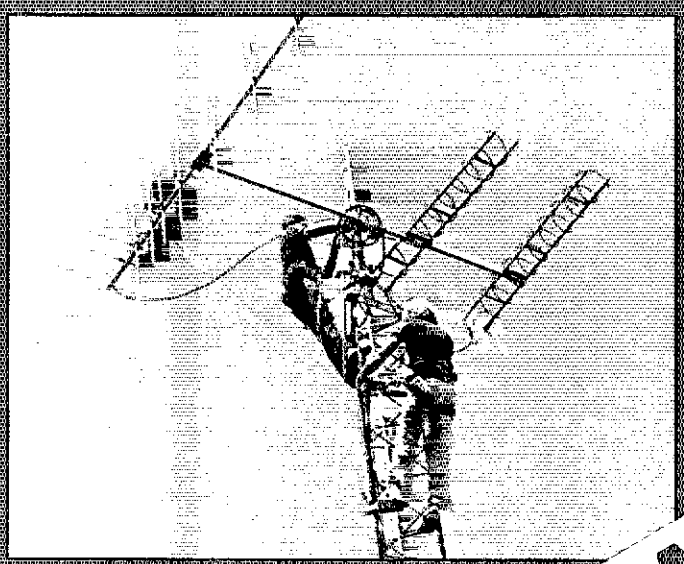
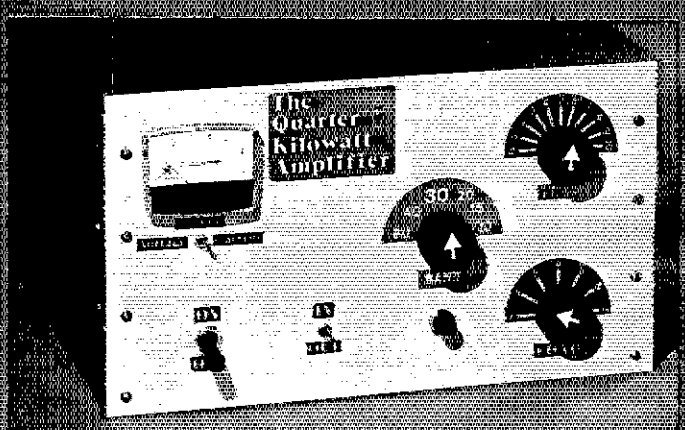
1982 THE RADIO AMATEUR'S HANDBOOK



NOW AVAILABLE!



Published by the American Radio Relay League

THE BEST IS EVEN BETTER!

The best is even better, and at no change in price! Each year *The Radio Amateur's Handbook* is updated to reflect changes in the state-of-the-art. Besides a new full-color foldout spectrum chart, here is what you will find in the 640-page 59th Edition:

NEW PROJECTS INCLUDE:

- Code Practice Oscillator
- QSK kw HF Linear Amplifier
- 250-Watt Linear Amplifier Covering 30-M Band
- Two-Tone Generator
- High-Performance SSB Speech Processor
- Simple Switching Regulator
- General-Purpose RTTY Demodulator
- 50-MHz Transmitting Converter
- 8-Band Communications Receiver

TOPICS ADDED TO THE 59th EDITION:

- 10-MHz Info Added to Several Construction Projects
- Introduction to Packet Radio and Spread Spectrum
- New RFI Chart Showing Frequency Relationships Between Amateur Bands (including WARC) and Other Services (including CATV)
- 10-GHz Gunnplexer Communications
- New Antennas for VHF FM
- Updated Parts Supplier List

CHAPTERS INCLUDE:

- Amateur Radio
- Electrical Laws and Circuits
- Radio Design Technique and Language
- Solid State Fundamentals
- AC-Operated Power Supplies
- HF Transmitting
- VHF and UHF Transmitting
- Receiving Systems
- VHF and UHF Receiving Techniques
- Mobile, Portable and Emergency Equipment
- Code Transmission
- Single Sideband
- Frequency Modulation and Repeaters
- Specialized Communications Systems
- Interference with Other Services
- Test Equipment and Measurements
- Construction Practices and Data Tables
- Wave Propagation
- Transmission Lines
- Antennas for High Frequency
- VHF and UHF Antennas
- Operating a Station
- Vacuum Tubes and Semiconductors (Tables)

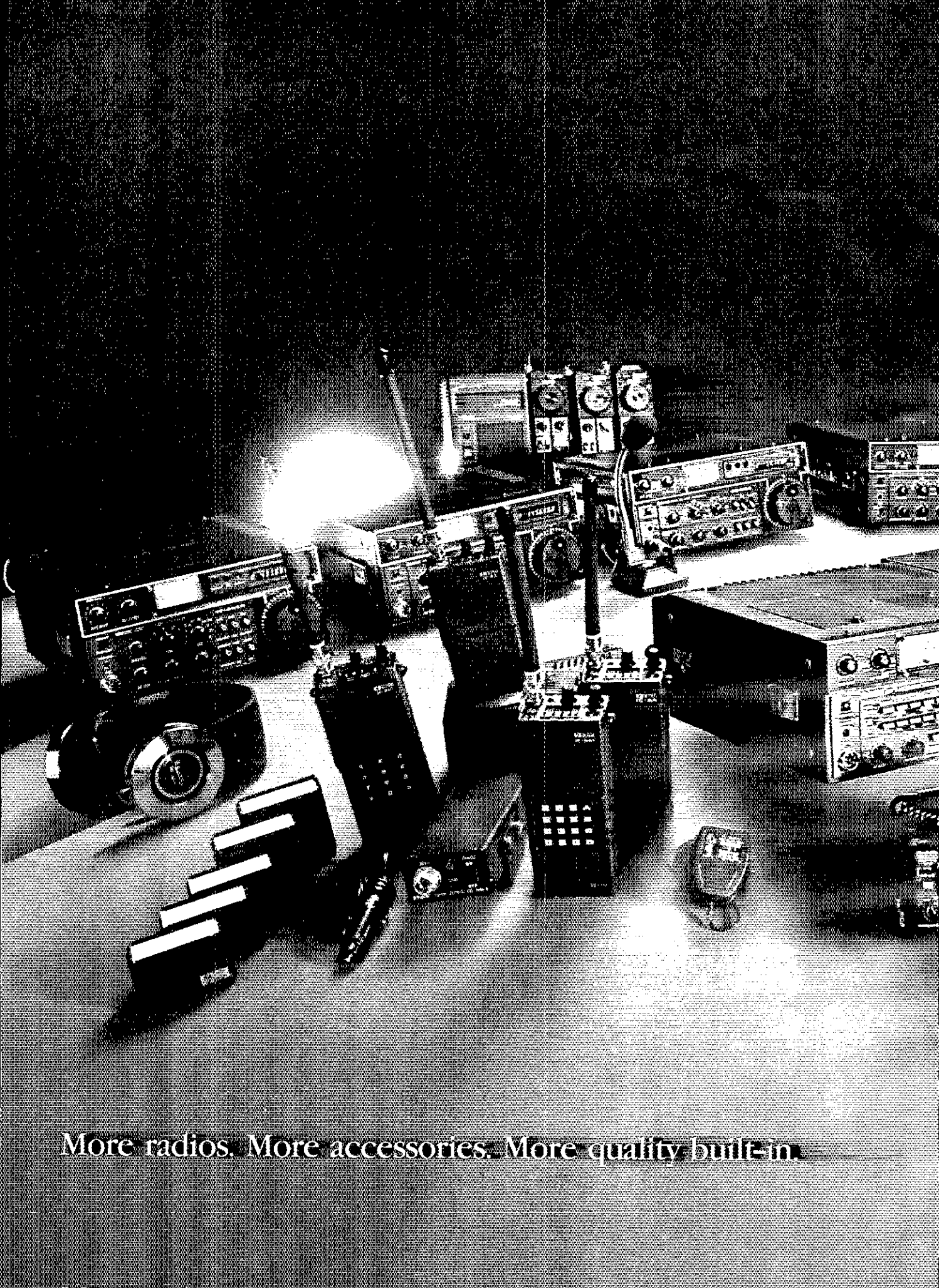
The price of the 1982 *Handbook* remains at $10 in the U.S., $11 in Canada and $12.50 elsewhere. Clothbound copies are $15.75 in the U.S. and $18 elsewhere. All payments in U.S. funds. Books will be shipped postpaid after they come off the press in November. *Order today!*

The 1982 *Handbook* is available at your radio store or from:

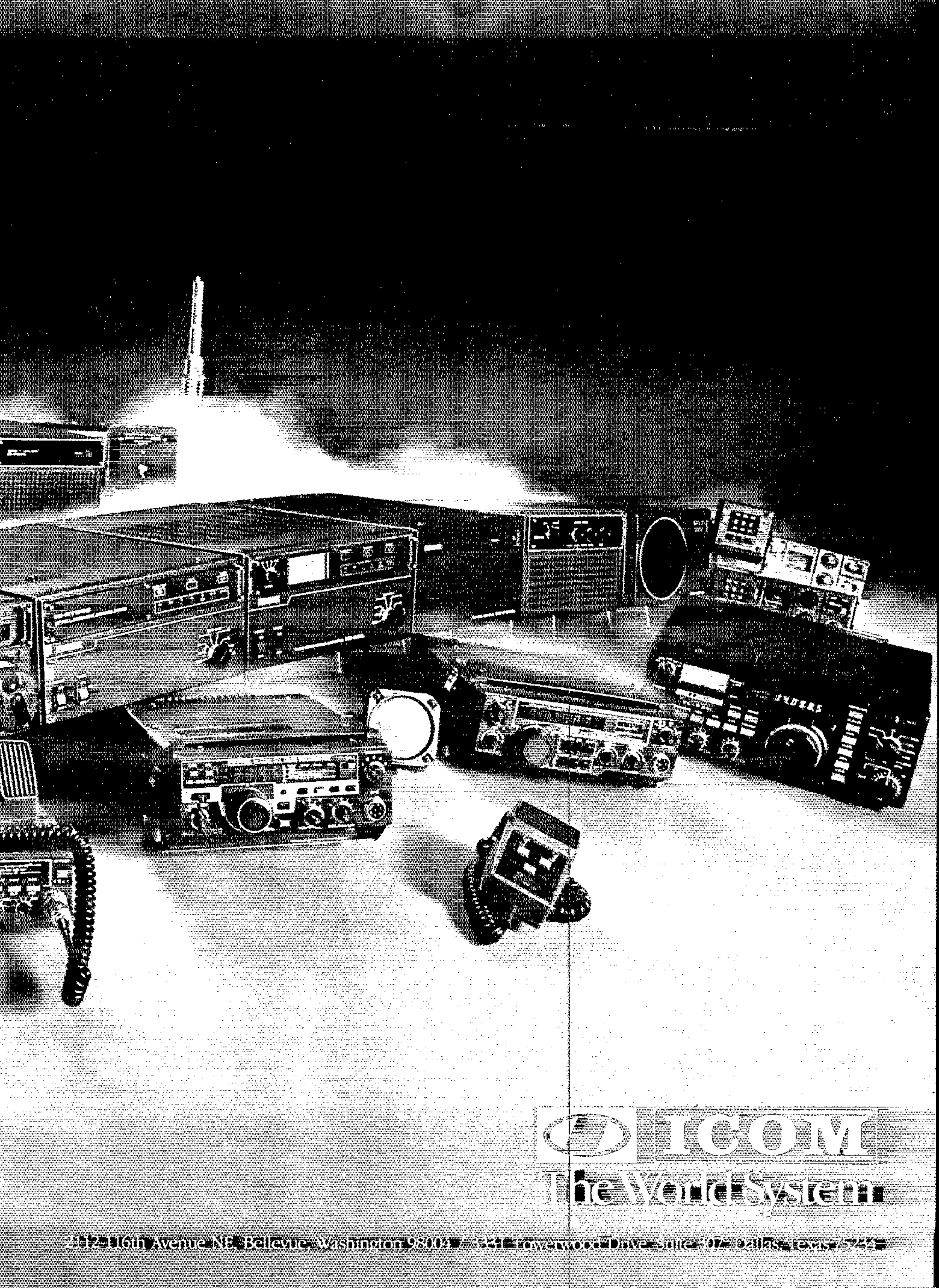
The American Radio Relay League, Inc.

225 Main Street

Newington, CT 06111



More radios. More accessories. More quality built-in.


ICOM
The World System
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MIC GAIN
MIN
MAX
COMP OFF
RF POWER
TRANSMIT
CW-N
RIT
TS
D.LOCK
MODE VFO
POWER
ICOM HF ALL BAND TRANSCEIVER
IC-720A
A
A=B
RIT
ON/OFF
B
AGC
NB
ATT
RF
SIMP
HAM
GENERAL COVER
DOWN
UP
PUSH-ON
PHONES
FAST
ON
ON
ALC
DUP
MIC
RECEIVE
VOX
100Hz
TRANSMIT
ON
10Hz
DIAL SELECT
P.B.T OFF
P.B.T
AF GAIN
RF GAIN
GENERAL COVERAGE RECEIVER

IC-720A

The Ultimate HF Transceiver

The IC-720A is ICOM's top of the line HF transceiver. Utilizing ICOM's direct feed mixing system, the receiver portion provides continuous reception of frequencies from .01 MHz to 30 MHz while the transmitter allows transmission in SSB, CW, RTTY or AM on the 160, 80, 40, 20, 15 and 10 meter bands as well as on the new bands at 10, 18 and 24 MHz.

Equipped with a 4 bit microprocessor and ingeniously designed logic, the IC-720A provides a combination of features found in no other transceiver. It has fingertip pushbutton control of all decision functions while maintaining the feel required of a truly great receiver by providing three tuning rates that give a choice of 100 KHz, 10 KHz or 1 KHz per revolution bandspread. A large tuning knob with adjustable tension and closely spaced RIT and passband tuning controls allow fine tuning of a signal with a minimum of effort.

Human engineering provides such features as illuminated annunciators for transmit, CW Narrow, RIT, tuning speed and dial lock. Readout of mode in use and VFO along with frequency eliminates unnecessary eye movement. One large multi-function meter shows signal strength, relative power out, SWR, collector voltage, or collector current.

ICOM's dual VFO system is included as standard with the IC-720A and provides easily split frequency operation.

Other features standard with the IC-720A are variable power output, RF speech processor, receiver attenuator, noise blanker, and selectable AGC. All of this in a broadbanded transceiver requiring no tuning of transmitter or receiver.

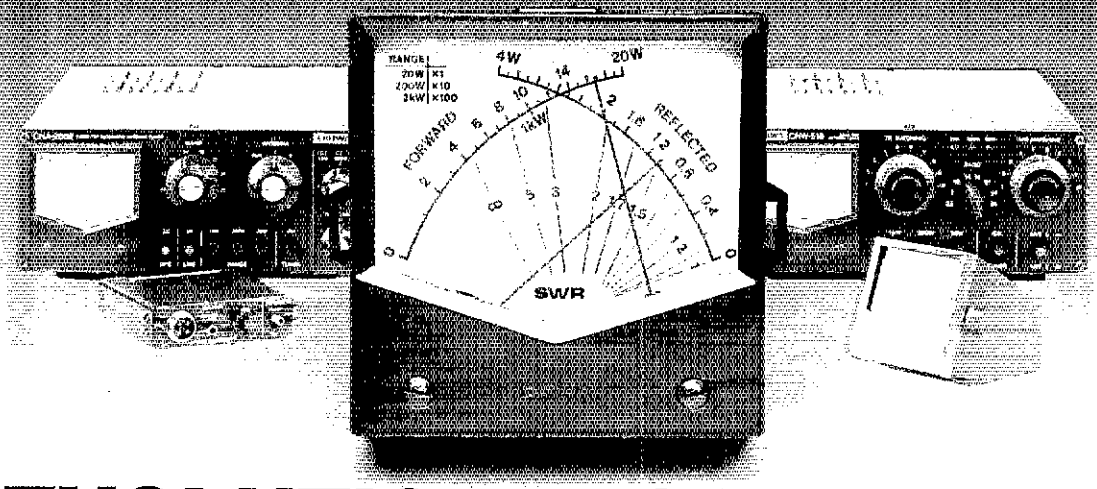
Use of the IC-720A with the fully broadbanded IC-2KL linear amplifier and IC-AT500 fully automatic antenna tuner provides 500 watts of solid state power output. Controlled from the IC-720A, the linear amplifier and tuner change bands automatically with the transceiver and the tuner automatically adjusts to maximize the power output to the transmission line.

ICOM's control features and engineering quality make the IC-720A the ultimate in a HF transceiver.

ICOM

The World System

3112-116th Avenue NE, Bellevue, Washington 98004 • 3331 Towerwood Drive, Suite 307, Dallas, Texas 75234

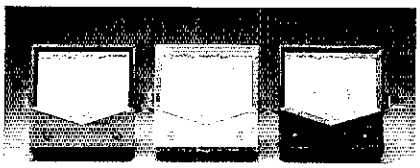


A REVOLUTION IN CONVENIENCE

DAIWA announces an *all-new lineup* of high-quality amateur radio innovations.

Cross-Needle Meters CN-520 / CN-540 / CN-550

DAIWA cross-needle precision is now available in a compact case. Get forward power, reflected power and SWR readings at a single glance—from a meter that fits anywhere!



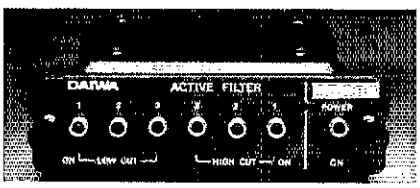
CN520 - Frequency: 1.8-60MHz • **Power range:** Forward 200/2kw, Reflect 40/400 watts • **Detection Sensitivity:** 40 watts minimum • **Accuracy:** ±10% at full scale • **Dimensions:** 72W x 72H x 95D m/m

CN540 - Frequency Range: 50-150MHz • **Power Range:** Forward 20/200 watts, Reflected 4/40 watts • **Detection Sensitivity:** 4 watts minimum • **Accuracy:** ±10% at full scale • **Dimensions:** same as CN-520

CN550 - Frequency Range: 144-250MHz • **Power Range:** Forward 20/200 watts, Reflected 4/40 watts • **Detection Sensitivity:** 4 watts minimum • **Accuracy:** ±10% at full scale • **Dimensions:** same as CN-520

Active Audio Filter AF-306

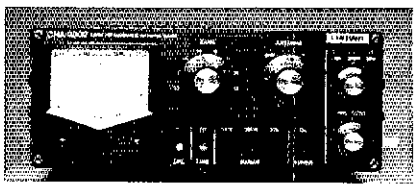
By electronically filtering unwanted signals, the AF-306 gives you clean, distinguishable copy. Featuring its own internal speaker, the AF-306 Active Audio Filter is easy to install, easy to operate.



Input: 2.8v (4v max.) • **Output power:** 1 watt @ 8 ohms • **Distortion:** less than .2% • **S/N ratio:** better than 50dB • **Low Cut Filters:** 400Hz, 800Hz, 1100Hz • **High Cut Filters:** 1100Hz, 1600Hz, 2500Hz

Automatic Antenna Tuner CNA-2002

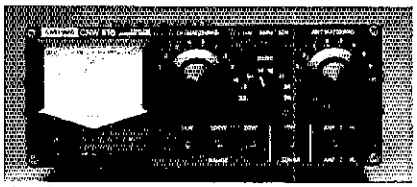
Leading the way in convenience is the Daiwa CNA-2002 2.5 kW (PEP) Automatic Antenna Tuner. Cross-Needle Metering and optimum matching in under 45 seconds make it the perfect compliment to any state-of-the-art amateur station.



Frequency Range: 3.5-30 MHz including WARC bands • **Tuning Time:** less than 45 seconds • **Power Rating:** SSB-2.5kw PEP, CW-1kw (50% duty), AM-500 watts, RTTY, SSTV-500 watts (10 minutes) • **Output Impedance:** 15-250 ohms (unbalanced) Dummy Load 100 watts 1 minute (installed) • **Metering Ranges:** Forward power - 20/200/2000 watts, Reflected power - 4/40/200 watts, SWR-1:1-Infinity • **Power Requirements:** 11-16 vdc @ 200 ma

Manual Antenna Tuners CNW-518 / CNW-418

The serious amateur wants to achieve the best antenna match possible. That's why DAIWA offers two manual antenna tuners that maximize power transfer—and offer cross-needle metering as well.

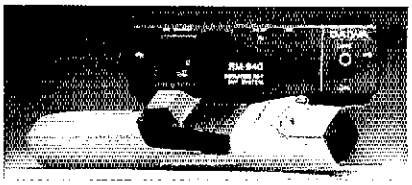


CNW-518 - Frequency Range: 3.5-30MHz including WARC bands • Power rating: 1kw CW (50% duty) • **Output Impedance:** 10-250 ohms (40-10 meters), 25-100 ohms (80 meters) • **Insertion loss:** less than .5 dB

CNW-418—Same as above except—**Power rating:** 200 watts CW

Infrared Cordless Microphone RM-940

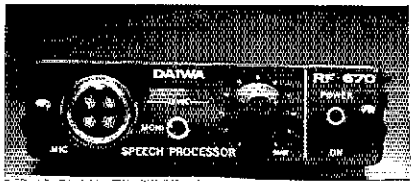
DAIWA ingenuity is also evident in the RM-940, an Infrared cordless mobile microphone system. Audio and transmit/receive switching are carried on a safe infrared beam. Experience the freedom of cordless mobile operation. Ask your Daiwa dealer for a demo today!



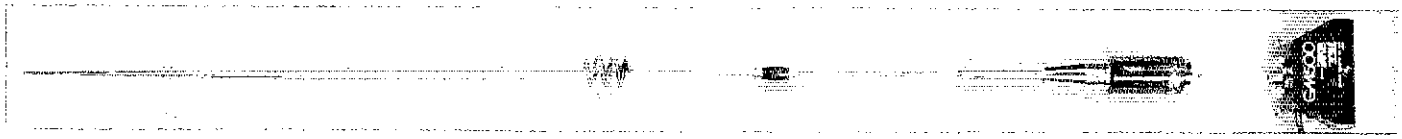
Microphone: Electret Condenser type • **Continuous Operating Time:** 5 hours minimum • **Charging Time:** 8 hours max • **Usable Distance:** 3.5 feet—microphone to sensor • **Power Requirements:** Controller—13.8 vdc @ 80 ma, Microphone—2.5 vdc @ 30 ma.

Speech Processor RF-670

DAIWA innovative thinking led to the development of the RF-670 Photocoupler Speech Processor. Its unique design gives your signal the boost it needs to cut through bothersome QRM. Get RF-type processing performance with the RF-670's economic photocoupler design.



Clipping Level: 20dB max • **Frequency response:** 300-3000Hz (-10dB) • **Clipping Threshold:** less than 2mV at 1kHz • **Bandwidth:** 2400Hz at 6dB down • **Distortion:** less than 3% at 1kHz, 20dB clip • **Output level:** 40mV max • **Mike imp.:** 600-50k ohms • **Power requirement:** 13.5v @ 60ma • **Dimensions:** 90 x 25 x 93 m/m



UHF/VHF Mobile Antennas

Premium quality, high-gain design. Special *tilt-over* feature for added convenience.

DA500 - 146/440 MHz Dual Band Length 960 m/m
DA100 - 5/8 wave • Length: 1,360 m/m • 146 MHz
DA200 - 7/8 wave • Length: 1,870 m/m • 146 MHz

Gutter Mount

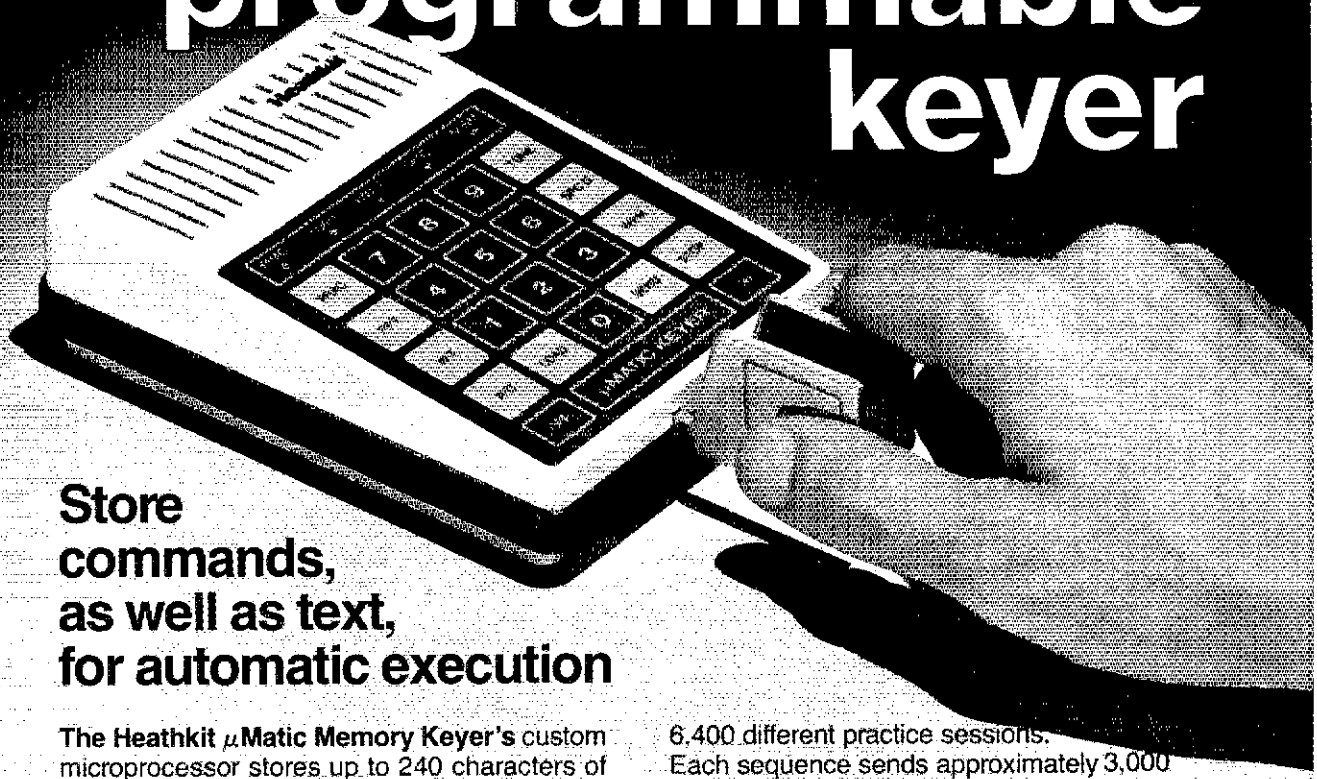
GM500 - Frequency Range: 1.8MHz-500MHz • **Power Rating:** 1kw • **Dimensions:** 86W x 54H x 37D m/m

mcm COMMUNICATIONS 858 E. Congress Park Drive
Centerville, Ohio 45459

Exclusive U.S. Agents for these Daiwa products Dealer inquiry invited

DAIWA
Amateur Radio Innovations

Introducing the first fully programmable keyer



Store commands, as well as text, for automatic execution

The Heathkit μMatic Memory Keyer's custom microprocessor stores up to 240 characters of text or commands. *Variable-length buffers* eliminate wasted memory space. "Command strings" allow text to be stored in several buffers, then strung together in any sequence for most efficient use of memory. Command strings can also select speed, weight, spacing and auto-repeat count.

No external key to buy

Integral capacitive "touch" paddles unplug and store in their own compartment inside the Keyer when not in use. Left handed? A touch of the keypad and the paddles are reversed. Choose any speed between 1 and 99 words per minute, and any of 11 weight settings. Special rear-panel jack connects mechanical paddle.

Great code practice machine, too

A "practice" mode sends random code groups of random length and selectable types for a total of 6,400 different practice sessions. Each sequence sends approximately 3,000 characters before repeating.

Other features:

Built-in sidetone oscillator and speaker have pitch and volume controls. Phone jack and earphone are included for private listening. Complete details on the great new μMatic Memory Keyer are in the latest Heathkit Catalog. Or see it at your nearby Heathkit Electronic Center.*

Send for free catalog

Write to Heath Company, Dept. 009-834, Benton Harbor, MI.
In Canada, contact Heath Company, 1480 Dundas Street E., Mississauga, ONT L4X 2R7.

Visit your Heathkit Store

Where Heathkit products are displayed, sold and serviced. See your telephone white pages for locations.

*Units of Veritechnology Electronics Corporation in the U.S.

Heathkit®

Local Nets	QNI	QTC	Sess.
BRTN	373	279	31
CLARCEN	116	6	4
COARES	101	24	4
Firelands Red Cr.	45	2	4
LCNWOARES	984	343	62
MASER (July)	83	10	4
MASER (Aug.)	101	6	4
TSRAC (July)	1023	91	41
TSRAC (Aug.)	873	95	32
VWCEN	34	2	4

Traffic: (Aug.) W8GGX 698, WB8JGW 528, K8DL 496, W8PMJ 406, WD8KFN 381, WA8HGH 373, K8OZ 341, WD8NEC 284, W8QZK 270, WD8PUH 216, WB8RUW 199, KF8J 190, K3RC 184, W8MOK 176, AB8P 171, WB8YUS 166, N8BQK 157, KB8YS 157, KA8DJZ 152, WB8DMF 144, N2NS 140, K8GET 133, WA8GMT 131, KK8L 128, WD8KBW 127, WA8SSI 120, WB8WTS 119, KA8IUK 118, N8JR 111, WD8DYW 99, KA8HGH 99, W8RG 96, W8WEG 96, KA8HOK 92, WB8OHU 88, WD8ODV 84, K8JDI 79, WD8PEI 78, WB8MRL 75, W8TP 71, N8APM 70, KC8JI 67, WA8BUW 62, WD8OYO 62, WB8SIQ 58, W8BHL 57, WA8LOI 57, W8BO 56, W8EK 56, KC8JV 56, K8AN 55, WD8MIO 54, N8AKS 52, N8DAD 52, WD8RGS 48, WB8UBR 47, KA8CDE 45, WB8SJE 43, WB8RSM 42, KA8ZID 35, WB8YGW 34, KB8YO 33, K8CKY 32, WD8QZM 32, WB8WNH 32, WD9HDZ 31, WD8DDE 28, WA8YLW 28, WD8QAC 26, KA8KFW 25, N8CJS 23, N8BHQ 22, WA8HED 22, WB8TTQ 22, KA8HNG 21, WB8RHP 21, KA8TXV 21, N8CGM 20, WB8CJU 19, WA1QAA 18, WA8QYJ 18, WB8PIY 17, N8AJU 14, KA8GGZ 14, WA8JNQ 14, N8AUH 13, WD8OYK 12, WB8SRC 12, W8ZM 12, W8UQY 11, W8MGA 10, WD8DOS 9, K8CMR 8, WB8NTR 7, KA8HOE 6, WD8EKI 4, W8OOL 4, WB8NHV 3, W8DYF 2, K8PYT 2, WB8QHV 1, WB8YTD 1. (July) W8PMJ 154, K8AN 67, WD8QAC 39, KA8CDE 28, K3RC 28, WA8QYJ 23, KA8HNG 19, WD8JIK 12, N8CW 9, WA8BOV 6, KA8GVR 2.

HUDSON DIVISION

EASTERN NEW YORK: SCM, Paul S. Vydareny, WB2VUK — SEC: KB2KW. STM: WA2SPL. ASCM: W2IT KB2TM.

Net	Time/Day	Freq.	NM
EPN	2300Z	3.902	WB2MCO
ESS	2300Z	3.590	W2W8S
NYS	0000/0300Z	3.677	KA2CTU
NYPON	2200Z	3.913	K2KQC
NYSPTEN	2300Z	3.925	AA2Y
NYSRATT	2330Z	3.625	W2ODC
CDN	2330Z	146.34/94	WB2ZCM
HVN	0030Z T-S	146.37/97	N2BDW
HVN	0030Z S-M	144.535/135	N2BDW
SDN	0230Z	147.66/06	K2ZVI
SCRN	0200Z	147.735/135	WB2HDU

PD5 is now history. Thanks to all those who took part. Results will be sent out to all ECs as soon as they are completed. Results for ENY will appear in January QST. Sorry for errors on NYS RATT net. Freq is 3.625 and unless my info is wrong again NM is W2ODC. Contact WA2SPL for any changes! Recent upgrades from AARA are W2ANB KB2FC to Extra, WB2SMR to Advanced and KA2MKB to Tech. Appointments for ENY are all being redone to bring all records up to date. A reminder: for NM and ORS contact WA2SPL. For OBS, OO and OVS contact KB2TM. For OES and EC and DEC contact KB2KW! BPL: WA2SPL. PSHR: KB2KW WB2MCO WB2ZCM WB2EAG W2YJR W2ACO N2BDW. Traffic: WA2SPL 744, WB2EAG 481, KB2KW 264, WB2ZCM 164, WB2MCO 161, W2YJR 109, W2IGK 91, W2ACO 78, AA2Y 48, N2BDW 45, KA2CLX 39, K2ZVI 33, W2EFU 27, WA2CJY 26, K2MI 21, WB2SON 12, N2CPX 6, N2CSX 5.

NEW YORK CITY — LONG ISLAND: SCM, John H. Smale, K2IZ — SEC: WA2KKJ. STM: WB2BNY. The following are traffic nets around the section. NLI CW 3830 kHz 1900/2200 WB2TOC mgr; NLI PHONE 3928 kHz 1815 WA2SEL mgr; NLS 3710 kHz 1930 WB2EUF mgr; NASSAU VHF 146.04/64 2100 M W Su WA2SOE mgr; BIG APPLE VHF 147.915/315 M-F 2030 N2BMF mgr; SUFFOLK VHF 144.77/145.37 M-F N2BKK mgr; LIMARC 146.25/85 Fri 2045 WA2SOE mgr. Note: All times are local, please try and help out by checking in whenever you can, most of the vhf nets can be reached with one watt and a decent antenna, also, if you have an ORS or OTS, you must show some activity by checking into at least one net to retain your appointment. WBØMKR, who has been stationed at Governers Island, will be departing for KH3-Johnson Island, as CO of the LORAN station there. Congratulations to N2BNK on upgrading to Advanced. WB2JAY is now ORS and OVS. K2GCE received a PSHR certificate in Aug. For those of you that are starting to pick your vacations for next year, HARC has pulled it off again, the 1982 convention will be held at the PLAYBOY CLUB at Great Gorge, New Jersey, Oct. 29-31, 1982, the XYL already has a baby sitter lined up for the kids, so plan now on attending. Both Suffolk County RC and LIMARC held their flea markets in Sept. It is with regret that we list K2KXN as a Silent Key. For those of you that have questions concerning traffic, there is THIN, The Traffic Handlers Information Net, hosted by WA2KOJ and N2APB with the participation of W2MTA and other knowledgable traffic ops, it meets every Sunday at 4 P.M. on 3913 kHz and provides a forum to discuss your questions about nets and message handling. The following stations participated in the 1981 soccer tournament with the Grumman ARC: K2CRL K2CMV W2VQD WB2MPP WA2ITA WA2JMC WD2ACY WB1SIM WA2FGB WB2LVB WB2BNY K2DOD WB2PDK KA2CWT KA2CWS WB2KCT K2KSP W2ZVJ K2UAT and WA2PYK. N2BSS installed a new 11 el 2-m beam. N2BKA upgraded to Advanced and N2GCL made it to General. WA2BUV won a Clegg FM76 and WB2WMJ won a 220 mag mount ant. at the Metroplex picnic. KA2ELB is now ORS, W2DJS is now an OBS. Traffic (Aug.) W2AHV 212, K2GCE 111, W2GKZ 106, N2BQD 53, WA2ARC 36, WB2KCT 35, N2BSS 28, K2IZ 22, WB2JAY 11, KA2KGK 5. (July) W2GKX 36, WB2KCT 18.

NORTHERN NEW JERSEY SCM, Robert Neukomm, KB2WI — ASCM: W5DTR/2. SEC: WB2VUF. STM: W2XD. NMs: W2CC N2BOP W2PSU KA2GQQ KA2HNQ N2XJ WB2IQJ N2BNB.

Net	Freq.	Time	Sess.	QNI	QSP
NJPN	3950	6 P.M. Dy 9 A.M. Sun	36	464	226
NJN/E	3695	7 P.M. Dy	31	213	146
NJN/L	3695	10:30 P.M. Dy	31	243	167
NJSN	3735	6:30 P.M. Dy	30	177	44
OBTTN	72/12	8 P.M. Dy	31	605	147
UCTEN	085/685	7:30 P.M. Dy	31	306	52
NJVN	49/49	10:30 P.M. Dy	31	366	194
NNJVN	90/30	8:30 P.M. Dy	4	16	4
NJRTTY	147.51	Autostart	31	64	6

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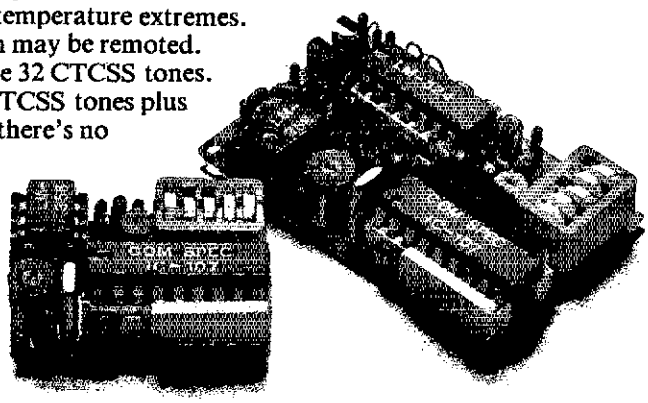

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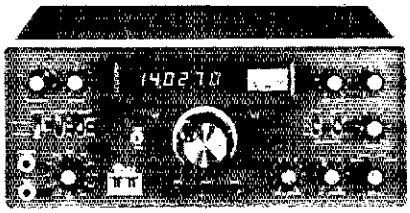
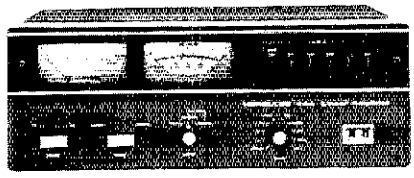


TEN-TEC Model 546 OMNI/Series-C All solid-state, 200 watt SSB/CW HF Transceiver. 9 HF bands, 160-10m including 10, 18 & 24.5 Mhz & 10 MHz WWV; 40 KHz VFO overrun. Instant band change, no tune-up. 100% duty cycle, 20 min. Digital readout, six 0.43" LEDs - reads to 100 Hz. Mosfet rf amp., sensitivity 0.3 uV for 10 db S + N/N ratio, 90 dB dynamic range; 18 dB attenuator for strong local signals. 8-pole 2.4 KHz SSB filter, 1.7 shape factor @ 6/60 dB and audio active filter. Select standard SSB filter, optional 1.8 KHz SSB filter or optional CW filter plus 450 Hz or 150 Hz of audio filtering. 50 dB notch filter, ± 500 Hz & ± 4 KHz offset tuning, 2-speed QSK instant break-in, VOX or PTT, adjustable threshold ALC, S/SWR meter, sidetone, Hi-Z mic. input, built-in spkr. 12-14 VDC/18A. 5½"h × 14½"w × 14"d, 14½ lbs.

Regular $1289 - ***Sale Price $1059***

OMNI Accessories:

280	18A power supply *(Reg. $169)*.....	SALE	$152.95
255	Deluxe ps w/speaker *(Reg. $199)*...	SALE	179.95
217	500 Hz 8-pole CW filt. *(Reg. $55)*....	SALE	49.95
218	1.8 KHz 8 pole SSB filt. *(Reg. $55)*..	SALE	49.95
219	250 Hz 6-pole CW filter *(Reg. $55)*..	SALE	49.95
243	Remote VFO *(Regular $189)*.....	SALE	169.95
1140	DC circuit breaker.....		10.00



TEN-TEC Model 444 HERCULES All Solid-State, KW Linear Amplifier for 160 to 15 meters - 1.8 to 21.5 MHz with provisions for 4 Aux. bands. Broadbanded, no tune-up, instant break-in. 1000 watts input, 500-600 watts output typical, all bands; 50 watts drive. Duty cycle - SSB: Continuous voice modulation; CW/RTTY: 50%, 5 minutes maximum key down. Manual bandswitching, or automatic when using the OMNI. Separate 45 VDC @ 24 A power supply and built-in control power supply, forced air cooled, automatic line voltage correction and exciter by-pass, two meters for collector I/E and forward/reverse power, adj. ALC, 6 LED monitors. Amplifier: 5¼"h × 16"w × 15½"d, 22 lbs; Supply: 7½"h × 15¾"w × 13½"d, 50 lbs.

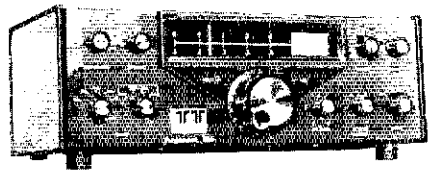
Regular $1575 - ***Sale Price $1349***

TEN-TEC Model 580 DELTA All solid-state, 200 watt SSB/CW HF Transceiver. 9 HF bands, 160-10m including 10, 18 & 24.5 Mhz & 10 MHz WWV; 40 KHz VFO overrun. Instant band change, no tune-up. 100% duty cycle, 20 minutes. Digital readout, six 0.3" LEDs - reads to 100 Hz. Sensitivity 0.3 uV for 10 db S + N/N ratio, 85 dB or better dynamic range. 8-pole 2.4 KHz SSB filter & audio active filters. Select the standard SSB filter, standard SSB filter with one section of audio filter, optional 250 Hz or 500 Hz CW filter or CW filter with four audio active filter sections. 50 dB notch, ± 1 Khz offset tuning, QSK instant break-in, VOX or PTT, adj. AGC & drive, 20 dB atten., S/SWR meter, extra receiver jack, sidetone, Hi-Z mic. input, built-in spkr. 12-14 VDC @ 18A. 4¾"h × 11¾"w × 15"d, 12½ lbs.

Regular $869 - ***Sale Price $769.95***

DELTA Accessories:

280	18A power supply *(Regular $169)*..	SALE	$152.95
255	Deluxe ps w/speaker *(Reg. $199)*...	SALE	179.95
282	250 Hz 6-pole CW filter.....		50.00
285	500 Hz 6 pole CW filter.....		45.00
283	Remote VFO *(Regular $189)*.....	SALE	169.95
289	Noise blanker.....		39.00
1140	DC circuit breaker.....		10.00



TEN-TEC Model 515 ARGONAUT All solid-state, 5 watt (QRPp) SSB/CW HF Transceiver. 5 HF bands, 80-10m plus 10 & 15 MHz WWV. No tune, broadbanded final - instant band change. Analog dial, 4-pole 2.4 KHz crystal SSB filter. Typical receiver sensitivity 0.35 uV for 10 db S + N/N ratio. Built-in SWR/S meter. QSK instant CW break-in and PTT on SSB.. ± 4 KHz offset tuning, adjustable sidetone, built-in speaker, Hi-Z mic input, LED output and offset indicator. 12-14 VDC @ 1A. 4½" × 13"w × 7½"d, 6 lbs.

Regular $469 - ***Sale Price $399.95***

ARGONAUT Accessories:

210	Power supply.....	$34.00
210/E	110/230v - 13v/1A power supply.....	39.00
206A	External 25 KHz calibrator.....	39.00
208A	External Notch & 150 Hz CW filter.....	59.00
212	29-29.5 MHz crystal.....	5.00
213	29.5-30 MHz crystal.....	5.00

TEN-TEC Model 525 ARGOSY All solid-state, 10/100 watt SSB/CW HF Transceiver. 6 HF bands 80-10m, including the new 30m band & 10 MHz WWV; 40 kHz VFO overrun on each band edge. Switchable, 10 watts or 100 watts input. 100% duty cycle, 20 minutes. Instant band change, broadbanded, no receiver front end or final tuning. Analog dial accurate to ± 2 kHz. 4-pole 2.5 KHz crystal SSB filter, sensitivity 0.3 uV for 10 db S + N/N ratio. Meter shows forward/reverse power, SWR and received signal strength. Offset tuning ± 3 KHz, notch filter, QSK instant CW break-in and PTT on SSB, sidetone, adjustable ALC. 12-14 VDC @ 9A. 4"h × 9½"w × 12"d, 8 lbs.

Regular $549 - ***Sale Price $499.95***

ARGOSY Accessories:

225	9A power supply *(Regular $129)*....	SALE	$119.95
217	500 Hz 8 pole CW filt *(Reg. $55)*.....	SALE	49.95
218	1.8 KHz 6-pole SSB filter *(Reg. $55)*..	SALE	49.95
219	500 Hz 8 pole CW filter *(Reg. $55)*...	SALE	49.95
220	2.4 KHz 8 pole SSB filt. *(Reg. $55)*...	SALE	49.95
222	Mobile mount.....		25.00
223	Noise blanker.....		34.00
224	Audio CW filter.....		34.00
226	25 KHz crystal calibrator.....		39.00
1125	DC circuit breaker.....		15.00
1126	Linear amplifier switching kit.....		15.00

Other Accessories:

234	Speech processor *(Reg. $139)*.....	SALE	$124.95
214	Electret microphone for 234.....		39.00
209	300 watt dry dummy load.....		26.00
215	Ceramic microphone with plug.....		29.50
215PC	Ceramic mic. w/plug & coil cord.....		34.50
227	1.8-30 Mhz, 200w tuner *(Reg. $79)*....	SALE	72.95
228	Tuner, as abv w/SWR *(Reg. $95)*...	SALE	85.95
645	Dual paddle keyer *(Reg. $85)*.....	SALE	79.95
670	Single paddle keyer.....		39.00

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Ramapo Mountain ARC news: WB2QEA now N2CTF, upgrade N2BKB to Extra. The club reports an excellent hamfest/flea market. Sussex County ARC reports that it hopes to interest all hams in New Jersey into supplying ham gear for the Battleship USS New Jersey (BB-62). Monies may be directed to N2WM. Let's get behind this effort with $1 from each New Jersey ham. We could put a great station aboard the USS New Jersey. The "Ka-Chunker" reports two plaques were presented to W2HZH and K2SGB. JSARS will be running a training class for Novices this fall. Contact KB2IB for particulars. Metroplex ARC reports very interesting meetings: October: WB0MKR will speak on proper grounding before he leaves for KH3-Johnson Island and W2JCI will speak on Smith Charts. November: WA2TLI will show slides on the spectacular launch of the Space Shuttle. December will have WB2ZPI showing slides of his experience in BY-Land. A great many 2-meter buffs will be needed for the NYC Marathon — 200 in fact — so volunteer to WA2DHF, NYC Marathon Communications Coordinator, 64 Malden Lane, Little Ferry, NJ 07643. Congratulations to WB2LCF who was recently elected to serve on the Board of Directors of the Radio Club of America. Upgrades: N2BNK to Advanced. WB1CNT and KA2MHK to Technician. Metroplex has a lot of DX members and their paper this month showed the fine shack of LA2BK. OO report from WA2QZD. W2XD was awarded a Certificate of Merit for publicizing need for daytime operators and moving vhf as a viable means of handling traffic. There will soon be a north and south Jersey link-up thanks to W2XD's coordinating efforts. A new Novice in Sussex County, KA2NFF, has 3 other hams in the family whose 2 grandfathers are hams — W2BRR and W2LV and his uncle W3HOA. W3TB is adding monobanders for the following: the new 30-meter band; 20, 15 and 10 meters together with a new Alpha linear. 2 new Advanced: KA2GMH and KA2MFZ. WA2KFE is now a 1st Lt. in the US Army Corps of Engineers. Good to hear WB2RMI back on the traffic nets after being off quite a few months. KB2WI will be on the air from Mesa, Arizona for the next several winter months and plans to get active in traffic and teach a course for Novices in a retirement village. In the interim please send all your station avtivity reports to W3DTR/2 — his address is: Curtis Williams, ASCM, RD 3 Box 175 Fox Run Rd., Califon NJ 07830. He is a former SCM and I know will do an excellent job while I am away. Traffic: KB2HM 373, KK2R 319, W2XD 245, W2GWS 202, KB2WI 180, N2XJ 169, N2BNB 100, KA2JMH 97, K2VX 88, W2UH 60, W5DTR 57, AG2R 51, WA8ZNH 45, WA7DPK 36, WB2KLF 34, KA2HNQ/T 32, W3TB 29, N2SU 28, KA2GSX 25, KA2GMH 21, KC2AK 20, W2NKD 20, WB2AIU/T 9, W2CC 7, K2WM 5, W2ZEP 2.

MIDWEST DIVISION

IOWA: SCM, Bob McCaffrey, K0CY — SEC: W0RKP. STM: KA0X. NMs: WB0AVW WD0HND WA0AUX W0YLS. 15 Dickinson County ARES assisted officials in searching for 2 1/2 year old boy lost for 3 days, he was found safe. The Ft. Dodge and Humboldt ARES, while assisting in canoe race communications, were able to save some young boaters from disaster. Davenport hams provided communications for the Bix Fair and Bix Race. CVARC assisted with a tennis tourney. 86 hams and their families attended the annual 75-meter picnic sponsored by the DMRAA. K0JGI of Ottumwa was cited for his outstanding contribution to the net. KA0AAJ now N0CUB; WD0HUJ now N0CXX. WA0NMA is now Extra Class. Now is the time to get reports of activities to me, would appreciate all newsletters. KA0JQG made PSHR this month. NIARC presented Amateur Radio demo at the Kinney Pioneer museum. The "Old Thrashers"reunion drew a large crowd to the Mt. Pleasant Radio booth. WD0DOK found the hidden bunny again followed by N0COL N0CXX. ICN now in full session, support this cw training net. Good liaisons to DTRN and TEN 100%.

Net	Freq.	Days	UTC	QNI	QTC	Sess.
TLCN	3560	Dy	0030-0400	344	135	62
ICN	3713	Thurs	0100	106	10	13
75M phone	3970	M-S	1830-2330	2135	125	52

Traffic: WA0AUX 608, W0SS 198, W0YLS 138, WD0HND 71, KA0JQG 64, KA0X 59, AE0R 57, WB0QAM 55, K0CY 39, WB0UPF 31, WB0AVW 29, W0BW 28, AI0K 13, K0GP 8, WA0NMA 4.

KANSAS: SCM, Robert M. Summers, K0BXF — SEC: W0KL. NMs: W0OYH W0FT WA0LBB. It is indeed a sorry chore when I have to list another Silent Key. WA0KQQ was an active county hunter. He will be missed by many. Hams in Wichita busy providing communication for the Lake Afton Grand Prix, using ATV equipment as exciting coverage of the event for the race officials. Had to miss a hamfest at Dodge this year due to conflicting prearranged meeting with ECs and DECs. I know of at least three other events sked for the same day. What say we try for better coordination in 1982. Parsons ARC planning an October cookout followed by CPR Lifesaving techniques. Haven't yet figured that one out, maybe a sac lunch followed by a Rolaid would be safer. Hi. W0RT working moonbounce. W0AM has all beams up and working, incl a new 40-M Telrex. CKARC garage sale reporting a big $300 profit, sounds like a winner. Some have asked why reports of traffic totals appear in the section activities column of QST and do not appear in the Kansas Bulletin by 0SEV. Answer simple — If by chance W0OYH or W0FT intercept the totals as they are passed on to me, they include them in their report for KS Bulletin. A copy of the report that goes to QST does not appear in the bulletin per QST request. Traffic: W0FIR 128, W0QMT 117, W0OYH 112, W0HI 90, AC0E 73, W0FT 68, WA0LBB 63, K0BXF 59, W0AM 46, WB0ZEN 31, W0CHJ 29, WB0YLP 29, W0KL 25, W0FDJ 22, W0PB 22, W0ASY 21, N0BDG 20, WB0YJT 19, W0RBO 12, W0NYG 8, W0RT 8.

MISSOURI: SCM, L. G. Wilson, K0RWL — Asst SCM: Joe Flowers, W0OTF. STM: KM0L. SEC: N0AJI. Our appt system has been revised and those who are inactive, have failed to file reports or did not respond to the letter sent from the SEC or STM will be receiving an appt cancellation notice. Volunteers for EC appts should contact N0AJI; OTS appts KM0L (WB0LFY) and the remainder to me. Congrats to the Warrensburg and Sedalia Radio Clubs on the outstanding public relations job done at the Missouri State Fair this year. The Heart of America Radio Club from Kansas City enjoyed the day they spent working the State Fair radio station and was glad they could give you guys a day of rest. There was fine photo layout in the recent PHD Newsletter covering several years of Amateur Radio. It was good to see some of those "oldtimers" and we noticed that W0CW and W0JU may have had a little more hair a few years ago. The Kansas City DX Club held its 1st annual

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1.6 to 30MHz	0.5μV 2μV
100 to 1600kHz	2μV 6μV
Selectivity:	6kHz/2.4kHz/0.6kHz/0.3kHz (*Option)
Stability:	Within 50Hz/one hour
Power requirements:	AC 100/117/220/240V,50/60Hz, 50VA
Dimensions and Weight:	340mm(W)×140mm(H)×300mm(D); Approx. 7.5kg
Preset memory (Option):	24ch
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Image rejection ratio:	70dB or more
IF rejection ratio:	70dB or more
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AF outputs;	
Speaker output:	1W or more (4 ohms)
Record/line output:	1mW or more (600 ohms)

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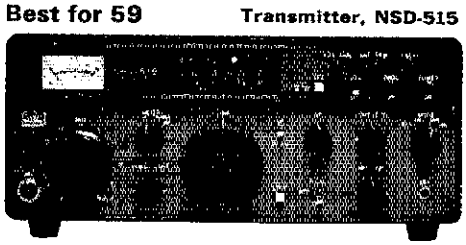
NRD-515

Best for 59 **Transmitter, NSD-515**



SPECIFICATIONS

Rated output power:	100W NSD-515 (50W 28MHz band)
Frequency range:	1.8MHz-2.0MHz/3.5MHz-4.0MHz/7.0MHz-7.3MHz/14.0MHz-14.35MHz/21.0MHz-21.45MHz/28.0MHz-29.0MHz/29.0MHz-29.7MHz/Optional new bands approved by WARC 79 10.1MHz-10.15MHz/18.068MHz-18.168MHz/24.89MHz-24.99MHz/
Mode of emission:	A3J (USB/LSB) A1 (CW) F1 (RTTY)

● For more information please contact to;

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A new name, a new look, and a new standard of performance in ham radio!

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DUAL ultra stable PTO's

Fast break-in (QSK)

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Jack for separate receive antenna

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ASTRO-103 — The Professional Ham Rig.

The Cubic ASTRO-103 expands on the highly acclaimed ASTRO-102BXA with the addition of the most asked for features — RTTY, an input connector for a separate receive antenna, and of course, ALL BAND coverage from 160 through 10 meters, including the new bands at 10, 18, and 24.5 MHz. All bands are operating *now*, nothing to buy later, and of course WWV is covered.

With the optional 400Hz crystal filter installed, which cascades with one of the 8-pole I.F. filters and can be moved through the passband, along with QSK provisions, the ASTRO-103 is the CW operator's dream!

Performance under high cross mod conditions found in todays' crowded bands is second to none. With dual independent high stability PTO's for split band DX and all its other features, the ASTRO-103 is the result of American Technology and American Quality combined to bring the best to the American Amateur.

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Cubic Corporation with over 3,500 employees world-wide, including more than 1200 scientists, engineers and technicians, has more than one million square feet under roof.

Established in 1951 the company has grown and expanded in high technology fields, including computer based automatic fare collection systems, electronic countermeasures, supersonic pilot training and other defense and space systems, electronic positioning devices and, of course, communications. New Cubic Amateur products reflect this heritage of excellence and is your assurance of the strength and resources to support your purchase in the years to come.

ASTRO-150A

Another member of the ASTRO family, the ASTRO-150 has been highly acclaimed as the ideal Mobile/Base station. With microprocessor control, VRS tuning and microphone scanning, the ASTRO-150A led the way for competitive radios now appearing on the market.

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The ASTRO-102BXA provides basically all the fine performance of the ASTRO-103 at a lower cost, but less the WARC bands, which of course may be added later if desired.

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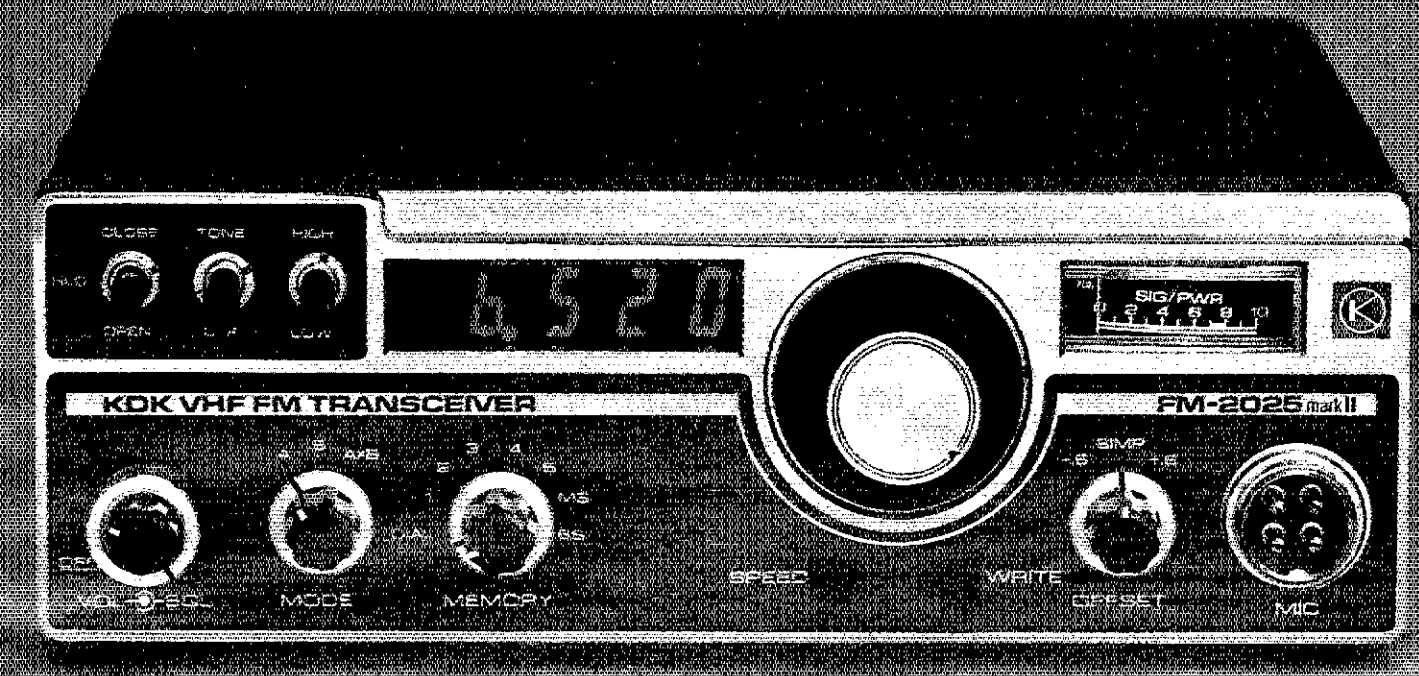
KDK MAKES 2 METER FM SIMPLE AND EASY!

KDK



KDK INTRODUCES A NEW GENERATION OF 2 METER FM RADIOS.
THE SPARKLING 2025A MKII IS LOADED WITH FEATURES. EASE OF OPERATION IS THE DESIGN CONCEPT AT KDK.

▪ Features such as ten channel memory in two banks of five each, a solid 25 watts of power, full MARS and CAP coverage from 143.000 Mhz to 148.995 Mhz, plus built in memory retention for up to one year . . . and much, much more makes this the radio of the year.

▪ If you have been waiting to move up to a new model, or have wished for a radio with "everything" . . . KDK has it!

▪ The ten channel memory is easily addressable and you have two banks of five channels each. You can even use both banks at once for odd splits.

▪ Standard 600 hz shift up or down — plus factory available boards for foreign shifts. Your 2025A is never obsolete!

▪ Band scan or memory scan. Memory scan is easy. There is also band scan with upper and lower limits you can choose yourself!

▪ Built in nicads for the memory retention which has drain in nano-amps, not milli-amps. The internal battery will hold the memory for up to one year! No other radio offers you this feature.

▪ Fast and easy dialing. Full solid state dialing and you can choose from the front panel either a fast or slow dial rate.

▪ No relays are used, only solid state switching. This eliminates a trouble spot many radios encounter.

▪ KDK has also eliminated another trouble spot by completely hand wiring each radio. No internal plugs to become intermittant and no wire wraps either, just good solid wiring.

▪ KDK gives you one of the hottest receivers you can find. By using UHF (not VHF) dual gate MOS-FETs with electronic auto tuning for the RF amplifier and the first mixer, you have a combination of ultra sensitivity and maximum quietness.

▪ The squelch on the 2025A MkII is highly sensitive and front panel adjustable, use it for ultra-DX or super local.

▪ The audio output stage in the 2025A MkII uses an integrated circuit which has internal protection against over-voltage and shorted output conditions. Plus it is a high audio output chip — just what you need in a noisy mobile situation.

▪ The transmitter uses direct VCO varicap modulation for true FM. Your transmitted audio sounds as it should; crisp, clear and natural.

▪ The power output stage of the 2025A MkII will not break down even with an infinite VSWR load, and uses heavy duty solid state antenna switching with a four stage low pass filter. All this gives you an exceptionally clean, spur free output.

▪ KDK has included an adjustable sub audible tone circuit which can also be used for CTCSS or tone burst on transmit. Again, more features!

▪ Size is 2 7/10" high, 7 1/8" wide, and 9 1/2" deep.

▪ You can switch from 25 watts to 3 watts low power.

▪ And, of course, the DC cable is included along with the matching microphone and mobile mounting bracket. A tone encoder microphone is also available to match and is, naturally, pre-wired.

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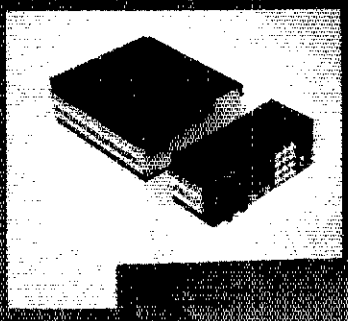

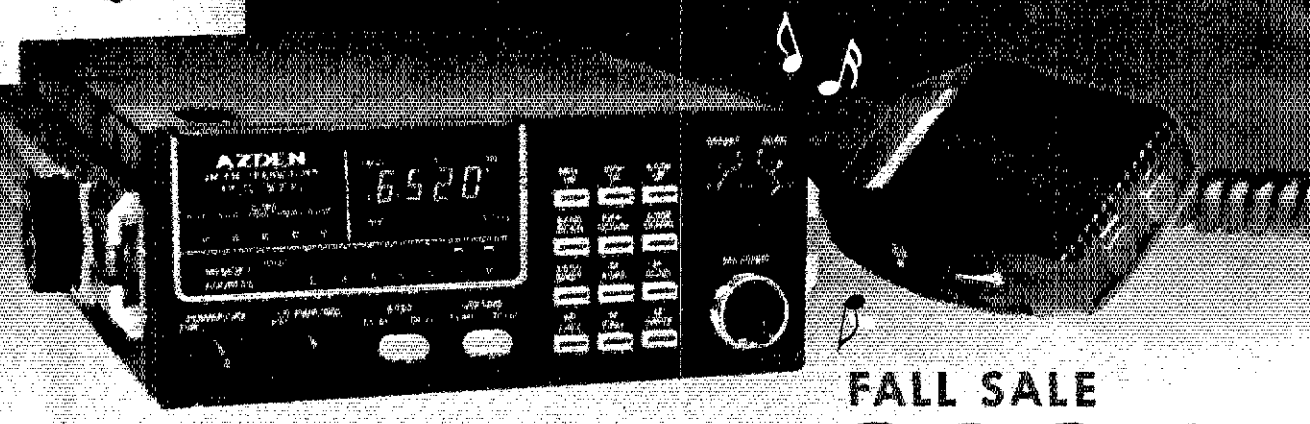

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COMPARE THESE FEATURES WITH ANY UNIT AT ANY PRICE

- **8 MHZ FREQUENCY COVERAGE, INCLUDING CAP/MARS BUILT IN:** Receive and transmit 142.000 to 149.995 MHz in selectable steps of 5 or 10 kHz. COMPARE!
- **SIZE:** Unbelievable! Only 6¾" by 2⅜" by 9¾". COMPARE!
- **MICROCOMPUTER CONTROL:** All frequency control is carried out by a microcomputer.
- **MUSICAL TONE ACCOMPANIES KEYBOARD ENTRIES:** When a key is pressed, a brief musical tone indicates positive entry into the microcomputer. COMPARE!
- **PUSHBUTTON FREQUENCY CONTROL FROM MICROPHONE OR PANEL:** Frequency is selected by buttons on the front panel or microphone.
- **8 CHANNEL MEMORY:** Each memory channel is reprogrammable and stores the frequency and offset. Memory is backed up by a NICAD battery when power is removed.
- **INSTANT MEMORY 1 RECALL:** By pressing a button on the microphone or front panel, memory channel 1 may be accessed immediately.
- **MEMORY SCAN:** Memory channels may be continuously scanned for quick location of a busy or vacant frequency.
- **PROGRAMMABLE BAND SCAN:** Any section of the band may be scanned in steps of 5 or 10 kHz. Scan limits are easily reprogrammed.
- **DISCRIMINATOR SCAN CONTROL (AZDEN EXCLUSIVE PATENT):** The scanner stops by sensing the channel center, so the unit always lands on the correct frequency. COMPARE this with other units that claim to scan in 5-kHz steps!
- **THREE SCAN MODES WITH AUTO RESUME:** "Sampling" mode pauses at busy channels, then resumes. "Busy mode stops at a busy channel, then resumes shortly after frequency clears. "Vacant" mode stops at a vacant channel and resumes when signal appears. If desired, auto resume may be prevented by pressing one button. COMPARE!
- **REMOTABLE HEAD:** The control head may be located as much as 15 feet away from the main unit using the optional connecting cable. COMPARE!
- **PL TONE OSCILLATOR BUILT IN:** Frequency is adjustable to access PL repeaters.
- **MICROPHONE VOLUME/FREQ. CONTROL:** Both functions may be adjusted from either the microphone or front panel.
- **NON-STANDARD OFFSETS:** Three accessory offsets can be obtained for CAP/MARS or unusual repeater splits. CAP and Air Force MARS splits are BUILT IN! COMPARE!
- **25 WATTS OUTPUT:** Also 5 watts low power to conserve batteries in portable use.
- **GREEN FREQUENCY DISPLAY:** Frequency numerals are green LEDs for superior visibility.
- **RECEIVER OFFSET:** A channel lock switch allows monitoring of the repeater input frequency. COMPARE!
- **SUPERIOR RECEIVER:** Sensitivity is better than 0.28 uV for 20-dB quieting and 0.19 uV for 12-dB SINAD. The squelch sensitivity is superb, requiring less than 0.1 uV to open. The receiver audio circuits are designed for maximum intelligibility and fidelity. COMPARE!
- **ILLUMINATED KEYBOARD:** Keyboard backlighting allows it to be seen at night.
- **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 circuits offer intelligibility second to none.
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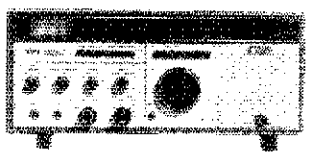

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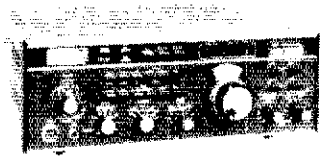
Amateur Net $3496.00

DRAKE TR7/DR7



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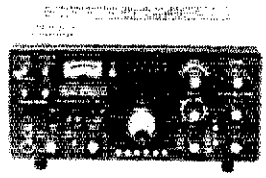

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Excellent receiver performance. Full line of accessories available. Contains built-in AC supply.

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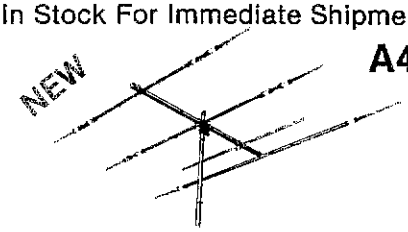

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40 meter adapter also available

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10 thru 80M vertical

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- Dual Microcomputers provide many features.
- Approximately 500 character memory with unique "soft-partitioning."
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- Beacon mode for VHF DX scheduling.
- Automatic serial number sequencing.
- Far too many features to describe; use it and you will believe it!

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Finally — a properly decoupled antenna with superior performance at a reasonable cost. Raise more repeaters or increase your simplex distance!

- Achieve maximum attainable gain for a twin 5/8 wavelength antenna.
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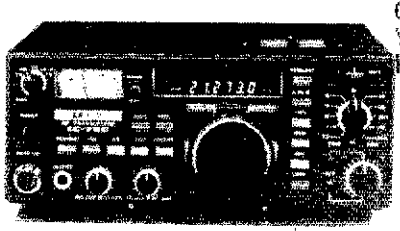

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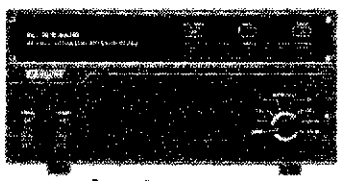
Truly an exceptional buy. Measures only 3.7"(H) x 9.5"(W) x 10.8"(D). Dual VFO's with 1 frequency memory per band. Covers 10-80M including the new WARC bands. 200W PEP input.

NEW! AT-100 AUTOMATIC ANTENNA TUNER

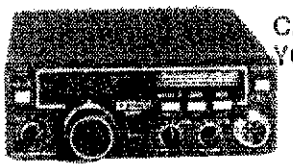


Amateur Net $349.00

No adjustments necessary when changing frequency or bands. Fully automatic. Compatible with IC-730 and IC-720A.

MINICOM IC-25A

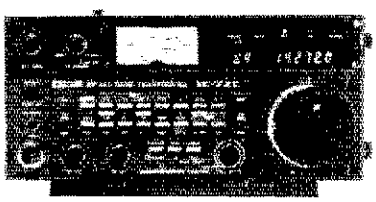
Full featured 2m FM transceiver in a very compact package. 25W too!



CALL FOR YOUR PRICE
Amateur Net $349.00

Measures 2"(H)x5½"(W)x7"(D). Dual VFO's with band scan and memory scan with automatic resume after preset delay or carrier drop. Encoding microphone also included. 5 memories with priority channel. Tuning rates 5KHz (A VFO) or 15KHz (B VFO).

IC-720A HF TRANSCEIVER



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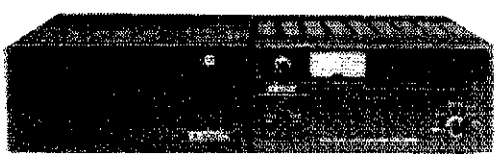
Available with all accessories

IC-2KL SOLID STATE LINEAR AMPLIFIER SPECIAL FACTORY OFFER



SALE $1449.00
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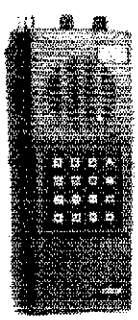
Amateur Net $1795.00

Compatible with IC-701, IC-720A and IC-730. 500W output power on 160 thru 15M including 10MHz and 15MHz WARC bands.

NEW! IC-3 AT



A 220mHz handheld based on the very popular IC-2A/2AT. Compatible with all 2A accessories. IC-3AT (shown) with 16 button encoder.

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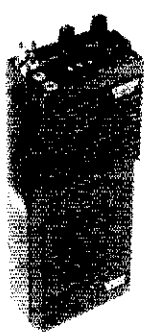
IC-290 2M ALL MODE TRANSCEIVER

CALL FOR YOUR PRICE
Amateur Net $549.00

Covers 143.8 to 148.1999MHz FM,SSB (USB/LSB) and CW. Output 10W/1W. 5 memories with 2 VFO's and priority channel. Tuning rate 5 KHz or 1 KHz on FM. 1 KHz or 100Hz on SSB and CW. Squelch with scan operational on SSB.

THE VERY POPULAR IC-2A/IC-2AT



IC-2A
Am. Net $239.50
(Shown)

IC-2AT
Am. Net $269.50
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Gold Tournament and family picnic recently. Some of the golf scores were in competition with some DXCC totals. One of the golfers has practiced enough that it looked perfectly natural when his ball went straight into the water. The Emerson Electric Radio Club made the front page of their company's newspaper with a photo of their 1981 Field Day site. The Ozark Amateur Radio Society is presently holding Novice classes.

Net	QNI	QTC	Net	QNI	QTC
MON	165	125	MEOW	219	50
MON2	144	45	ACE	35	1
MOSSB	482	93	NEMOE	143	9

There was a good turn out by Missouri stations during the recent NA Sprint. Didn't realize that Missouri had so many cw contest operators. Glad to report that W@VWW is out of the hospital and recovering nicely from his recent surgery. Also, here's wishing N@AQZ a speedy recovery from recent surgery. Lots of new equipment going up and getting on the air. K@GUG is sporting a new TS130, KA@FVV has a new 18HT up and Godzilla Enterprises announces the completion of a new blower system using a 4,000 BTU air conditioner. Congrats to new licenses KA@LVP and KA@LVQ and N@BQL on upgrade to General. Traffic: KC@AS 630, K@PCK 197, K@SI 135, W@OTF 118, W@BMA 104, W@OUD 89, W@BV 53, KM@L 10, K@RWL 10.

NEBRASKA: SCM, Shirley M. Rice, KA@BCB — SEC: N@AIH. STM: WD@BQG. Congrats to NE hams who completed a Radiological Defence Monitoring course, K@AMY Scottsbluff, WA@JBL KC@GF AJ@A W@EXK WB@SIN KA@BFL N@CSF. Instructor all from Grand Island. N@CSF recent "walk-in" that came out with an Adv. KA@LGF new Novice will be glad when he and his Dad, N@AIH, have the shack + antennae back in operation after their recent move to their new home. K@GJR retired this month from the United Telephone Co. & we hope to hear him on the air more. NE 40-meter Net has moved to 7282 and everyone checking in seems to like that freq better. 7282 rhymes with 3982 to help you remember and time is 1900 UTC. Have a nice Thanksgiving! Traffic: W@HOP 31, K@BRS 21, WB@GOB 20, W@ZNI 17, WA@BOK 14, W@EUT 11, @@NIK 10, WA@PCC 10, KA@BCB 9, WB@GWR 8, WB@GMQ 7, W@WKP 4, WA@OQX 3, WD@APY 2, KA@IOM 2.

NEW ENGLAND DIVISION

CONNECTICUT: SCM, Stan Horzepa, WA1LOU — SEC: W1SY. STM: KA1KD. Asst SCM: WB1AIU.

Net	Freq.	EST	Sess.	QTC	QNI	NM
CN	3640	1900 + 2200	62	230	358	K1EIR
CPN	915/315	1800/1000 Su	29	51	294	WB2PJU
NVTN	28/88	2130	30	61	313	WA1ELA
RTN	13/73	2100	31		42	WB1CPF
WCN	78/18	2030	31	72	392	W1DPR

High QNI: CN — WB1EKV W1QJM K1UQE. CPN: KA1QE K1EUW KA1KD. High QTC: NVTN — W1EFW. Shoreline ARC handled 45 messages at the Chester Fair and signed-up 12 people for their Novice course. New appointees: WB1CRH OBS, WB9IHH ORS. New Novices: KA1GQZ KA1GRD KA1GRL KA1GRM KA1GSO among the 32 newcomers produced by the Bethel Middle School ARC. Greater Fairfield ARA is appealing for contributions for building a station in the old Fairfield town hall. Connecticut Weather Net meeting Wednesday and Friday evenings on 146.52 simplex. Upgrading: Technicians — KA1CDH; General — KA1CAK KA1FKJ; Advanced — KA1BZW WB1CRH WB1CRI KA1CWB. Murphy Marauder members filled a lot of the top spots in the 1980 CQ WW phone contest results. KB1H hanging new DXCC and 5BWAS wallpaper. Southcentral Connecticut ARA flea market will be held November 8 at the North Haven Recreational Center. Special event station W1TCH will be active October 31. Traffic: (Aug.) W1EFW 306, WB1CPF 193, WB1GXC 131, K1GF 106, WB1CRH 81, K1UQE 76, W1XX 69, WB1EKV 59, WB1BDN 37, K1EUW 31, K1AQE 26, K1OQG 24, WA1WCG 24, KA1KD 23, W1DPR 18, WA1LOU 11, W1QV 6, W1CUH 4, WB9IHH 1. (July) WB1CPF 171. (June) WB1CPF 37.

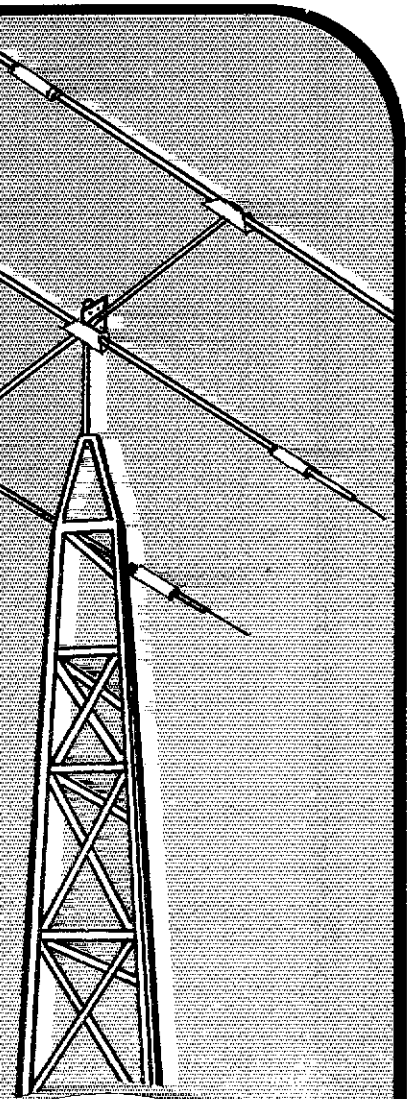
EASTERN MASSACHUSETTS: SCM, Rick Bebbe, K1PAD — STM: WA1TBY. SEC: WA1BLG. ASCM: K9HI.

Net	Mgr.	Freq.	Time (loc)/Dy	QNI	QTC
EMRI	N1GQ	3.658	1900/2200/Dy	468	370
EMRIPN	KA1BJY	3.898	1730/Dy	350	211
EM2MN	N1BNI	90/30	2000/MWF	230	89
NEEPN	K1BZD	3.945	0830/Sn	75	29
HHTN	K1BSO	04/64	2230/Dy	602	192
EMRISS	N1BHH	3.715	2030/Dy	160	82
NENN	WB1GQO	3.720	1815/Dy	325	89
MFARAD	WA1DWS	3.924	1300/M-Sa	161	53

Quannapowitt Radio Assn President, AA1M, was seriously injured in an airplane crash. Here's for a speedy recovery. Southeastern Mass ARA had a successful fund raising dinner. Wellesley Club celebrating 30th anniversary. Whitman Club had a flea market. W1BW recovering from a bad fall. KA1CKG was the winner of the Dr. Carlton Crosby Memorial Scholarship of $400.00 sponsored by FARA. WA1RKT flying over Nashua NH called in a fire through the Police Amateur Radio Team monitoring station on 52/52 and helped direct their efforts. OO W1NF received a thank you note from a 9-Land station for his card — pleasant surprise. The League has sent in its response to the FCC's Plain Language Rewrite. Because of membership input, the League recommended that the whole idea be scraped. Issue was taken with the question and answer, as well as some basic issues like the complete rewrite of the basis and purpose. The FCC's mistake was to claim they weren't going to change any substance and then turn around and redefine the basis and purpose, completely eliminating any reference to emerg communications. This slap in the face caused most hams to turn off right away. The League went on to suggest that the FCC should provide Amateur Radio with a sort of Bill of Rights stating once and for all that tower heights and interference are not the perogative of local governments at all, but federally regulated. In other League activities, the Long Range Planning Committee has submitted its Phase II report. It makes specific recommendations in a lot of areas, one of them being a reorganization of the field organization. Under the new structure, the SCM, (now called SM for section manager), would work more closely with the director and delegate some of his paper work to appointees. The "SM" would become part of a steering committee to help the director in doing what he is supposed to do — "set policy." Your thoughts? Traffic: N1BHH 602, WA1TBY 408, KA1ON 189, K1BSQ 75, WB1GQO 75, K1BA 66, KA1MI 62, KA1EMQ 57, K1BZD 40, W1CZB 18, WA1FNM 16, N8TM 14, N1AJJ 13, WB1EZT 10, K9HI 5, K1LCQ 3, KA1R 2, KE1U 1.

MAINE: SCM, Cliff Laverty, W1RWG — STM: W1BJ.

Hustler Tribander 3-TBA



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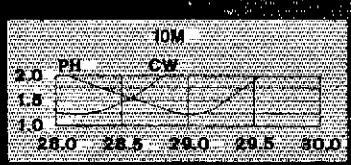

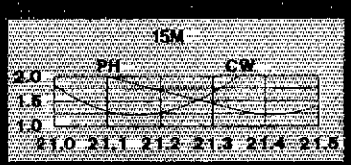

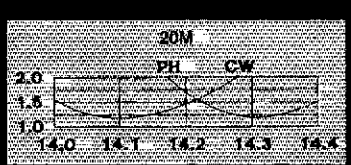

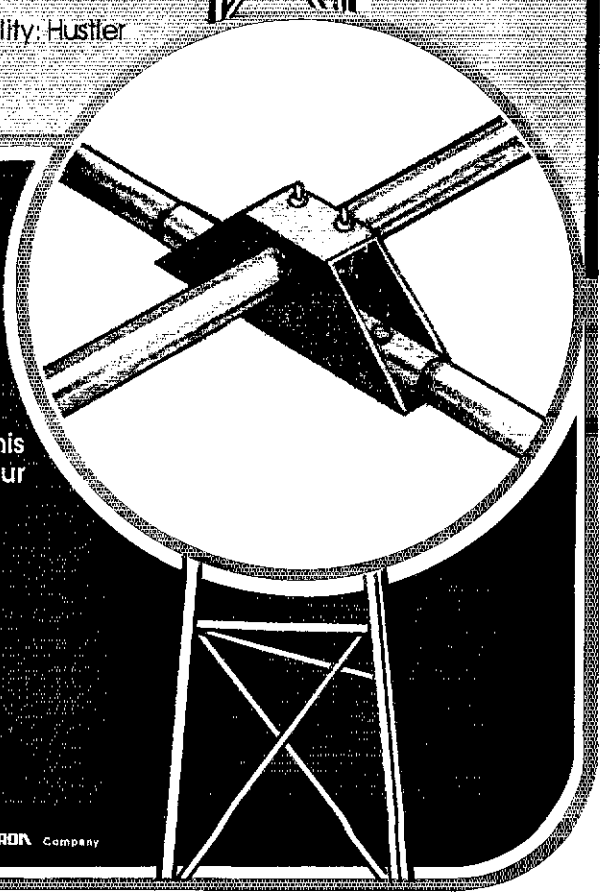

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SEC: KL7IJG. Arcadia Amateur Radio Assn provided comms for Winter Harbor Lobster Festival with WA1JMM KL7IJG N4CWY WB9WEP K7ABX and KA1GGE. The section is saddened to hear W1TO has become a Silent Key. Aroostook ARA provided comms for CEP, police, fire and highway depts during the flooding in Aroostook County. During power failures, ham radio was the only comms on road condx, washouts and evacuations. Net sessions/QNS/QTC: MSN 13/78/19, SGN 26/908/166, CMEN 8/115/18, PTN 31/275/132, MSPN 9/54/1, AEN 4/76/5, SPSN 12/13/158. PSHR: AK1W 105, K1NAN 65, W1BJ 62, W1RWG 60. Traffic: AK1W 155, W1BJ 87, WB1BYR 68, W1KX 68, W1RWG 66, W1BMX 50, W1HDC 49, W1AHM 33, W1GKJ 29, KA1TJ 24, W1CTR 23, K1TVT 19, N1BCE 16, WA1TNZ 15, N1BJW 14, W1WCI 12, KA1ENL 10, KA1CNG 8, KA1DIW 6, KA1AFV 2, WA2JCN 2.

NEW HAMPSHIRE: SCM, Robert C. Mitchell, W1NH/W1SWX — SEC: AK1E. STM: W1TN. NMs: N1NH K1OSM W1VTP. The 1RN meeting and picnic was excellent. Thanks to hosts W1QYY and XYL. Time to get antennas ready for winter. AK1E starting a cw slow speed net on Sunday evenings at 10. KA1BXN now KE1E. K1LGQ and KA1HU Extra. GSPN had 411 checkins and 90 traffic. The cord of wood raffle by the Great Bay Club was won by Mrs. Chick of Rochester. N1EX will be chairman for their second hamfest. Watch for the date. GSFMN had 751 checkins and 194 traffic. K1YPM on RTTY. Traffic: W1TN 238, W1GUX 120, KA1BBI 119, KA1CXP 93, K1OSM 88, N1NH 86, KA1BJ 75, N1ALM 71, K1YMH 64, KA1FWQ 47, W1MHX 44, W1ALE 39, W1VTP 35, KB1A 29, AK1E 19, WA1CJI 16, KA1FFX 8, W1NH 6.

RHODE ISLAND: SCM, Gordon Fox, W1YNE — SEC: KA1EHR. STM: KA1FE. Appointments: KB1G OBS. Endorsements: W2MCF EC Wash County. SEC reports 53 members enrolled in ARES. Section reorganization going forward. ORS KA1EAL will be sporting a new Extra Class call sign soon, as will KA1DZT. Congrats! STM, KA1FE, was recipient of citation from Hq for performance in PSHR. W1JFF coordinated group in supplying communications for Battle of RI, Inc. KA1FE KA1EAL WA1SEY KB0UX. OSARG 220 repeater should be in operation on .16/.76. KB1G OBS schedule Mon and Wed 2130 local and Sat 1200 local on 3715 and 147.57. Traffic: W1EOF 349, KA1BTU 244, KA1FE 116, KC1G 79, KB1G 64, W1YNE 49, KA1EAL 17, AE1S 2.

VERMONT: SCM, Bob Scott, W1RNA — SEC: WB1ABQ. STM: N1ARI. Upgrades: Extra — WA1ONT WA1ZMS WB1HHG; to Adv — N1AGY W1GXY WA1GKS. WB1CZE called the local police thru 2-mtr phone patch for a tfc accident in So. Burlington; AE1J called the State Police for a motorist on I-89. KA1GID is the new Net Mgr for VSBN, replacing N1ARI who had to resign due to other commitments after doing a very FB job as NM for about a year. VSB 31/548/88, GMN 26/437/45, Carrier 26/346/24, VTN 26/87/36, RFD 5/87/12, VPN 26/87/36. VTN (cw) welcomes any and all who would like to call in 3614 at 1900 hours, with or w/o tfc, slo or faster, bug, paddle, or straight key. Traffic: K1BQB 135, N1ARI 124, WB1ABQ 56, AE1T 34, W1RNA 31.

WESTERN MASSACHUSETTS: SCM, Art Zavarella, W1KK — ASCM: K1BE. SEC: W1JP. STM: W1TM. NMs WA1ITL W1UD W1UPH. Kudos NEARS group 1st anniversary Spfld repeater 146.835/235 N1AOX, pres.; K1ZGB, Tech. KA1T now taking regular NTS cw sked WMN/1RN. W1ETH maintaining JA connections and keeping ETH along with Extra Class. W1ZPB savoring the new delights of top-band op. W1YI still going strong on NE Teleprinter Net BPL tfc. Special Hq. recognition W1GKK receipt of QSL from country #366, thereby approving him as #1 on the DXCC Honor Roll. Mt. Tom Repeater Club with Hampden County support making final arrangements for Amateur Radio display and public svc at Eastern States Expo. with multi K tfc plans by K1IJV and W1UKR. PSHR: WB1HIH 117, W1TM 70. Traffic: WB1HIH 224, W1YI 217, W1TM 209, W1UD 168, WA1ITL 67, K1JHC 56, W1KK 33, W1JP 29, WA1OPN 21, KA1T 13, W1ZPB 13, K1IJV 11, WB1HKN 7, K1BE 6, W1UPH 4, WA1MJE 3, WA1YYW 2.

NORTHWESTERN DIVISION

ALASKA: SCM, Fred Wegmer, KL7HFM — ASCM: AL7AC. ASCM: KL7IBG. SEC: AL7CM. STM: AL7O. The autumn moths have heralded the upswing in ham activities as the kids return to school, hunting and fishing have taken a back seat for the winter. KL7CQ reports the DXpedition was cancelled due to slow diplomatic relations with Bhutan. KL7MD, Jasper, well known Alaska miner and writer, has tackled the job of writing an Alaska ham history. All who have some bits and pieces of information are asked to contact him and help out. The 10th annual Anchorage Electronics Flea Market looks like a success again. Vhf RTTY is looking good in Anchorage with about 15 participants with a variety of equipment and 146.70 simplex is the meeting place. Traffic: KL7AA 151, KL7I 41.

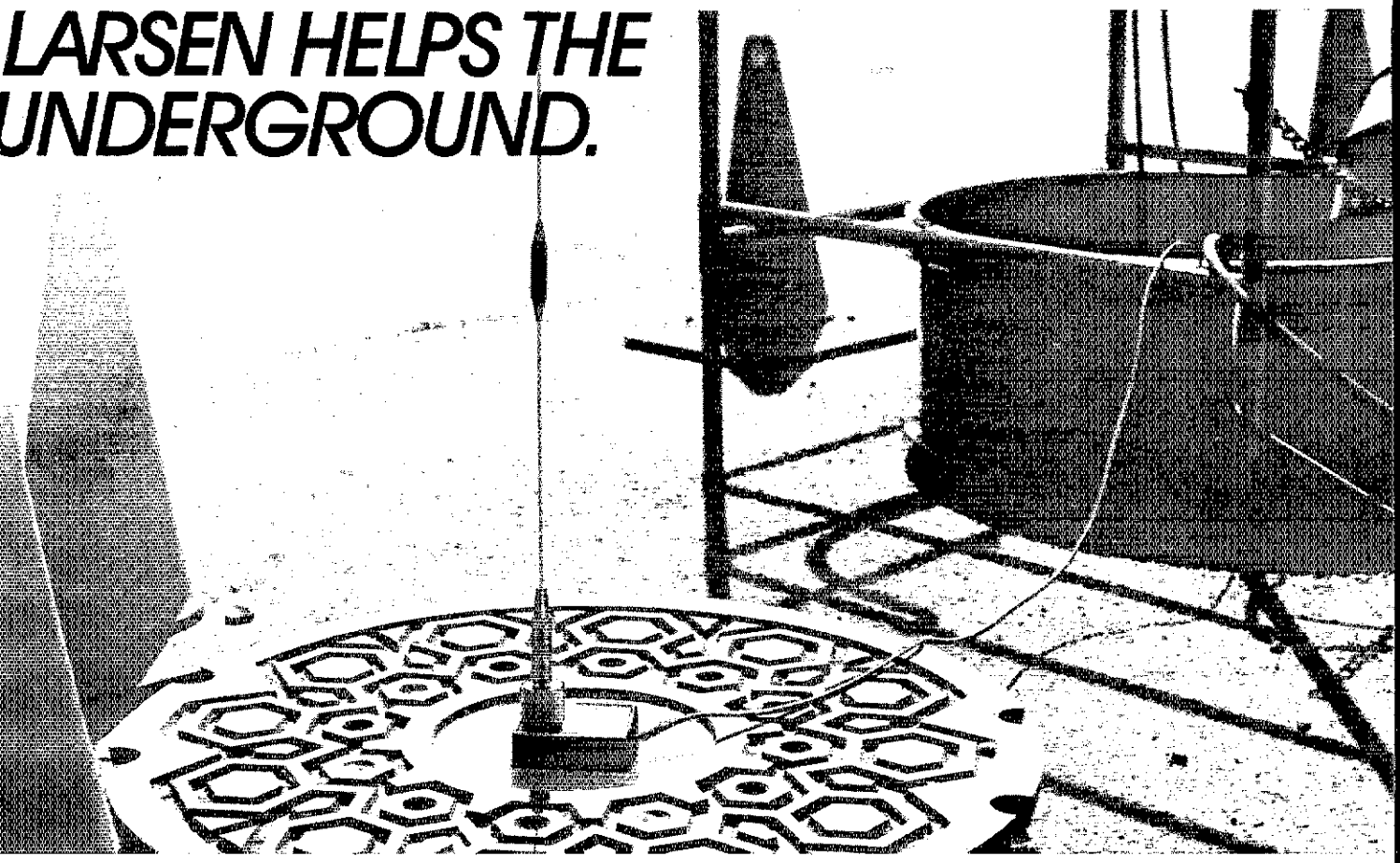
IDAHO: SCM, Lem Allen, Jr., W7JMH — Elmore County ARC reports fall classes for Novice start in Sept. Interested persons contact N7AYL or WB7QYU. Boise Club reports classes now starting — contact W7IWV or WB7PFQ. Congrats to WB7QYU, new EC Elmore County. W7HZL just back from 2000 mile motorcycle trip to 6-Land. W7CJC having tough time deciding whether to retire in Boise or stay on the farm where reception is better. KA7EIQ visited her parents, KA7FOV and W7JMH, briefly on trip back to Oregon. N7CPV visiting in Calif.

Net	Freq.	Time	Sess.	QNI	QTC
FARM	3935 ssb	8 P.M. Dy	30	1132	17
CD	3990 ssb	8:10 A.M. M-F	21	520	14
IMN	3635 cw	9 P.M. M-F	21	147	92

Dust off the portable rig and test it soon — the SET is coming. Traffic: W7GHT 190, AC7P 54, W7JMH 53.

MONTANA: SCM, Les Belyea, N7AIK — For the second year in a row the Gallatin Ham RC has provided a week of around the clock communications for the Youth Diabetic Camp held at Hyalite Lake south of Bozeman. KB7BJ KB7Q KF7R KA4DQV W7GP WB7OYP took 24 hour shifts. Also members from the Butte ARC spent a weekend at Red Mountain tuning up their repeater and was kept honest by a bear. Call change — WB7FBW is now KK7Y. N7AGP is net manager for the Montana Section Net. This net meets Sunday mornings at 9:30 (local time) on 7240 kHz. N7ATT has relocated to Billings and is working for Conley Radio. WB7BSC has moved to Texas with future plans for working in Australia (VK8-Land). W7LR has sent in QSLs for DXCC up-date, 299 countries mixed 273 on cw FB. KB7Q is looking for folks interested in fast scan television (ATV). W7RZY is the Montana Area Coordinator for AMSAT and is looking for new members. K7TQM has revamped his antenna farm and can now work K7SIK on 2-m via the 28/88 repeater

LARSEN HELPS THE UNDERGROUND.



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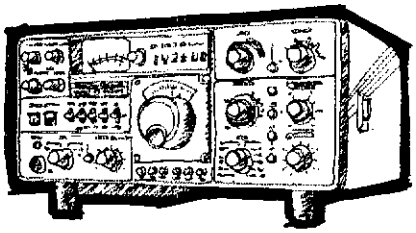
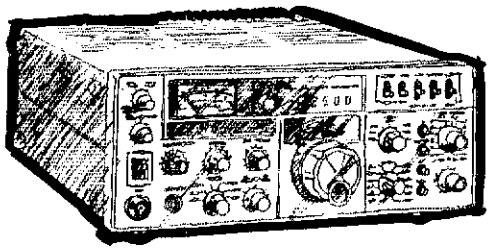


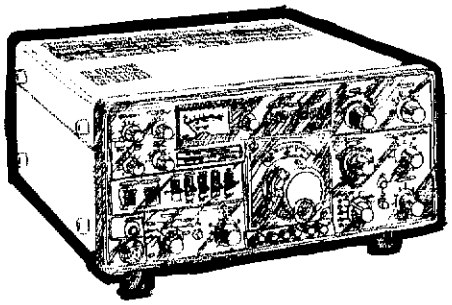
FT-902DM

YAESU

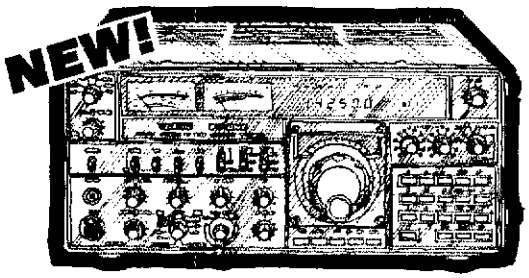
FT-707



FT-107M



FT-101ZD MARK III



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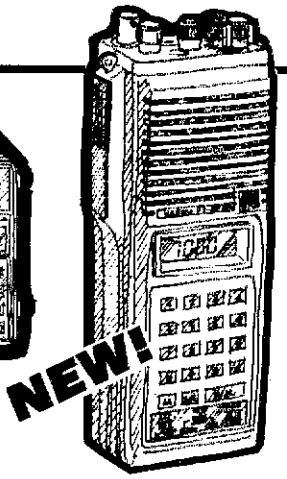

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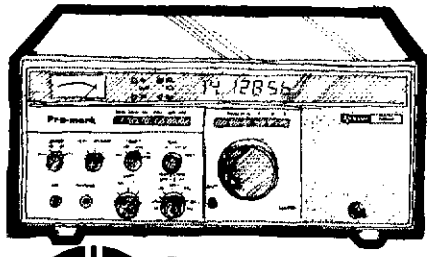

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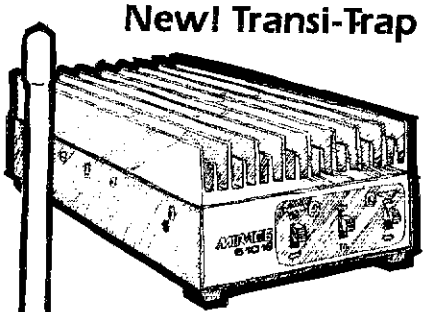

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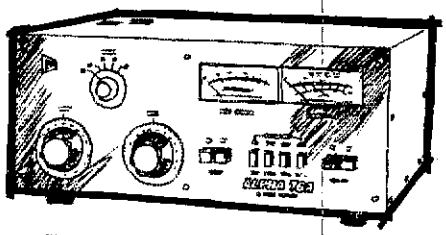

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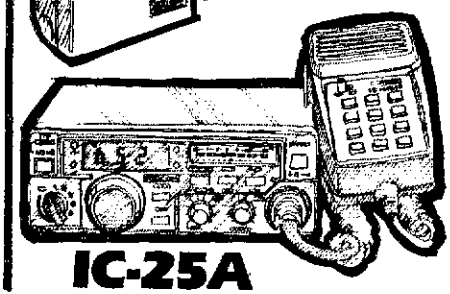
IC-2AT

IC-720A



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OREGON: SCM, William R. Shrader, W7QMU — SEC: K7WWG. STM: W7VSE. Section nets:

Net	Time/Day	Freq.	QNI	QTC
BSN	0145Z Dy	3908	730	37
OSN	0230/0600Z Dy	3587	461	444
OARES	0115Z Dy	3993.5	456	136
OARES	0230Z Dy	3993.5	146	31
WCN	0300Z Dy	3706	358	120
PTTN	0300Z Dy	146.76	616	93
PdxARES	0300Z Dy	147.32	1518	22
LBLARES	0330Z Dy	146.79	995	8
LCARES	0300Z TWFSu	146.85	245	6
SOARES	0330Z MThSa	146.94	265	100
MPARES	0300Z TTh	147.02	263	1
SOFM	0330Z T	146.64	160	4

Upgrades: KA7JCX KA7DRH KA7KIR (Tech); KA7EHS KA7TED (Gen); WB7TYR (Adv); K7ZIG KB7JW (Ex). WB7TED teaching Novice class in Warrenton. Mt. Shasta climbed in one day by WB7RQF and WA7USX. W7TC working hard as Official Observer. W7KEU new OO. N7CJQ with help of W7NCO N7CVA KA7DWX and KA7JOH got beam and tower up. W7FQ new BSN manager. OSN/RN7 campout success; ops WA7LGN KA7ELI N7BMY KB7JW and visitors N7BIY KA7IYD KA7SKK and WB7TXF. Lots of traffic handled. K7JUC new Grant Co. judge, congrats. Douglas Co. ARES group handled comms for canoe and kayak races on Umpqua River; KA7AID coordinated. Traffic: W7VSE 698, KB7JW 449, W7LRB 320, KA7ELI 279, W7ZB 208, K7NTS 205, WA7IHS 178, W7LNE 172, WB7OEX 109, WA7LGN 101, W7OMU 51, K7VM 35, K7ZIG 24, KA7DBS 15, W7LT 12, W7DAN 6, K7WWR 6, WB7DSK 3, W7TC 2.

WASHINGTON: SCM, Bob Klepper, W7IEU — SEC: WA7RWK. STM: W7DZX. NMs: WA7CBN KA7CSP W7GB W7IEU. Nets reporting are: NTN: QNI 936, QTC 64; WARTS, QNI 2888, QTC 179; NWSSBN, QNI 607, QNI 46; WSN, QNI 633, QTC 196; EWTN, QNI 73, QTC 92; IETN, (4 sessions), QNI 16, QTC 5; PSTS, QNI 116, QTC 61; SCARES, QNI 102, QTC 3; KB7G busy going to school and working 40-mtr DX. W7UU heard daily on 3975 airing Westlink News at 5:50 P.M. Sorry to report the following have become SKs: W7AJ W7FDP WA7GMX W7PRY. WSN traffic training net operates on 3730 kHz Mon, Wed, Fri at 6:15 local time. Members of Evergreen Amateur Radio Service, (EARS) joined members of Jefferson S&R group was well pleased with the communications EARS provided them. WB7FGC has installed new 2-mtr antenna at OES office. Daily WX reports on Mt St Helens are heard at 9:30 A.M. on the BEARS Rptr. on 145.33. New officers of NWSSBN are: W7JHR, mgr.; W7DSB, secy/treas.; K7AJT W7FIM W7GTJ K7GXZ K7KPC, directors. LCARA had a hf and 2-mtr display along with DES emergency van at Cowlitz Cty Fair. Members of Centralia Valley ARS provided communications for Centralia Criterium Bicycle Races. KD7G was inadvertantly left off the list of participants who participated in the hospital exercise mentioned in the June report, sorry. WA7RWK will be your new SCM beginning October 1, let's get behind him and support him. Traffic: W7DZX 723, AD7G 147, W7FJZ 118, K7GXZ 117, W7IEU 104, K7CTP 96, W7BUN 80, N7AFZ 71, WA7BDD 68, WA7JEB 52, W7GB 31, N7AFY 22, W7APS 21, WB7GFH 18, W7ERH 11, WA7EDQ 10, KB7G 2, WA7OJI 1.

PACIFIC DIVISION

EAST BAY: SCM, Bob Vallio, W6RGG — Asst SCMs: W6ZF N6DHN VE2AQV/W6. SEC: WB6KQU. EBARC welcomes new member Earl Pederson & congratulates WD6DRQ on his upgrade to Adv. Their members on the scene of the Blackhawk Fire were KA6OLK WA6JSO WA6ZFV N6DRT & WB6MFE. LARK welcomed new members KE6BS KA6JOQ & KA6QEL. They have revived their "Klutz of the Month" award & the latest honoree was KA6QEL! Their latest Novice class graduates are KA8PUU KA8QEI KA8QEJ KA8QEK KA8QEL KA8QGN KA8QJG KA8QJY KA8QJZ KA8QLW KA8QLX KA8QLY & KA8QOT. Congrats to them and the club! SBARA meets each 3rd Thurs at Fremont School, Fremont. If you'd like to attend, they have a talk-in on 145.6. Their recent picnic featured a T-Hunt won by KA6BOI, an IC-2AT raffle won by N6DNC & champagne at 5:30 A.M. NCCC Repeater, WR6ADM, 147.84/24, now has its antenna atop a 90 foot tower thanks to the combined efforts of K6OMB WA6BOB WA6TPE N6BT N6RO W6XX KN6K WB6FCR KD6ZY WB6NMW WB6UZX WB6VIV WA6IVQ & N6KB. The increase in coverage for Alameda County RACES has been FB. Traffic: WB6UZX 20, KA6ERF 7.

PACIFIC: SCM, Pat Corrigan, KH6DD — NH6K doing most of the work on PTN these days. If you can help, check in on 14110 kHz at 0200Z. W8WU/KH6HEI visited over Labor Day. WB6CKT back here to visit family this summer. KH6HIJ made another trip to visit family on the mainland and thanks to NH6K for filling in on PTN. New repeater on windward Oahu on 147.81/21. EARC is firming up plans to have 2M/10M link-up to American mainland. Plans call for a tone access to activate system. At this writing, ARRL Pres., W2HD, and Pac. Div. Dir., W6ZM, are planning trip to Hawaiian Islands in Oct. KH6N got his big iron in the air in preparation for fall season contests and DXing. KH6GMP had hard time keeping things straight when talking to both NH6K and KH6N in the same QSO.

SACRAMENTO VALLEY SCM, Norman Wilson, N6JV — SEC: N6AUB. ASCM: KI6T. KA6IUE is the new EC for Sacramento County. Many thanks to W6CFQ, the former EC, for his fine service to the ARES. Thanks also to WA6BYY, ex-EC of Nevada County, who has moved out of the section. The River City ARCS in cooperation with the Fulton-El Camino Recreation and Park Dist. are holding Novice/General classes. Congratulations to KA6NSF on getting his General ticket. NA5A was the call used by the Nevada County club at the Nevada County Fair. Their solar powered station was a special hit. WR6AEN has the bugs out of their auto-patch. Traffic: W6RSP 13, N6AUB 10.

SAN FRANCISCO SCM, Bob Smith, NA6T — STM: K6TP. Mendo Coast amateurs received 60 ft tower donated by City of Fort Bragg for new repeater on Cahto Peak. FWRA upgrading 5 repeater system for emergency communications in NW CA. Late congrats to W6SG ops for 780 pieces of traffic handled and FB PR for Amateur Radio at Marin County Fair. Newly merged Sonoma County Radio Amateurs Inc. now publishing "Short Skip." Sonoma Co. amateurs to have DAT and RACES training. N6BLN, EC Sonoma Co., Forming vhf and hf nets for CDF assistance at fires. Mendocino Co. RACES installed 2-mtr equipment at Adventist Hospital for

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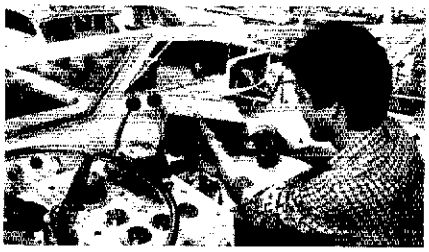

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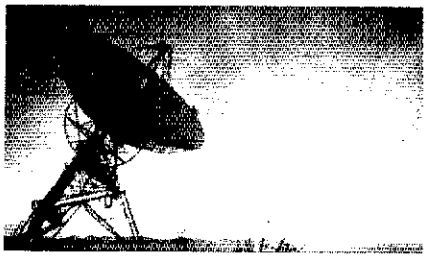

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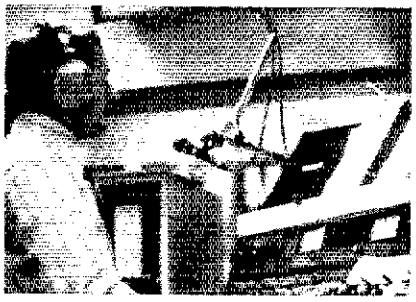

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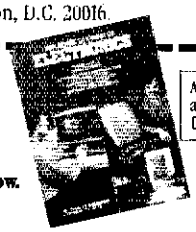

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emergency communications. Congrats to WA6ACX and N6DCJ on upgrades. Traffic: K6IPL 303, W6NL 287, W6RNL 213, K6TWJ 83, K6TP 74, WB6RTE 46, WA6QXV 6, AA6DX 4, W6GGR 4.

SAN JOAQUIN VALLEY: SCM, Charles McConnell, W6DPD — SEC: WA6YAB. K6SEV W6FEE W6BUT W6AW and WB6WWJ are Silent Keys. Appointments renewed: WA6JDB, ORS; WA6EXV, OVS. New officers of the Tulare County ARC are KA6HAY, pres., WD6FUF, v.p.; WB6MGG, secy-treas. The club meets the 4th Thrus. in Visalia. Recent upgrades: Advanced — KA6DTV WD6GJL; General — N6DQE; Tech — KA6ADO KA6OWZ WD6FAA WB6PJY. K6XJ has aTR-9000. AD6V W6RGJ and WB6YDE have TR-7730s. W6DVL has a TS-130S. KU6A has a TR-2400. K6OZL won the CQ WW 28 MHz CW Single OP for Cal. K6BPY chases DX from near Mariposa. WA6JDB has DXCC. W6ILH has a new linear. K6JKQ is working on his 1296 MHz rig. KA6CZR WA7PEI K6YK and WA6GQY are active on the County Hunters Net. I wish to everyone in the SJV Section a very Happy Thanksgiving. Traffic: N6AWH 187, KV6W 20, W6DPD 13, KB6CC 6, WD6FRS 6, WA6JDB 5, WA6YAB 4, W6SX 3, K9YBM 3.

SANTA CLARA VALLEY: SCM, Jettie Hill, W6RFF — SEC: WB6IZF. STM: W6ZRJ. WVARA had showing of "So This Is Ham Radio" and KA6PVI gave talk on fire fighting; new or upgrades are KA6JFC KA6PVI KA6PZO KA6PZP KA6PXU KA6PWZ KA6PXV KA6PVJ KA6OVW and KA6PZS. WVARA's Emergency Communications Mannual is being updated by WA6WEB. New trea. for SLVARC is WB6IZT. New member of NPSARC is KA6IVL and KG6G departing for Germany. The SPARK picnic was a "howling affair"? N6OM is bowing out as SPARK editor. W6CFK will describe two weeks on the Love Boat, on a special cruise section for hams to the SCCARA members. Special planning meeting for 1982 Pacific Division Convention was called by WA6OCV — remember it is in Oct and in Santa Cruz. Memorex ARC has started code classes at work — N6XV for info. N6ST described his DX trip to the Caribbean to FARS members. New FARS members are KA6MPK N6EAF WB6UGZ KA6HMZ KA6DNX KH6LD W6CIE N6APD WA6VZZ KB6BA KD6QG and several others awaiting calls. A talk on "Using Test Equipment in Amateur Radio" was given to SMRC by W8MKM. SMRC is conducting a Novice Training Course at the home of W6SER. New OO for SCV is WD6GIT. K6AYB busy with OO work. Northern California Net Picnic in Lafayette was a huge success with 30 attending, from SCV were W6ZRJ W6YBV K6YKG W6VZT W6RFF and others. LERA ARC's repeater now resides on Black Mtn and they welcome new members W7QJC WA6UAP and WB6MJD. WD6FEL is off to Guam for a year. SEC WB6IZF is looking for emergency coordinators, especially in the north of San Mateo County — contact him if interested. Traffic: W6YBV 246, W6KZJ 138, W6ZRJ 33, W6RFF 29, W6PRI 12, W6ASH 6.

ROANOKE DIVISION

NORTH CAROLINA: SCM, Ed Stephenson, AB4S — ASCM: N4UE. STM: NJ4L. SEC: WA4BFT. NMs: CN AB4V, CMN NJ4L, THEN WD4CNR, JFK WB4WII, NCSSB WB4CES. NC's loss is Florida's gain. K4DHX already moved to Orlando. Thanks for all the help while here. He leaves a big hole. Another big success at Shelby Hamfest despite threatening weather. This might be our last chance before winter weather to finish antenna projects. How's yours? Silent Key: WA4LFE, Wilmington. WA4PID new Director for JFK Net; congrats. Two shopping malls in Wake County to be covered for one week before Christmas. Crabtree Valley Mall by Raleigh ARS and Cary Village Mall by Cary ARC. Any others? New satellite should be up in orbit by now. See OST for details. Personality of the month: Carl Starnes, W4EAT. First call sign K0MXQ in Gettysburg, SD, January, 1958. Received W4EAT in January, 1959. Retired air traffic controller. He is active in NC traffic nets and the Interstate Net. Does your club have someone assigned to send news items to your SCM? Suggest it at the next meeting, PLEASE. Net managers reporting generally increased participation. Thanks to all. That is what makes it (NTS) work. Traffic: (Aug.) NJ4L 367, WD4CNQ 314, WD4CNR 202, KF4R 177, W4PCN 176, WB4UJH 173, WB4WII 168, W4EAT 166, AB4V 159, K4MC 130, NB4L 120, WA4UTC 120, AB4S 109, N4CJJ 94, WA4SRD 91, KU4W 85, K4DHX 73, WD4JJK 69, K4FTB 67, WD4EIQ 65, WA4OJU 59, W4RVE 52, N4CCK 36, WB4CYN 36, WA4OBR 35, W8PJS 34, K4IWW 33, NE4J 29, WA4CUD 27, WD4LOO 26, W4PRQ 26, K4EVY 25, WD4HTE 23, N4UE 21, KC4AM 17, KA4KJI 17, WA4PID 17, KA4ATK 16, W4WXZ 16, KZ4A 12, WB4DAR 12, K4DGU 12, N4EHM 8, WB4SLF 4. (July) N4BEX 10, WB4SLF 4.

SOUTH CAROLINA: SCM, Richard McAbee, W4MTK — Asst SCM: WB4DUK. SEC: WD4HLZ. STM: W4ANK. NM K4PFC KC4LA KA4AUR. Congrats to the following: new net mgr. for SC Noontime Net KC4LA, upgrades NO4K. Carolina State Line Net keeping busy with communications for foot races, as well as the Spartanburg ARC. Newberry County ARES Net provided communications for foot races at the Little Mountain reunion. Need net control stns. on the morning net, won't you join them and give them a hand? Check-ins/traffic: SC SSBN 1352/143; Blue Ridge 2-Meter Net 2620/72; CN 636/316; SC Noontime Net 291/35; Lancaster County 2-Meter Net 148/7; Western SC Emergency Net 482/41; Newberry County 2-Meter ARES Net 93/3; Carolina State Line Net 81/3, 54/0 (July); CNN 125/19; York County ARES Net 239/18 (July); SC ARES Net 22/0. Traffic: (Aug.) K4ZN 276, W4ANK 134, W4NTO 127, K4ZB 80, W4FMZ 78, KA4AUR 50, WA4MIY 43, K4FRX 39, W4MTK 29, WA4JWS 15, NQ4N 14, WB8TCT/4 11, KA4LRM 10, WB4NBK 7, W4DRF 4. (July) WA4MIY 31.

VIRGINIA: SCM, Luck Hurder, WA4STO — ASCM: K3RZR. STM: KY4K. SEC: KZ4K. Chief OO — W4HU. Chief OBS: K3RZR. Chief OVS: N4CD.

Net	Time	QNI	QTC	NM
VSBN	6:00	603	335	W4NWM
VSN	6:30	332	135	WB4KSG
VN	7/10	526	314	W4SUS
SVEN	7:15	446	63	N4EVV
VLN	10:15	558	279	WD4ALY
VNTN	Noon	236	104	WD4FTK
WARC	8:30 A.M./Su	26	6	K4JST

A fond welcome back to the ORS ranks to Charter Life Member K4LMB. NMs W3ATQ & K4JST working overtime prepping liaisons and Net Controls for the Christmas traffic crunch. New ECs: WA1VRL WB4YEX KA4SSZ. Blue Ridge District has new DEC — WD4RIE. New OESs: WA4TVS and WB2OMZ (of K4KDJ fame).

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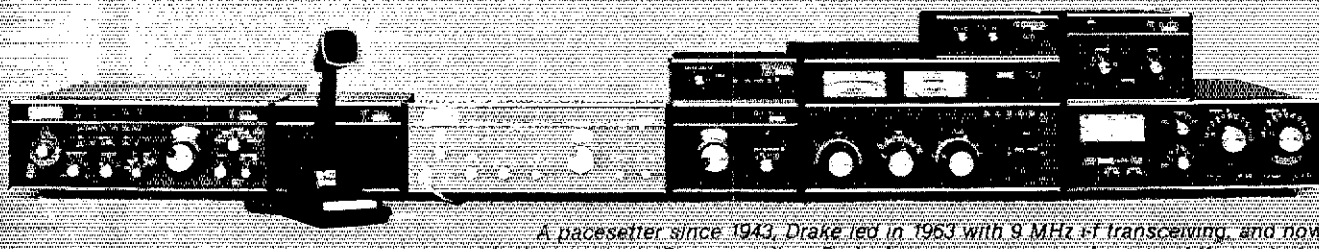

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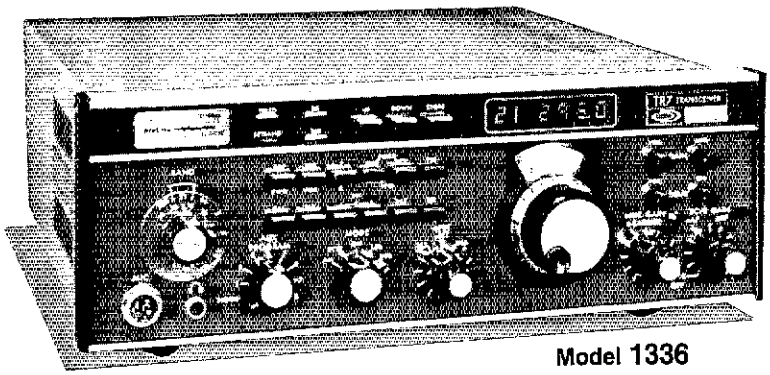

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TR7

solid state continuous coverage synthesized hf system

Continuous Frequency Coverage—The TR7 provides continuous coverage in receive from 1.5 to 30 MHz. Transmit coverage is provided for all amateur bands from 160 through 10 meters. The optional AUX7 Range Program Board allows out-of-band transmit coverage for MARS, Embassy, Government and Commercial services as well as future band expansions in the 1.8 through 30 MHz range.* The AUX7 Board also provides 0 through 1.5 MHz receive coverage and crystal-controlled fixed-channel operation for Government, Amateur or Commercial applications anywhere in the 1.8 to 30 MHz range.

Synthesized/PTO Frequency Control—A Drake exclusive: carefully engineered high-performance synthesizer, combined with the famous Drake PTO, provides smooth, linear tuning with 1 kHz dial and 100 Hz digital readout resolution. 500 kHz up/down range switching is pushbutton controlled.

Advanced, High-Performance Receiver Design—The receiver section of the Drake TR7 is an advanced, up-conversion design. The first intermediate frequency of 48.05 MHz places the image frequency well outside the receiver input passband, and provides for true general coverage operation without i-f gaps or crossovers. In addition, the receiver section features a high-level double balanced mixer in the front end for superior spurious and dynamic range performance.

True Passband Tuning—The TR7 employs the famous Drake full passband tuning instead of the limited range "i-f shift" found in some other units. The Drake system allows the receiver passband to be varied from the top edge of one sideband, through center, to the bottom edge of the opposite sideband. In fact, the range is even wider to accommodate RTTY. This system greatly improves receiving performance in heavy QRM by allowing the operator to move interfering signals out of the passband, and it is so flexible that you can even transmit on one sideband and listen on the other.

Unique Independent Receiver Selectivity—Space is provided in the TR7 for up to 3 optional crystal filters. These filters are selected, along with the standard 2.3 kHz filter, by front panel pushbutton control, independent of the mode control. This permits the receive response to be optimized for various operating conditions in any operational situation. Optional filter bandwidths include 6 kHz for a-m, 1.8 kHz for narrow ssb or RTTY, and 500 Hz and 300 Hz for cw.

Broadband, Solid State Design—100% solid state throughout. All circuits are broadbanded, eliminating the need for tuning adjustments of any kind. Merely select the correct band, dial up the desired frequency, and you're ready to operate.

Rugged, Solid State Power Amplifier—The power amplifier is internally mounted, with nothing outboard subject to physical damage. A Drake designed custom heat sink makes this possible. The unique air ducting design of this heat sink allows an optional rear-mounted fan, the FA7, to provide continuous, full power transmit on SSTV/RTTY. The fan is not required for ssb/cw operation, since normal convection cooling allows continuous transmit in these modes.

Effective Noise Blanker—The optional NB7 Noise Blanker plugs into the TR7 to provide true impulse-type noise blanking performance. This unit is carefully designed to maximize both blanking and dynamic range in order to preserve the excellent strong-signal handling characteristics of the TR7.

* NOTE: Transmitter coverage for MARS, Government, and future WARC bands is available only in ranges authorized by the FCC, Military, or other government agency for a specific service. Proof of license for that service must be submitted to the R. L. Drake Company, including the 500 kHz range to be covered. Upon approval, and at the discretion of the R. L. Drake Company, a special range IC will be supplied for use with the Aux7 Range Program Board. Prices quoted from the factory. See Operator's Manual for details. (Not available for services requiring type acceptance.)

Specifications, availability and prices subject to change without notice or obligation.

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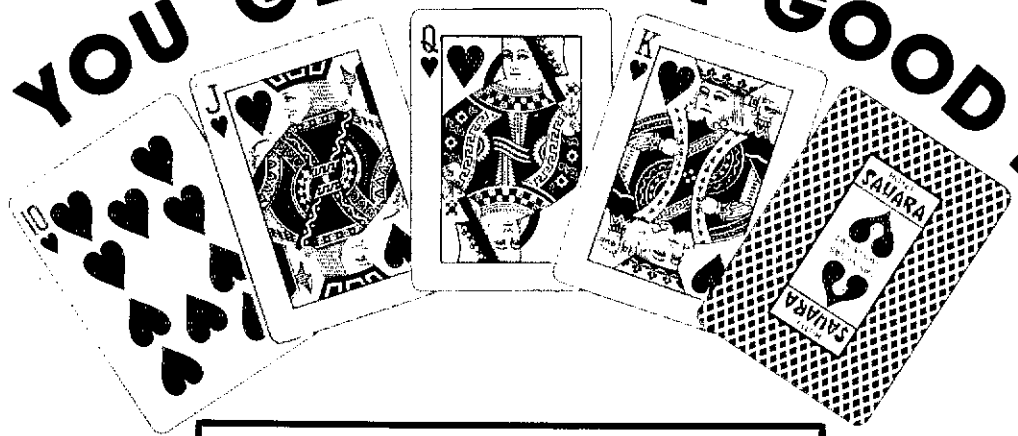

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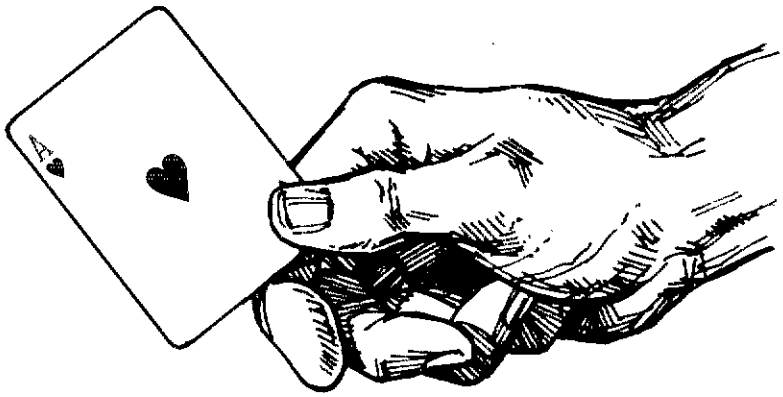

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OOs WB4CGI W4HU W4MLC WA4STO and KB4WT report 20 violations for August. K3RZR KA3DTE KZ4K and KA4ERP enjoying Navy MARS. W4SUS has his TRS80 perking on RTTY, while N4DYL has Robot doing likewise. W4YE W4KFC & K4LMB in Cleveland for QCWA convention. WA4LJI reports good rapport with Highland County officials in preparing for emergency communications demonstrations. If someone asks, do YOU know how ARES and RACES fit into the overall Virginia emergency plan? Are YOU a member of RACES? Contact SEC KZ4K for the details. Hey Novices and Techs! There's a group of public service communicators looking for YOUR help at 6:30 each evening on 3705. Join in and find out what's happening. The Virginia SCM election is right around the corner, now! Don't neglect to send in your vote to Hq. Kudos to BPLers KA3DTE KA4ERP W3ATQ & K4JST! N4NK sends word that he is still working with OEES and WA4LJI reports his 5th year of success with the Rockbridge Festival — FB! Hq reports that a forthcoming package will help groups to set up public service demonstrations while other efforts will be made to train and certify those of us interested in emergency preparedness — Good news from the folks in Newington! Traffic: (Aug.) WA4STO 691, KA3DTE 666, KA4ERP 644, W3ATQ 587, K4JST 542, WB4PNY 422, WA4LJI 412, WA4CCK 382, KY4K 301, KZ4K 248, WD4FTK 198, WD4ALY 162, WB4FDT 138, KA4IUM 119, W4UQ 114, WB4KSG 103, W4SUS 100, WB4FLT 96, N4EVV 92, W4NWM 90, N4DYY 68, W4YVG 57, K4JM 55, W3BBN 44, WA4YIU 44, WA4QWC 37, K4VWK 37, KB4WT 37, NN4I 35, WB4KIT 29, K4DHB 27, K3RZR 27, K4EJ 24, KI4W 24, WB4RWY 22, WB4ZTJ 20, KA4HLI 19, W4NFA 18, W3BBQ 15, N4BJX 12, WB4MAE 12, WD4KQJ 11, W4LXB 11, WB4UHC 11, WA1VRL 11, WB4ODZ 10, W4YE 10, W4OKN 8, N4LE 7, KD4FP 6, W4KXE 6, WB4DQZ 5, W4KFC 5, K8LGA 4, W4PVA 4, WA4EQW 3, WB4LAB 3, W4CFV 2, KC4HN 2, WA4TVS 2. (July) KD4FP 30, W4NLC 18, K4MTX 17, W4CFV 8.

WEST VIRGINIA: SCM, Karl S. Thompson, K8KT — SEC: K8QEW. STM: KD8G. NMs: K8MHR, W8FZP WB8LDY. WV ARES/RACES Net meets 2nd and 4th Thurs. on 3990 just after WVFN. Chas. area hams assisted with stern-wheel regetta activities.

Net	Freq.	Time	QNI	QTC	Sess.
WVFN	3990	2200Z	716	121	31
Midday	7235	1600Z	327	29	30
WVN	3567	2300Z	131	72	27
WVNN	3730	2215Z	101	19	22
Hillbilly	14290	1600Z Su	171	36	5
WV 6Mtr.			118	4	29
KFC 2Mtr	87/47	8:30 (E) M	120	12	4
PARA 2Mtr	19/79	8:00 (E) F	59	2	4

KD8G 72, WD8DHC 62, K8QEW 61, N8AJC 56, K8KT 55, KD8X 42, KC8CS 30, WD8LDY 21, KN8W 21, W8CKX 12, KA8HAL 11, WB8SAW 10, K8MS 9, N8CFX 7, N8CFY 4, WB8UDY 3.

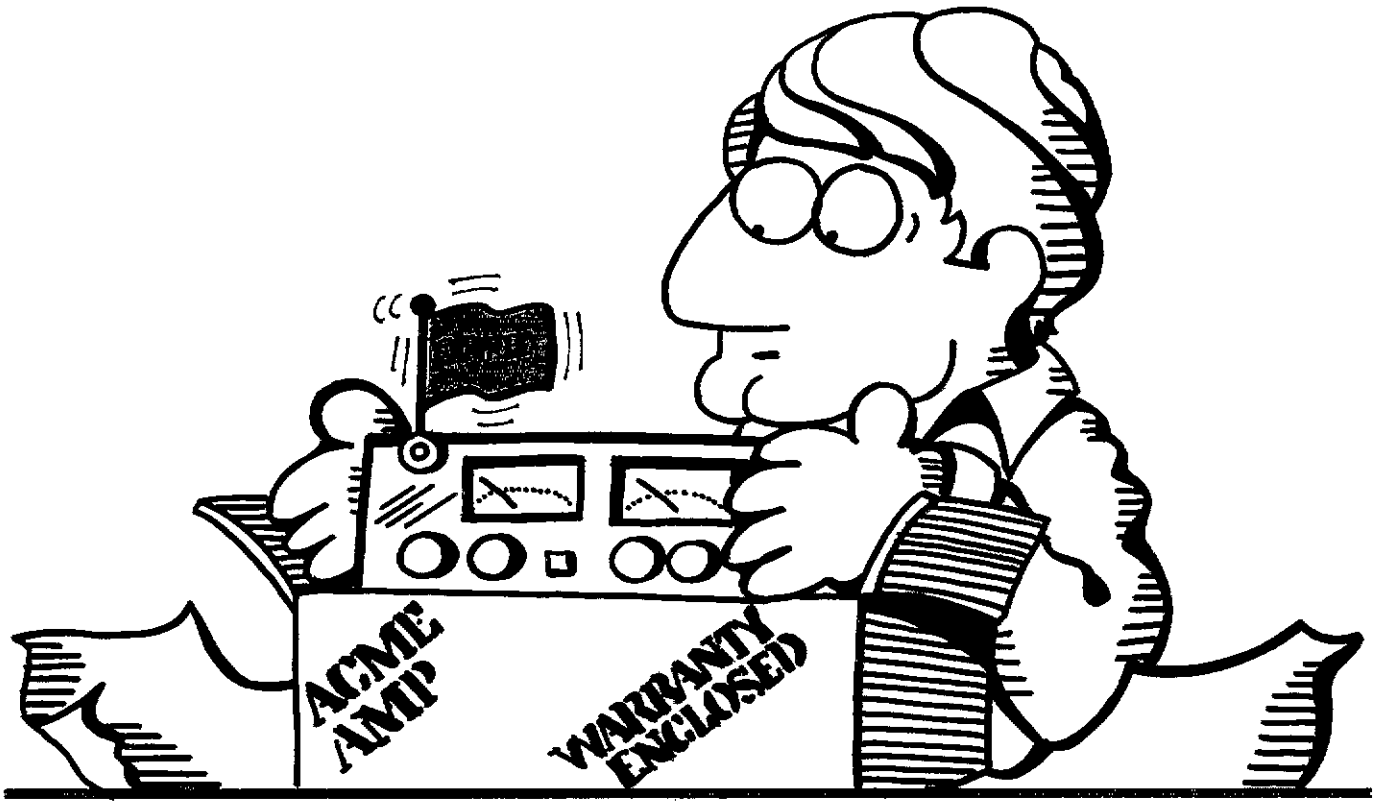
ROCKY MOUNTAIN DIVISION

COLORADO: SCM, L. E. Steimel, W0ACD — SEC: K3PUR. STM: WB0MCL. NMs W0HXB N0AXQ WD0AIT W0EJD WA0RYL KB0Z. This has been a busy summer for the amateurs of the Colorado Section, with the various public service activities such as the March of Dimes, Mile High Marathon, other races and activities. There has been several weather nets with participation from amateurs all along the Eastern Slope of the Continental Divide. The Severe Weather Net System has been effective due to the efforts of WB0TWE, who has acted as liaison between the Weather Bureau and amateurs. The regular Colorado Amateur Radio Weather Net has some old timers as regular checkins. W0ACH was among the first to assist in forming the net. He completed 26 years on Sept. 5, 1981 with 8133 weather messages. Not only radio amateurs participate in the net activities as KEL 2538 from Crook, CO has originated 1982 weather messages as of Sept 5, 1981. Thanks to everyone for their loyal support to the weather net. Nets: HNN, 29 sess, QNI 1722, QTC 115, Inf 338, QNF 1351, TCN, 29 sess, QNI 178, QTC 151, WNF 697; Columbine, 26 sess, QNI 976, QTC 53, Inf 178, QNF 972. Traffic: (Aug.) N0BQP 2245, WA0HJZ 1249, W0EJD 256, K0DJ 210, W0HXB 181, W0FPT 176, W0RE 171, WD0AIT 167, W0ACD 78, W0LAE 67, KB0Z 56, W0NFW 51, W0GO 38, W5HRS 30, W0GW 6. (July) N0FB 30.

NEW MEXICO: SCM, Joe T. Knight, W5PDY — SEC: W5ALR. NMs WB5NNG KB5LI W5VFQ. Southwest Net (SWN) meets daily on 7.083 at 1930 local and handled 134 msgs with 242 stations in. New Mexico Roadrunner Net (NMRRN) meets daily on 3.939 kHz at 0100 Zulu and handled 99 msgs with 881 stations in. New Mexico Breakfast Club meets daily on 3.940 kHz at 0700 local and handled 91 msgs with 734 checkins. Yucca 2-Mtr Net, 146.01/61 handled 20 msgs with 738 checkins. Vy sorry to report the passing of three who will be deeply missed. They are W5IWX WA5FQQ and WB5YCF. Each held a special place in our hearts. Abq Caravan Club reports a fine Corn Roast with about 60 attending. Traffic: W5DAD 250, W5JOV 159, KA5DDW 110, W5ENI 83, KB5LI 50.

UTAH: SCM, Leonard M. Norman, W7PBV — SEC: WB7BZJ. Utah Code Net (UCN) meets daily at 1930 on 3710. Novices welcome. Beehive Net meets daily at 1230 on 7272. KA7GRW and N7BUO passed General. WB7NDL, despite the ATC strike, presented a slide show on radio controlled model aircraft. W7PBV and WB7BZJ enjoyed WIMU Hamfest. UARC starting a Novice class, contact N7SM for details. KA7IMV has worked WAS, now looking forward to WAS on 15, needs AZ, ID, NM, and ND. W2HD presented WB7BZJ with a certificate of merit at WIMU. WB7TUR has a model 28 teletypewriter. WA7ZBO WB7VCI KA7AFG KA7EVV KE7G N7BNC and N7CGD provided comms for a Ride and Tie competition. KA7IMV played host to a group of radio amateurs on a tour of an ATC radar site on Blowhard Mtn. Traffic: K7HLR 202, WA7MEL 72, W7OCX 18, N7DF 4, W7FYR 4, W7PBV 4.

WYOMING: SCM, Dick Wunder, WA7WFC — SEC: WB7EIN. As we get into the fall routine, let's get the Amateur Radio classes started. Also, keep me informed on your club activities and meeting schedules. I will try to visit your clubs when traveling in the area. WB7VYO upgraded to General and KA7FPX upgraded to Technician, congrats to both of you. WB7NHR reports the Wyoming Cowboy Net held 21 sess with 418 QNI and 10 QTC. WA0PFJ reports the Wyoming Jackalope Net held 25 sess with 332 QTC and 0 QNI. The SET is coming up October 17 and 18. Coordinate your activities with the Section Emergency Coordinator (SEC), WB7EIN. Traffic: WB7NHR 206, WA7GYQ 167, W0OGH 165, W7SQT 26.



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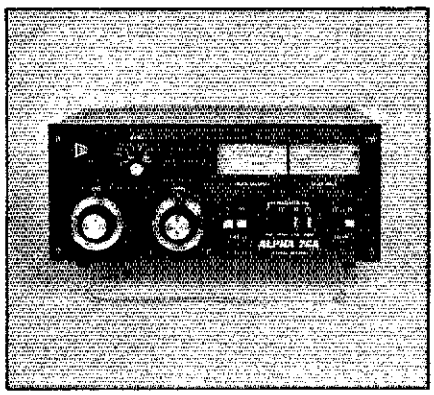

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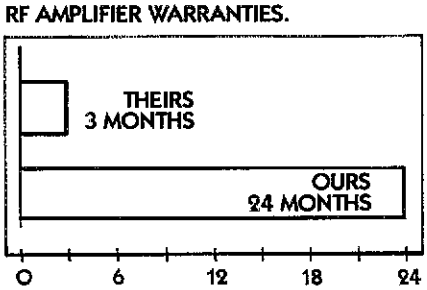

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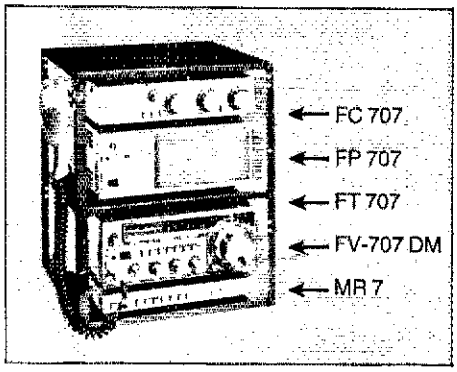

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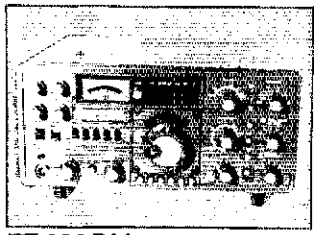

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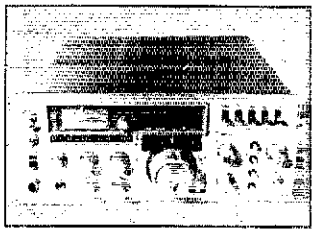

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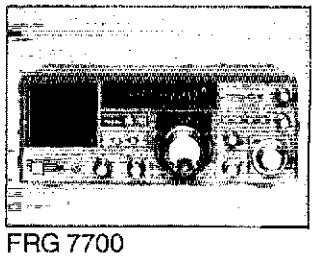

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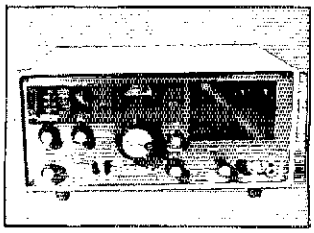

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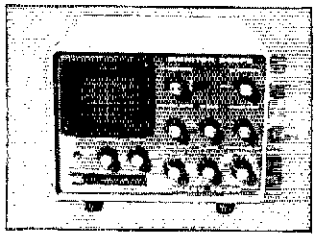

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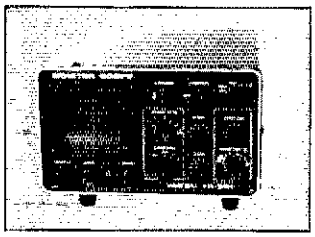

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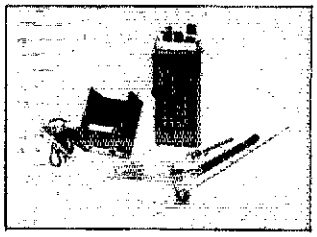

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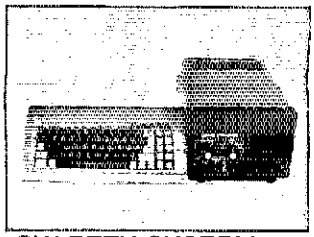

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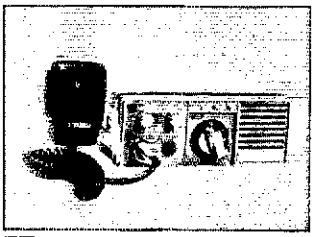

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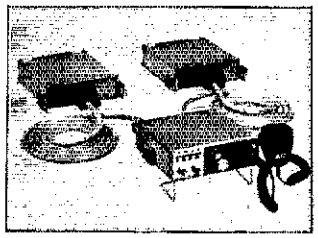

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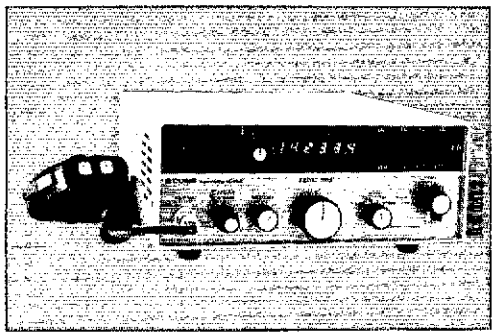

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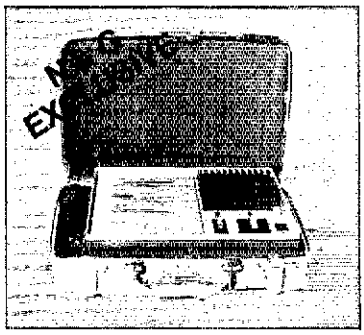

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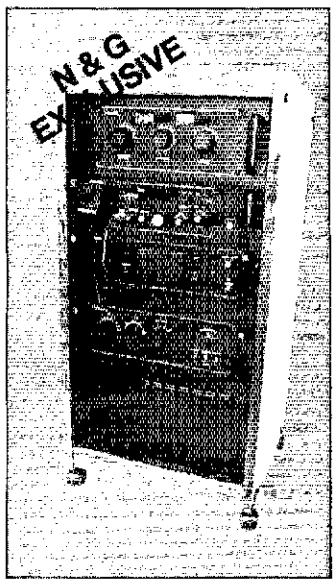

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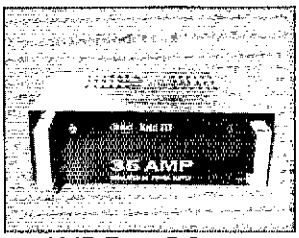

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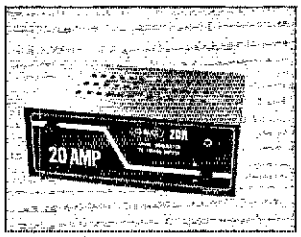

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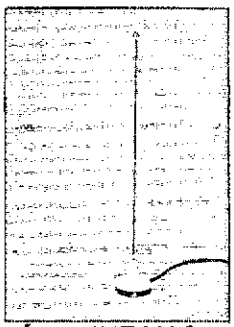

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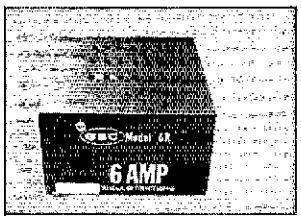

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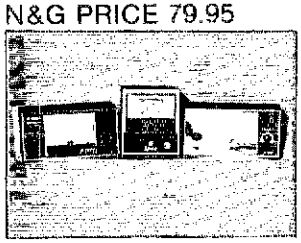

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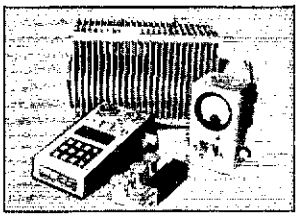

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SOUTHEASTERN DIVISION

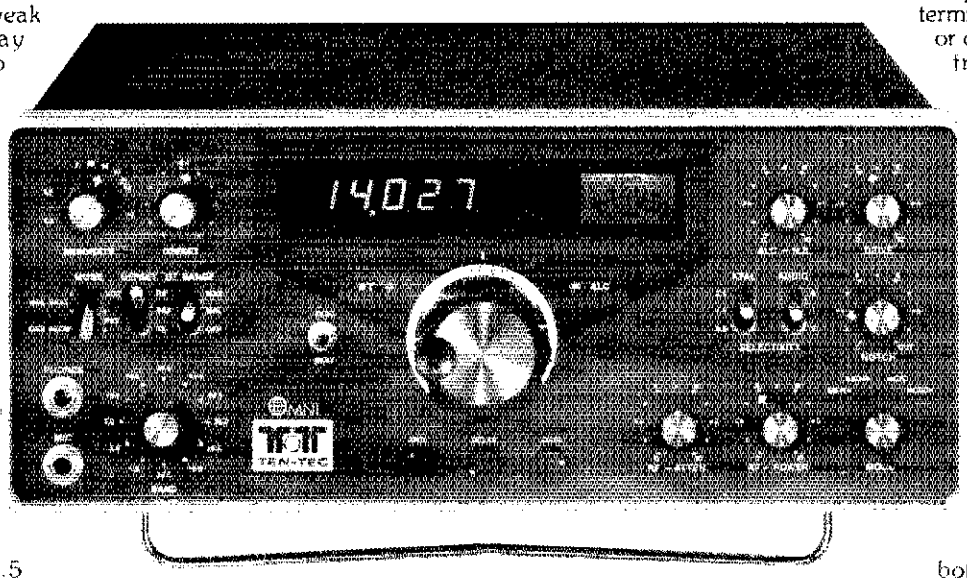
ALABAMA: SCM, James M. Bonner, K4UMD — SEC: W4IBU. The Huntsville Hamfest is history now. It was a great success. Good to meet Harry Dannals, Pres. of ARRL and Frank Butler, Director Southeastern Div. Also a good many members of the nets. This issue I would like to introduce our ECs and DECs across the state. I'll just list call and county. ECs — WA4YCM Autauga; WB4JAX Butler; K4HJM Calhoun; WD4DHI Clay; KA4CMD Cleburne; KA4BNO Colbert; WA4JDH Coffee; WD4KTM Coosa; WB4MLV Covington; AK4B Cullman; KA4AFI Dale; K4OOV Dallas; N4CSX Escumbia; WA4QOW Etowah; WA4RNP Jefferson; WB4NQH Lauderdale; W4KCT Lee; W4PLI Lowndes; K4HJX Macon; KA4LLP Marshall; WD4KTB Randolph; KA4CHA Russell; N4DMA Shelby; W4LVT Talladega; WA4KIK Tallapoosa; WD4DAT Tuscaloosa; WB4VSV Walker. DECs — WA4YCM Montgomery, Lowndes, Elmore; WB4JAX Calhoun, Talladega, Randolph, Clay, Butler, Connecut, Monroe, Wilcox; WB4MLV Covington, Coffee, Crenshaw; WA4QOW Chambers, Lee, Macon, Russell; WD4DAT Hale, Green, Fayette, Lamar, Pickens, Tuscaloosa. W4EVD Jefferson, Shelby, St. Clair, Blount. NE4L Lauderdale, Colbert, Franklin, Marion. As you can see we made lots of improvements. You could fill some of the counties for EC. Get in touch with your SEC or SCM. New Novice in Ft. Payne KA4UTY. DRN5 was 100% presented by WD4IRU WA4JDH WA4PIZ and W4WJF. AEND QNI, 107 messages. AENB QNI 265, 99 messages. AENR QNI 39, 1 message. AENR (July) 49 QNI, 1 message. AENX QNI 223, 5 messages, 4 sessions. AENM, QNI 2730, 123 messages, 36 sessions. Traffic: WA4JDH 972, W4CKS 172, K4AOZ 80, WD4DHI 70, WA4LXP 60, WA4PIZ 59, K4UMD 30, W4IBU 24, WB4TVY 20, N4CSX 12, KC4GS 8, W4RNX 8, NM4B 7, WB4EKJ 7.

GEORGIA: SCM, Eddy Kosobucki, K4JNL — ASCM/SEC: K4VHC. ASEC/NVOAD: WA4PUP. STM: W4WXA. Chief OBS: W4BIA. The Stone Mt. Famvention closes out the hamfest season for this year. Dates are Nov 14th and 15th. K4ZYK, this year's chairman, invites all to attend. Tnx to W4GH for the FB job with the Ga Tfc Net for the past two years. WB4NTW replaces him and I hope all will give her real support. WA4PUP reports that the NVOAD program in the section is steadily progressing & should be in full swing by the end of this year. Tnx to WD4ERM on the fine activities by the South Georgia ARC. N4BGH reports BGMRC again had great participation during the annual Power's Crossroads Country Fair. There are many local 2-meter nets in the section & I would appreciate monthly QNI & QTC reports so they may be sent in with my monthly reports. The Georgia Peach YL Net has been reactivated & meets at 1601Z each day on 7243. WB4NTW invites all to checkin. W4AAY was honored with a testimonial at the Augusta Hamfest for the many years of dedicated service to the section. If you hear of a Silent Key, please report it to me and if possible send me the obituary out of the paper. Much time & effort is spent on the club bulletins & newsletters by many. I want to say tnx to those who take this time. The section's sympathies to the family of K4WLJ who was killed in an auto accident in Jacksonville on July 31st. Over the past two or three years, hamfests continue to grow. In order not to have any conflict, please inform me of the dates etc. you are planning in writing & I will keep the info on a calendar for anybody's information. Please do this ASAP before the 1982 season. If you are an affiliated ARRL club & want a League hamfest, write to W4RH, our S.E. Director, at least three months in advance for the necessary paperwork. As we approach the holiday season, traffic should be picking up, so won't you please help by checking in to one of our fine section nets. Traffic: (Aug.) WB4NTW 96, K4EV 90, W4PIM 77, W4WXA 72, WB4ZVX 56, K4JNL 48, W4HON 37, WB4LBM 27, KA4ATM 22, W4GH 21, W4BIA 12, K4AZM 8, N4UZ 5, K4BAI 4, K4PIK 4, WA4ABY 1. (July) AA4EI 28.

NORTHERN FLORIDA: SCM, Billy Williams, N4UF — SEC: WA2GIN. ASCM: W4BSP WA4AXJ WB4QBB N4EDH. NM: KF4U N4EC WN4IIV. New ECs are KW4F (Alachua Co.) and NF4O (Bradford Co.). KC4UF is NCS for GARS Sunday Net on 22/82 at 2030L. WD8JXZ is PR Chairman for HCARA. W4ZFQ is Silent Key. KC4JL serving as GCARC Rptr Trustee with W4OHU K4JDL WB8ONY AA4FG K2BOQ KT4O & W2LJR on Tech. Comm. Jax RANGE Rptrs have "73" and "79" message tapes reinstalled. KA4FGR appointed RANGE membership chrmn. Jax clubs RANGE and NOFARS will hold joint Xmas banquet in Wilmington Room at SCL Bldg. on Dec. 10th. PARC named N4DZT as 1982 Ft. Walton Beach Swapfest Chairman. N4DAS showing ARRL films to local organizations to promote Amateur Radio. WD4JEJ presented ATV demo to PARC and W6JIF narrated a DXpedition slide show. W4BLQ became a Silent Key. KA4MLQ won TS-130S at Jax Hamfest. PCARC in Panama City planning new classes for fall and will hold club dinner in Nov. FFARA updating the club station at Red Cross Hq. KB4AR has a color computer system connected to his slow scan. WD4BEF & KA4RUL now edit "Keyed Up" for the Lake Monroe ARS. That group meets the 1st Tues. of each month at the Altamonte Civic Center. K4MZA has a nice rptr on 147.63/.03 up 460 feet. K4AQQ of Deseehee fame now lives in Tally and is upgrading his station and tower. WA4GYR is new OES appointee. Other appointments available for active ARRL members. Write for details. Traffic: (Aug.) WD4HIF 824, N4PL 583, W4SIZ 242, WA4EYU 198, W4JL 197, N4EDH 196, WD4IIO 178, WA4OXT 149, WB4TZR 90, KF4U 72, W4BSP 66, AA4FG 55, W4KIX 46, W4MGO 40, N4BZH 37, N4AXN 24, N4UF 23, W4GUJ 22, W3IDO 17, WB4GHU 9, N4BOY 8, WB4DTS 5, WA4STZ 4. (July) WB4FJY 77, W4KIX 63, AA4FG 62, N4BZH 53, N4BOY 4.

SOUTHERN FLORIDA: SCM, Woodrow Huddleston, K4SCL — Asst SCM: W4KGJ. SEC: AA4WJ. STM: WA4PFK. Tropical Storm DENNIS gave our section a nice drill. Your SCM was out-of-state on vacation at the time, so other Leadership Officials did their duty and our section response went smoothly. AA4WJ placed 3940 kHz on standby Saturday night, Aug. 15, with a few members of FAST, TPTN and FPTN monitoring all night. About 8 A.M. Sunday, Aug. 16, FMTN was activated via the statewide 2-meter call up. Since DENNIS posed a certain threat to the Keys, WB4AID kept FMTN in emergency session until 5 P.M. Sunday when relieved by TPTN. FAST Net took over at 6 P.M. until 6:30 when Keys stations reported no need to keep the net in session. FAST reconvened at 9 P.M. to enable Leadership Officials studying the situation to compare notes. It was then decided there was no need to go back into emergency session. Later there was considerable flooding reported in Dade County and Dade Emergency

The Rig That Filters The Crowd



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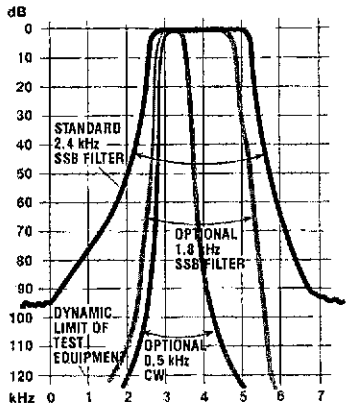

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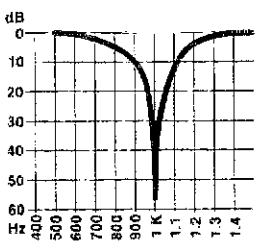

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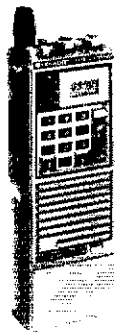

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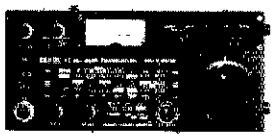

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See you next month!

P.S. Turns out Tang (our spy in Japan) was snortin' Saki when he reported on the Kenwood TS-840. It flat doesn't exist, never has, never will. I put him on probation.

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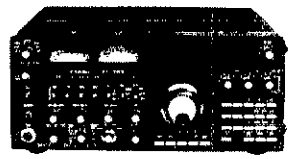

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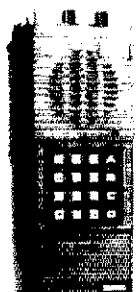

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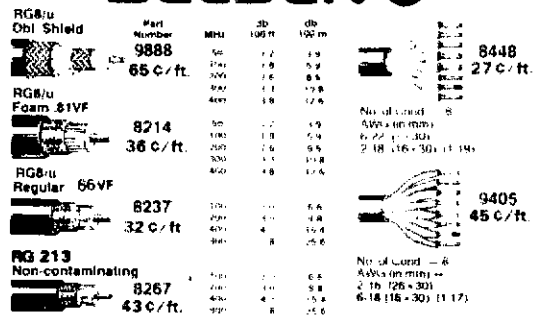

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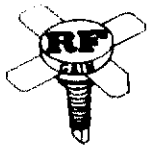

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Net under management of KA4GUS went into operation. WB4AID offered facilities of FMTN to W4IYT, EC Dade, but it was decided formal emergency sessions were not needed. I think the SEC, ECs, Net Managers and Southern Florida amateurs reacted in an exemplary manner to this storm threat. Congratulations to all! Similar congrats and appreciation are extended to Manatee and Sarasota Counties where considerable flooding and small tornadoes occurred a few days after DENNIS. The ECs, ARES and RACES responded in an exemplary manner. In Pinellas County, most ARES members, as recommended by the EC, W4GPL, are being appointed RACES members and issued numbered RACES cards which are to be used to identify radio amateurs on emergency communications missions. This is the culmination of several years work trying to get local governments to recognize the Amateur Radio mission. Ham rigs are still being stolen occasionally. WB8VLR reports her 2-meter equipment was stolen from her car. Too bad she did not have ARRL insurance. WD4COL informs us we can soon expect his dad, K4BR, on the traffic nets from Clearwater with a new ICOM 720A and new antennas. K4JM says he is now "retired 100%" but already loaded down with "honey do" jobs. W4DL continues to be our most outstanding OBS station, with about 39 bulletin transmissions for the month and a continuation of his faithful monthly reports. KA4ASZ, EC Collier County, is one of our most active ECs, giving KB4OW, EC South Brevard, and W4IYT, EC Dade, a run for their money. Recent public service activities reported by KA4ASZ included Fourth of July Parade supporting Collier County Veterans Organization, inc., Off-Shore Power Boat Race May 23, supporting West Coast Power Regatta and Children's Fun Festival in Naples August 22 and 23. I hope everybody is all set for SET October 17-18. Recheck all emergency gear and be ready for two days of heavy operating both in local emergency drills and in support of 4 cycles of NTS. I hope especially that, when the lights go out, we will be able to maintain long range communications in addition to the dependable battery-powered short range stuff. Traffic: W3CUL 2852, W3VR 835, WB4FVV 511, WD4COL 443, K4SCL 282, WA4PFK 260, W4GPL 206, K4ZK 195, WB4AID 161, NC4H 157, W4NFK 152, K4EUK 150, KA4ASZ 135, KA4LNA 124, KE4O 103, WB4PIB 100, WB4WYG 97, WA4EIC 95, W4DVO 92, WA4HXU 90, N2WX 77, WD4AWN 69, W4ESH 62, W3TLV 61, KD4DC 57, W4IYT 46, K5IHH 43, NJ4O 42, W4SMK 34, WA4FKE 32, KA4BBA 30, WB4GCK 30, AA4WJ 29, WB4FVN 12, W4IRA 7, W1DLP 4, WA4BYT 3, WB8VLR 3, K4IEK 2.

WEST INDIES: SCM, Julio Negroni, KP4CV — KP4DJ rebroadcasts ARRL bulletins every day at 6:00 P.M. on WINS 3710 kHz. WP4BCV xmits bulletins Mondays and Wednesdays QQQQZ on 146.37/97 repeater. New appts: ORS WP4BCV, ORS endorsements NP4D. ARES is being systematically reactivated by SEC KP4CU and able aide NP4CP. New EC appts: San Juan KP4AJ, Bayamon WP4AOV, Carolina NP4AJ WP4AIP, Guaynabo KP4DEM, Toa Baja KP4FOD, Rio Piedras WP4ADA, Aibonito KP4SR, Comerio KP4FOG, Corozal KP4DH, Morovis KP4FDZ, Naranjito KP4AHX, Patillas KP4FNR, Villalba KP4EHF, Guayama KP4CR, Caguas WB4AQT, Canovenas KP4DSW, Fajardo WP4AGV, Juncos KP4DE. BPLs: WP4AOH 774, NP4F 603, WP4BDS 234; PSHR: WP4AOH 207, WP4BDS 95, NP4D 66, KP4DJ 77. Traffic: WP4AOH 764, NP4F 604, WP4BDS 470, NP4D 181, KP4DJ 106.

SOUTHWESTERN DIVISION

ARIZONA: SCM, Erich J. Holzer, N7EH — STM: W7EP. The summer vacation season is drawing to a close, I hope all had an enjoyable summer. Preparations for the SW Division Convention are currently in high gear. By the time you get to read this, the convention will most likely be history. I hope all attendees had a fine time. New calls: KA7KXB KA7LOS KA7LEW and KA7LEX in Tucson. The SSARC is becoming involved with the Mesa Disaster Committee. This looks like fertile ground for ARES development. W7LUX reports a few single hop E openings during Aug. K7WIP has been awarded special recognition by the Catalina Council BSA for his invaluable public service communications provided for many of the Council's activities. I would like to encourage all appointees to have their monthly reports to me NLT the 6th of the month. I would like to congratulate WA7FDN on taking over as the new NM for the Cactus Net. KB5LI is now acting NM for SWN. Please send reports of amateur public service communications activity to me. I would be interested in attending club meetings of the clubs within the section. If your club would be interested, please contact me so that arrangements can be made. ATEN: WNI 854, QTC 243. Cactus Net (July): QNI 806, QTC 79. SWN: QNI 242, QTC 134. Traffic: K7NTG 71, WA7KQE 52, K7NMQ 41, KB7HA 33, W7OIF 31, W7AMM 23, K7JKM 18, KE7W 11, W7LBW 9, K7UXB 9, WA7NXL 5, N7EH 4, WA7YUL 3.

LOS ANGELES: SCM, Stan Broki, N2YQ — ASCM: N6UK. SEC: WB6FAK. STM: K5DY. Congratulations to the following new appointments K5DY, the new STM and KE6EF OBS. KE6EF is ex-WB6PWA and just received his new call. He is also DEC for the South Bay Area. The Long Beach ARC has been very active the past two months with supporting the 4th of July celebration and communications for the pre-Olympic sailing regatta in Alamitos Bay for 6 days. K6INK was reelected as YLRL rec. treas. I wish to thank all of you that helped in my reelection. I hope that I can continue to do a good job. W6VIO worked over 11,000 stations during the Voyager encounter with Saturn special event. It was a new record for this active club. All operators are to be congratulated on such a dedicated job well done. Clubs and members are encouraged to send me information you wish to appear in this column. If it is in a news bulletin, please underline the information you with to appear. Traffic: (Aug.) WB6NH 136, WA6OCM 119, K6OWA 109, N6DZQ 74, KB6FC 65, K6INK 61, WA6LVO 50, KT6D 41, K5DY 41, W6NKE 39, N6PZ 29, N6BCY 13, K6CL 10. (July) K5DY 54, N6PZ 47, KB6OT 39, N6BCY 33.

ORANGE: SCM, Fred Heyn, WA6WZO — ASCM: WA6WZN. SEC: W6UBQ. STM: KA6A. DECs: K6GGS WB6JBI W6LKN WB6YZY. NMs: WB6AKR W6CPB K6JT WA6QCA WA6WZO. WD6EBI appointed OES. W6DHK reports ARES support of China Lake S & R Squad in rescuing Mt. Whitney climbers tnx to KA6KZV & N6KE plus K6VG/R 146.22/82. Al6I reports the following helpful in the Rancho fire, Center fire, and Hemet fair: WA6QMW WD6EWL WA6FIE W6LKN WA1TGO N6CFN WB6MMA WB6NSX NA6S WA6EPI WD6GEE KA6IXY N6BAE WA6QHR N6AUI WA6NUW K6VDS N6CBK KA6DZU WA6EFT WB6FRB WA6MGU K6SML K6SNO W6UBQ WB6VXC. WA6OPS reports FB St. Jude Hospital scramble drill. Congrats to KA6DZU, Ham of the month of

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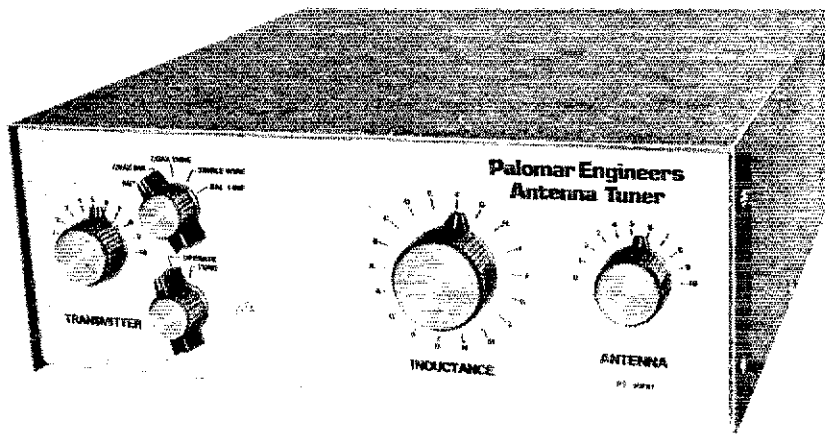

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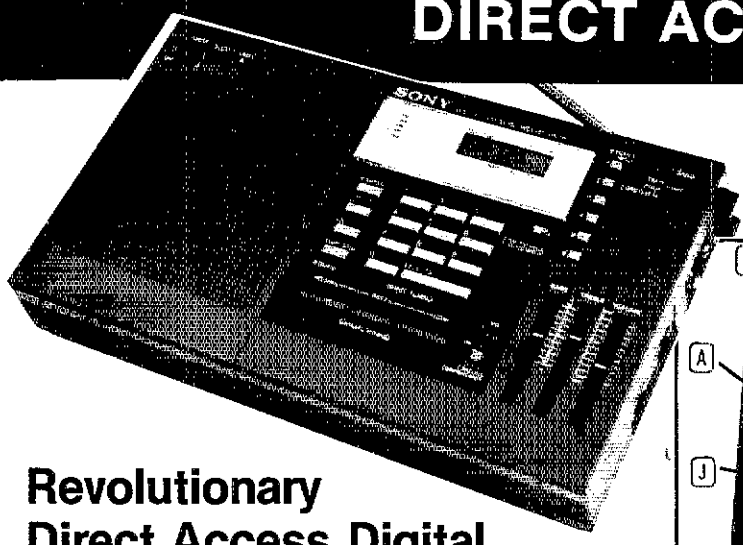

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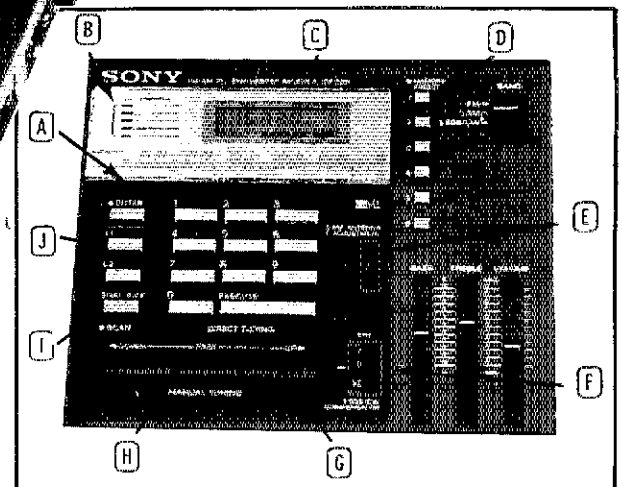

A Enter Button
B Signal Strength Indicator
C Liquid Crystal Display
D Memory Preset Buttons
E Antenna Adjustment Dial
F SSB/CW Compensator
G Execute Bar
H Manual Tuning Buttons
I Scan Button
J High/Low Limit Buttons

OPERATIONAL FEATURES

INSTANT FINGERTIP TUNING with the calculator-type key board enables the operator to have instant access to any frequency in the LW, MW, SW, and FM bands. And the LCD digital frequency display confirms the exact, drift-free signal being received. **AUTOMATIC SCANNING** of the above bands. Continuous scanning of any desired portion of the band is achieved by setting the "L_1" and "L_2" keys to define the range to be scanned. The scanner can stop automatically on strong signals, or it can be done manually. **MANUAL SEARCH** is similar to the manual scan mode and is useful for quick signal searching. The "UP" and "DOWN" keys let the tuner search for you. The "FAST" key increases the search rate for faster signal detection. **MEMORY PRESETS.** Six memory keys hold desired stations for instant one-key tuning in any mode (AM, SSB/CW, and FM), and also, the "L_1" and "L_2" keys can give you two more memory slots when not used for scanning. **OTHER FEATURES:** Local, normal, DX sensitivity selector for AM; SSB/CW compensator; 90 min. sleep timer; AM Ant. Adjust.

SPECIFICATIONS

CIRCUIT SYSTEM: Fm Superheterodyne; AM Dual conversion superheterodyne. **SIGNAL CIRCUITRY:** 4 IC's, 11 FET's, 23 Transistors, 16 Diodes. **AUXILIARY CIRCUITRY:** 5 IC's, 1 LSI, 5 LED's, 25 Transistors, 9 Diodes. **FREQUENCY RANGE:** FM 76-108 MHz; AM 150-29,999 KHz. **INTERMEDIATE FREQUENCY:** FM 10.7 MHz.; AM 1st 66.35 MHz., 2nd 10.7 MHz. **ANTENNAS:** FM telescopic, ext. ant. terminal; AM telescopic, built-in ferrite bar, ext. ant. terminal. **POWER:** 4.5 VDC/120 VAC **DIMENSIONS:** 12¼ (W) X 2¼ (H) X 6¾ (D). **WEIGHT:** 3 lb. 15 oz. (1.8 kg)

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Western Public Service System (WPSS), which meets dy on 3952 kHz at 7 P.M. Fullerton RC donated $100 to ARRL Foundation Satellite Fund. WB6OKJ reports completion of Coast Guard Aux. DF station at Point Viente. WA6EFW & WA6YBG awarded Life Membership in Victor Valley ARC. WD6FEM reports K6DE/R is reversing its freq to 146.625/025. Congrats to WA6WZN for being elected v.p. for 1982 of Young Ladies Radio League (YLRL) with K6INK reelected rec treas. New chairman of Committee for Legal Maritime Mobile Amateur Radio Operations (CLAMMARO) is WD6EHA. Current ATV coordinated duplex freq: 146.43 fm for 434.0 ATV, 147.51 fm for 426.25 and 1241 ATV. ATV repeater outputs: W6ORG/R 1265 and WA6SVT/R 1253 with future repeaters planned for 1277 in San Diego and 1289 for San Fernando Valley. WB6ZPN invites checkins to the Braille. QRS CW Net 11:30 A.M. Sat & Sun on 7105 kHz. PSHR: KA6A KN6C W6CPB WB6QBZ W6NTN. Don't forget Nov. 1st repeater registration deadline/please send a copy to N6BVU. It is with deepest regret I must report WA6MBE a Silent Key.

Net	Freq.	Time	QNI	QTC	Rec.
SCN/1 (>20)	3598 kHz	7 P.M. Dy	351	284	K6FI
SCN/2 (<13)	3598 kHz	8:15 P.M.	361	167	K6HAP
SCN/V(FM)	146.045/645	9 P.M. Dy	497	251	WA6QCA
SCN/RTTY	3637.5 kHz	5 P.M. Dy			WB5EKU

(K5DY) SCN NM — KA6A Asst. NM) Traffic: (Aug.) WB6EIG 673, WB6QBZ 239, W6NTN 220, KN6C 195, WA6QCA 83, W6CPB 51, KA6A 49, W6TKV 18, K6ZCE 16, W6RE 14, WA6WZO 11, KA6DZU 10, WA6WZN 2. (July) W6RE 38, W6TKV 14, N6ADV 2.

SAN DIEGO: SCM, Arthur R. Smith, W6INI — STM: N6GW. SEC: W6INI. Asst SEC: N6RD. Official Relay Station appts available to ARRL members who regularly handle written messages by phone, or RTTY. KA6PPC (age 12) won AZDEN 3000 at Palomar ARC's annual picnic. The club's William J. Gilmour (W6VTV) scholarship was awarded to Cynthia Rutherford. Monthly ARES breakfast/meeting is on second Saturday at Normal Heights United Methodist Church, 4650 Mansfield. Breakfast 0800, meeting 0900. All are welcome. ARES is working with San Diego County Health Dept planning emergency comm for 13 health centers. ARES ranks would swell considerably if all who showed dissatisfaction with FCC's proposal to eliminate Amateur Radio's emergency mission would register in ARES. N6COE upgraded to Advanced with new call KE6FA. Since he became an active traffic ham in late 1975, KT6A has handled 24,595 messages thru Aug 81, and earned 17 BPL awards. Congratulations. Traffic: (Aug.) KT6A 409, N6GW 198, KM6I 197, K6HAP 103, W6DEY 48, KB6AI 35, N6AT 22. (July) KM6I 218, W6DEY 47, K6AE 3.

SANTA BARBARA: SCM, Robert N. Dyruff, W6POU — K6DZT named DEC. New ECs: WB6IIY K6FI W6MSG. SLO govt held "Nuclear Disaster" exercise. Agencies impressed by ARES. AVERT Council names Maj. Mal Peattie Admin. Coord.; replacing KB6PX. Vent. Co. Sheriff's plan by W6RIC/N6MA allocates ARES/RACES roles. K6YD editor SCN Zero Beat offers to train ARES ops in tfc. handling. N6BNO new NTS rep. in Vent. Co. Sctn tfc mgr slot still open for qualified candidate. Satellite ARC held special program on upcoming UoSAT launch Sept 20 from VAFB. FCC license data shows semi-annual SCTN growth: Vent. Co. up 2.6%, SBAR So. 1.6%, SBAR No. 2.8%, SLO 2%, thanks to classes. Traffic: K6YD 116, W6JGS 70, N6YH 59, N6BNO 17, N6MA 9.

WEST GULF DIVISION

NORTHERN TEXAS: SCM, Phil Clements, K5PC — Asst SCM: WA5QFD. STM: W5VMP. SEC: W5GPO. NMs: AA5J AE5I KA5IWF WD5JYI. WB5JFL takes over as EC in Lamar Co. She joins WB5WKG, and WB5UXG as our third YL EC in the section. WA5RQS has agreed to serve again as EC of Hansford Co.; a post he had for many years. Welcome back. The Emergency Coordinators Notebook is still in reprint; it is hoped that all EC's will soon receive it. Lots of good FD activity in the section this year, with good WX and high scores reported by most groups. Hope you are sending in your FD pix to Hq for the FD issue in the spring. Who would have thought that Amarillo would have a full-fledged flood, with waterskiers parading in the streets!?!? Just goes to show ya that all emergency preparedness bases should be covered! I'm sure that new EOC at W5WX got a real work-out. Just a few weeks ago, the Amarillo ARES bunch were pondering what to do for the SET; guess mother nature provided the answer! There will be a section-side EC/DEC meeting at Texoma Hamarama on Saturday, Oct 31. Try to make this one if you can. It is also a fine time to meet our Oklahoma counterparts, and compare notes on ARES work. PSHR: KA5MAY KA5AZK N5BT WD5JYI KC5NN WA5KHE KC5FX KA5IWF W5VMP and W5HMR. Traffic: N5BT 258, K5BNH 236, KA5AZK 118, KC5FX 117, AA5J 100, WB5OXE 97, KC5NN 92, WD5JYI 83, KA5IWF 84, W5HMR 61, W5VMP 26, AE5I 25, WD5JIR 22, KA5MAT 22, K5PC 19, K5HGX 17, WA5KHE 13, W5ERT 9, K5SOR 9, KB5UL 6, AJ5F 4, W5PBN 2, WB5WDL 2.

OKLAHOMA: SCM, Leonard Hollar, WA5FSN — Asst SCM: W5REC. SEC: W5ZTN. We are happy to welcome him as the new SEC. We feel that he will be a valuable asset to the emergency program in Oklahoma. He is no stranger to ARES, having been EC for Payne Co. for a number of years. It is especially hoped that you will give him the support that he needs to build the program up. 25 reports from ORSs; 3 reports from OOs. It is good to see the large number of new calls showing on these reports. They are picking up some of the load and giving some of the oldtimers a rest. There is always room for more. WB5NKD and W5AS on the sicklist, but doing better. W5JJ skipped Ham-Holiday to attend his college class 50th reunion. K5WG bragging about a new FT107. Lots of new calls popping up, evidence of upgrading and new amateurs. Congrats to all who have upgraded this summer. We hope to hear of a number of classes starting soon, and that the instructors will do all they can to encourage them to participate in our net activities. Even better, maybe we can get the old Slow Speed Net going again. Any one interested?? W5ZUM operates sailboat mobile. Traffic: W5REC 366, KA5CXW 255, W5RB 152, WB5ELG 112, K5CXP 106, KB5EK 94, WB5NKC 86, WA5FSN 84, WA5OUV 61, W5UYH 60, WB5EAY 54, W5SUG 49, K5CAY 41, WB5TFX 40, W5VXU 34, WD5IFB 33, W5VLW 22, W5VOR 22, N8IN 19, WB5LSW 8, K5MGD 7, K5WG 6, KA5FBG 4, WA5JGU 4, W5JJ 2.

SOUTHERN TEXAS: SCM, Roger Coday, N5FN — ASCM/STM: N5TC. SEC: AK5N. K5RG is preparing for CAS meeting at Houston Com-Vention 81. He tuned generator in preparing for SET. WD5AAH participated in a public event station at the Great Texas Mosquito Festival in Clute. WA5RVT received a public service commendation for his service in the Red Cross message

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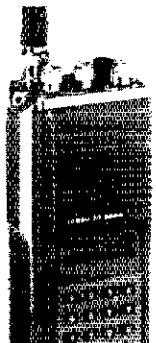

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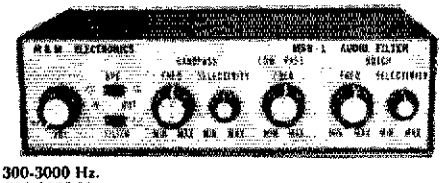

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relay. W5KLV reports reading 9 bulletins for a total of 218 readings. Houston ARC is still running Novice classes on Friday evenings at their club house, 7011 Lozier in Houston. WB5RFQ reports he is back on hf after power supply problems resolved. The following stations maintaining South TX 100 percent on DRN5-N5CRU W5CTZ N5DAA N5DRK W5KLV K5OWK WA5RVT W5SHN W5TUK WB5YDD WB5YTT. W5VXD was appointed Director of Brazos Valley ARC. Recent upgrades include KA5BBZ KA5URJ KA5KQX KA5MBH and KA5HSM to Tech. WD5CVX as new EC of Hardin City, is beginning to get ARES activity started. Traffic: WB5YDD 701, W5KLV 482, W5SHN 232, W5CTZ 155, K5HZR 146, K5GM 126, N5DAA 113, WB5MMI 100, WD5AAH 85, WB5EFJ 81, N5TC 59, WA5RVT 61, KA5GYJ 58, KB5NX 58, KB5TC 44, K5RG 40, K5ZC 33, N5AMH 26, N5CRU 26, N5FN 25, KA5KRI 24, WD5DQR 18, WB5DYB 15, AK5M 15, KC5RP 8, WD5GKH 7, KB5KZ 3.

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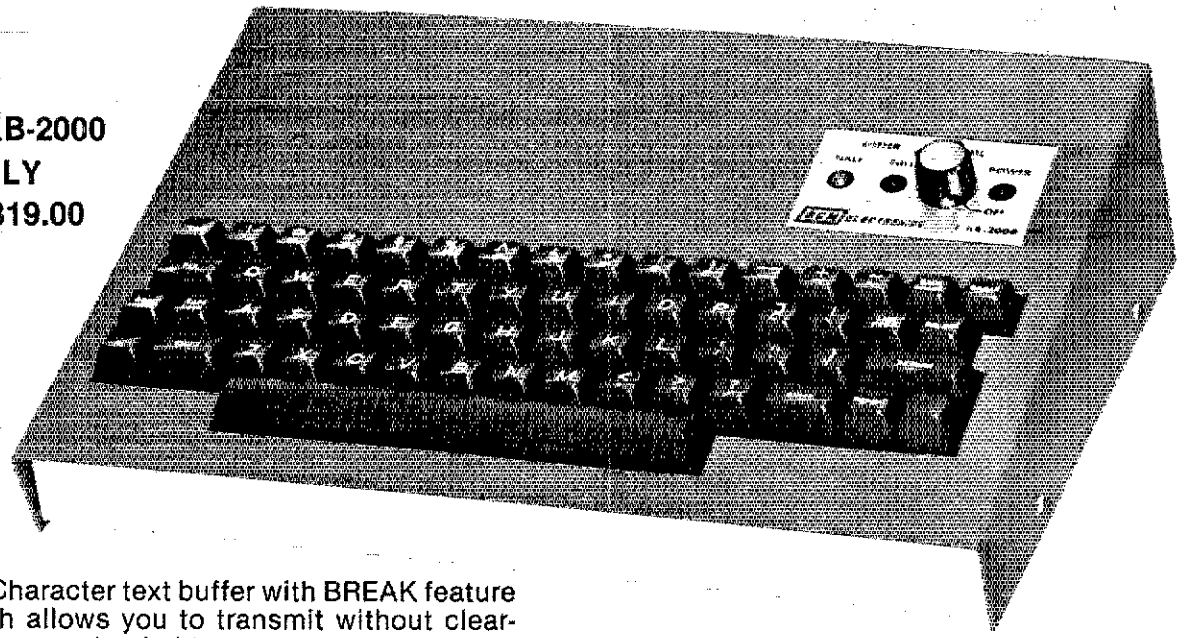

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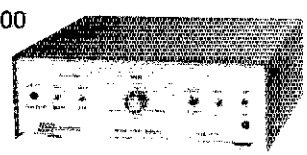

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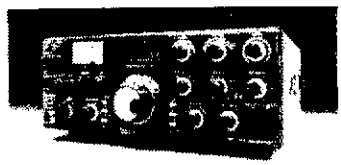

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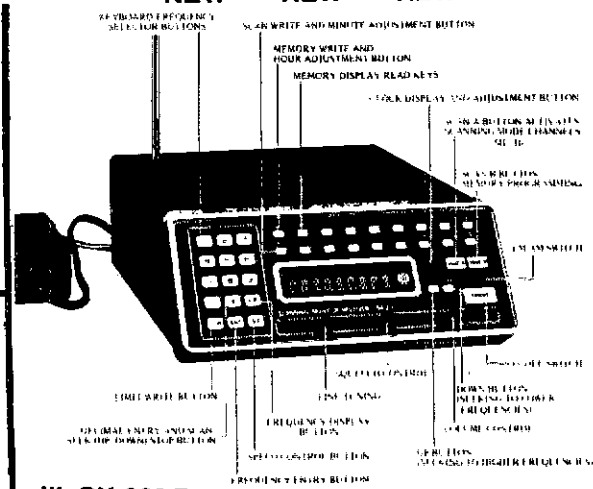

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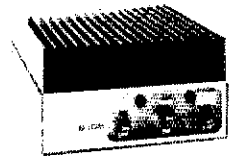

Features: 10W in — 80W out or 2 Watts in 50 Watts output for Handie-Talkies. Built-in Recieve Preamp, Adjustable Delay for SSB. Automatic Internal or External Relay Switching. Frequency Range 144 to 148 MHz. Works for SSB, CW or FM Modes., Receive Preamp provides 10db Gain Min.. 5 year warranty (1 year on Power Trans.).

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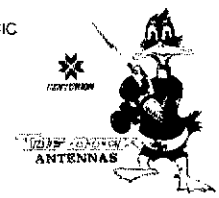

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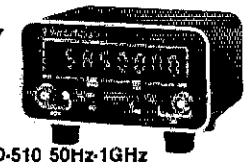

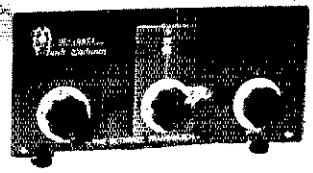

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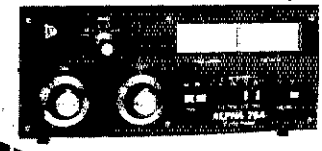

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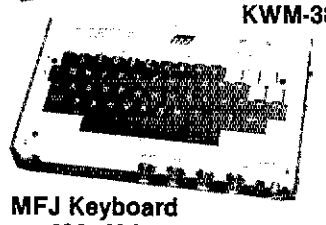

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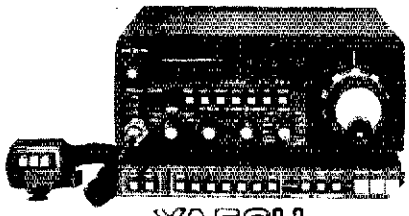

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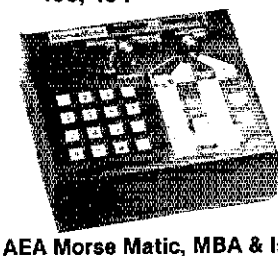

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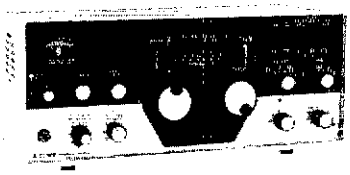

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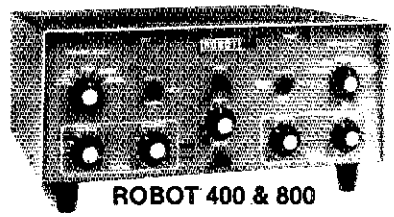

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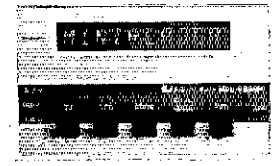

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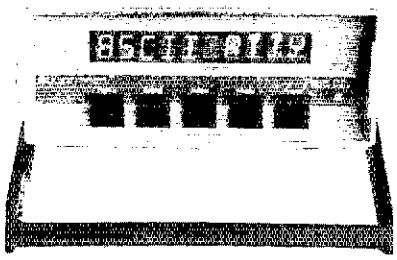

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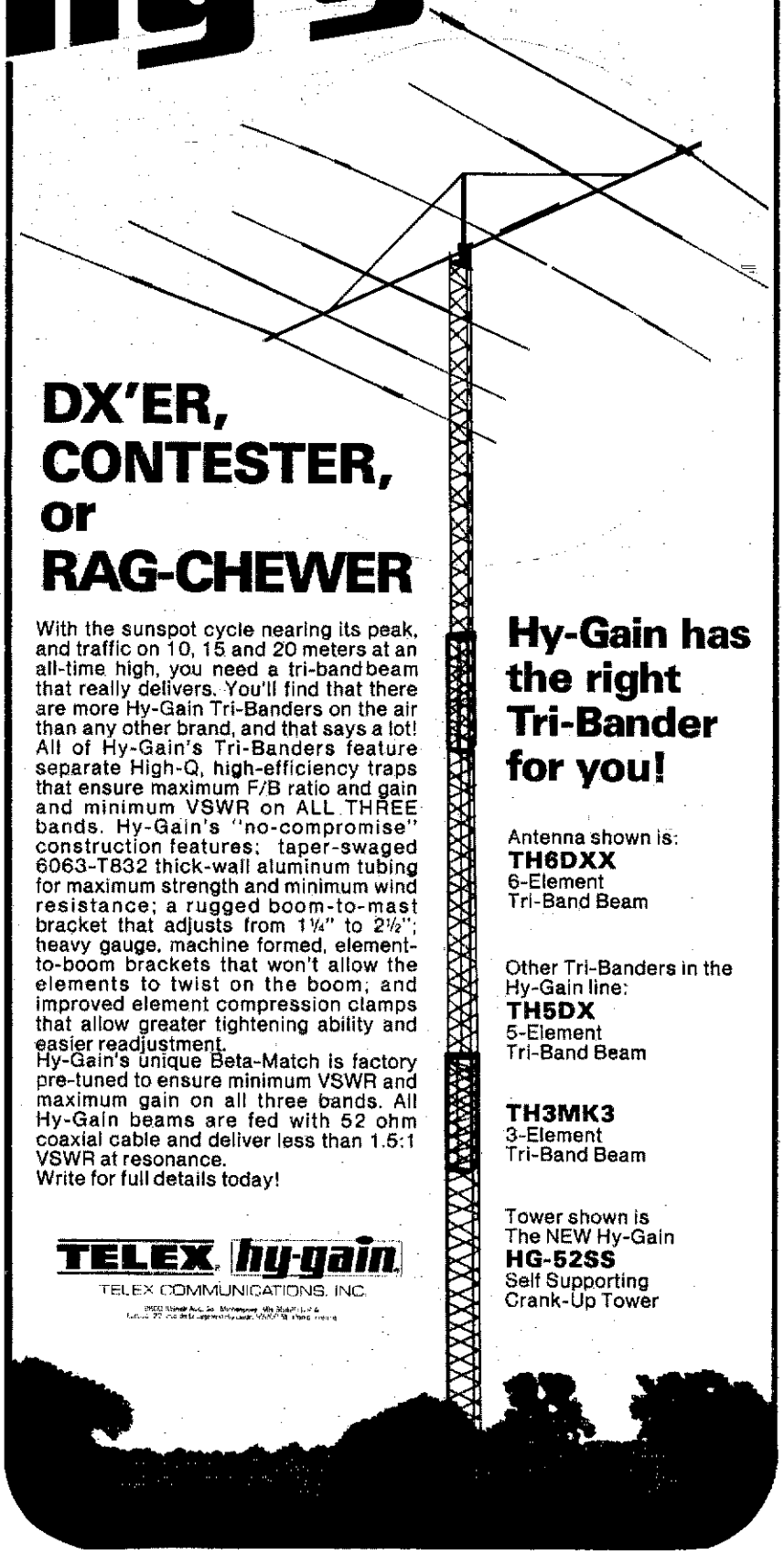

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Model & Description	Ham Net
HG52SS Crank-up Tower	$990.00
HG10 10' mast	56.00
HGCOA Coax Arms (3)	39.00
TH5DX Tri-Band Antenna	289.95
2BDQ Trap Doublet	59.95
BN-86 Baluns (2)	31.90
HDR300 Rotator	499.95
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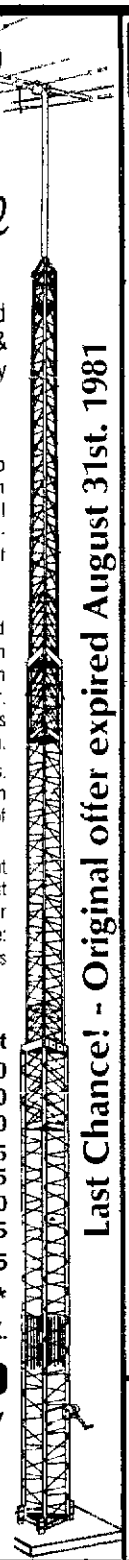

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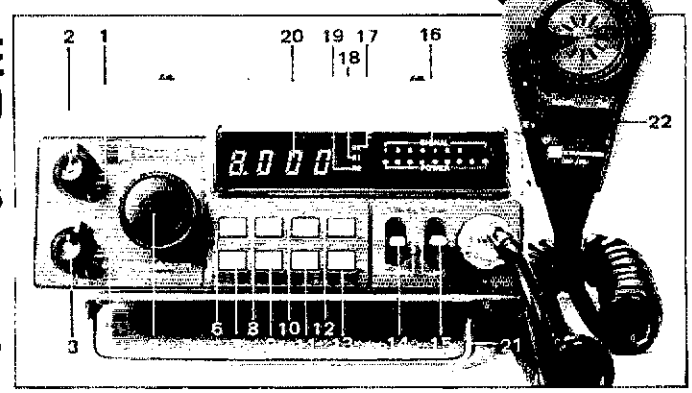

C-7800 450 Mhz FM Transceiver

(1) Mode selector (2) Squelch (3) Push on/volume control (4) Power selector (5) Channel selector (6) Memory enter key (7) Spare key (8) Memory recall key (9) MHz key (10) Scan all key (11) Call key (12) Scan memory key (13) CCL Key (14) Scan mode switch (15) Scan speed switch (16) S/RF meter (17) UL indicator (18) RT indicator (19) RZ indicator (20) Freq. display (21) Stand (22) Frequency up-down control

8-bit Microcomputer:

The C-7800 incorporates an 8-bit microcomputer with high processing capability. The brand-new LSI, which has been developed especially for this transceiver, has a huge memory capacity twice that of conventional LSIs. A full 16K bits for read only memory (ROM) and 0.6K bits for random access memory (RAM). This is the brain of the C-7800 which precisely controls the many active functions such as multi-mode scanning and 5-channel memory. It actually memorizes, thinks, and makes decisions for quick and correct channel control.

The microcomputer offers the following functions:

• Capable of memorizing, or programming any five (5) frequencies. • Scans up and down the five stored channel frequencies. • A frequency range from 438 Mhz to 449.975 MHz divided into 12 steps of 1 Mhz each and each 1 Mhz span scanned up and down at 25 or 50 KHz intervals. • Automatic search for busy or vacant channels. • Two switchable scanning speeds. • A higher priority given to the call channel. • Memory back-up. Preprogrammed channel frequencies are maintained in the memory when the main power to the unit is switched OFF. An abnormal low supply voltage makes an internal DC-DC converter maintain the back-up voltage at a constant level. • Up to 480 channels can be selected using the non-contact channel selector which has 24 steps per rotation (240 channels at 50 KHz interval and 480 channels at 25 Khz).

RECEIVER SECTION

Receiver type	Double superheterodyne
I.F. frequencies	1st. 21.4 MHz, 2nd: 455 kHz
Sensitivity	0.5uV (20 db QS), 0.4uV (12 dB SINAD)
Pass bandwidth	17.5 KHz (-6dB)
Selectivity	Greater than 60 dB at ±25 kHz
Squelch threshold sensitivity	0.2uV
AF output	2w into 8 ohms @ 10% distortion
AF load impedence	8 Ohms
Standby current	0.6A

TRANSMITTER SECTION

Transmitter power output	10 watts/1 watt
Output impedence	50 ohms
Spurious response rejection	60 dB
Maximum frequency deviation	±5 kHz
Modulation type	Variable reactance
AF response	300 Hz to 3000 Hz
Microphone input impedence	600 ohms
Supply voltage/current	13.8 vdc/4.5 A
Size	5.6"w × 2.3"h × 9.4"d, 6.6 lbs

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IMMEDIATE DELIVERY: Teletype ASR 33 from $100. Friction and sprocket feed available; 20mA interface; ASCII coded keyboard; Paper tape punch and reader; 110 baud (10 cps) 30 day warranty, parts and labor on reconditioned units. Call Sue Woodhams, 800-538-9721 (California only 408-263-8520 Ext. 263).

HAM RADIO fanatics! You need The W5YI Report, twice-monthly award-winning insider Newsletter. Acclaimed best! Confidential facts, ideas, insights, technology, predictions, alerts! $14. annually. S.a.s.e. (2 stamps) for free sample. Box #10101Q; Dallas, TX 75207.

RIT KIT for HW-101, SB-102 etc., works equally well with most other types and brands of transceivers. Kit includes custom potentiometer with center tap and center detent. $15.70 postpaid. Add $2.50 for RIT/XIT Switch. Or send $3. for instructions and schematics. Then take $3. off when you order Kit. Protronics Inc., 20 Monte Vista, Buckley, WA 98321. 1-206-829-0056.

AMPLIFIER parts. S.a.s.e. for list KD1Z, WB1FVO.

WANTED Johnson kilowatt Matchbox with SWR bridge — Collins 75A4 Johnson Ranger II. K4VUQ. 191 Kentucky Ave., Lexington, KY 40502.

TOP PRICES paid for antique radio, telegraph & test apparatus: W1EC Box 1607 Duxbury MA 02332 617-934-5043.

DIGIDEN DG-146A now in stock. DG-146-A $179.95. Tone Pad $40. Crystals $10 pair. Leather holster $12.95. Drop-in charger $45. MC/VISA accepted D/H Communications 7109 So. 79th Omaha, NE 68128 402-331-1433.

DXPEDITION VP2ML Monserrat BWI QTH. $235/week including antennas. Box 4881 Santa Rosa CA 95402. VP2ML.

PARTS FOR amplifiers, power supplies: transformers, capacitors, inductors, chokes, variacs, tubes, meters, relays. Hf, vhf equipment, tuners, noise bridge. Big list, Big S.a.s.e. Don Bishop, NØEA, 561 Geneva St., #100, Aurora, CO 80010. 303-363-8070, 303-371-2800.

TENTEC: 580-Delta, 9-band, solidstate transceiver, $890; power supply, $90. WA7LKZ, Box 1918, Fort Collins, CO 80522. 1-303-484-4121.

432 MHz transverter: MMT 432/144S $275 KH6P, 94-703 Manawahine Place, Mililani, HI 96789 808-623-5235.

ATB-34, MFJ-LSP520BX II processor, both mint. Best offer. WD9CJG, Dave, 311 HY135 Oconomowoc, WI 53066.

SELL Kenwood TS820 six months use, $550, TS820S with cw filter $800 Both excellent. Gathercole, K1BI, 802-259-2397.

COLLINS 32S-3 and 516F-2, 75S-3 with manuals and cables $1475. Telrex six-element monobeams for 14, 21 and 28 MHz. Telrex A2695RIS rotator and cable. W3TV, Indiana, PA 412-463-9328.

MOTOROLA HT220 synthesized 2m $400. Motorola HT220 on 443/448 high power 2F $500. Motorola HT220 464 Mc touchtone $450. HRO500 $800. Teck 545 scope $375. Sony AV5000 color video reel recorder $300. Sony AV3400 portable with camera $850. Gene K3DSM 215-644-0885 mornings or 935-0362 evenings.

MINT RVD1005, DKB2010 $350. WA5OXK 504-392-9101.

SB104A, SB604, HP1144, cw, nb $399. WA5OXK, 504-392-9101.

TELETYPE Model 33ASR with all manuals and schematics. Excellent condition, $400. Pick up only. AA8W, 313-939-8791.

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Save over $14.00 with complete CW package for H-8/H-89.
Package includes CODEM, Interconnect Cable, Power Supply, CW89 Software, complete documentation and shipping.
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The CODEM: a universal CW interface for your personal computer.
$124.95

Here is an easy way to get your Morse code software on the air! The CODEM converts received CW audio to RS232 or TTL signal levels and RS232 or TTL signal levels to transmitter keying. The CODEM doubles as a code practice oscillator and CW regenerator. A sharp 800 Hz bandpass filter, AM detector and low pass filter are designed into the CODEM to provide outstanding noise and QRM rejection. Requires a 9 VDC power supply.

CODEM	**$124.95**
9 VDC Power Supply	**9.95**
Shipping and Handling	**5.00**

CW89: a sophisticated split screen Morse code transceiver and trainer program for Heath computers.
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Transmit and decode CW with your H-8/H-19, H-89 or Z-89. This feature packed program incorporates 4-99 WPM operation, receive autotrack, a 1000 character pre-type buffer, 10 user-definable messages, unique break-in mode, on-screen status, disk I/O and hard copy and a versatile code practice section. A comprehensive manual and prompt card are included with CW89. Requires HDOS, 32K RAM and hardware interface (such as the CODEM).

CW89 *postpaid*	**$99.95**
CW89C H-8/H-89 Interconnect Cable for CODEM	**24.95**

SWITCH 2 OR 3 ANTENNAS OVER ONLY ONE COAXIAL FEEDLINE
With INLINE "wireless" weatherproof coaxial relays you simply add more antennas without costly control cables.

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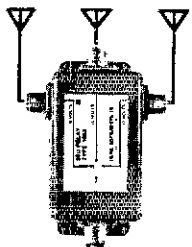
INLINE relays, by the thousands, are in constant use by Amateurs and Commercials in all climates in more than 100 countries worldwide.
INLINE relays are available in two position and three position types, either wired or "wireless". Wired types require 1 conductor + ground.



Type 1053C (3 position) Illustrated **$79.95
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Distributed worldwide. Literature and application data upon request. If not in stock at your dealer, order direct.
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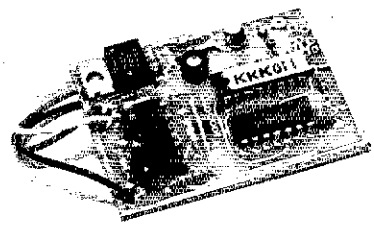
Identify your FM transceiver with automatic code on each transmission.



SMALL: 1 3/4" X 2 1/4" X 5/16"
Perfect means of RTTY code ID

PRICE **$49.95** Ppd.
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Full feature repeater IDer with timer **$79.50** Ppd. +$4.77 for Calif. address.

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Your call sign programmed at factory, please be sure to state call sign when ordering.

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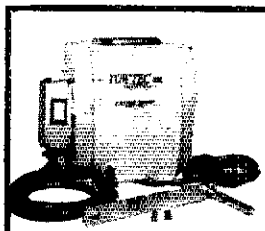

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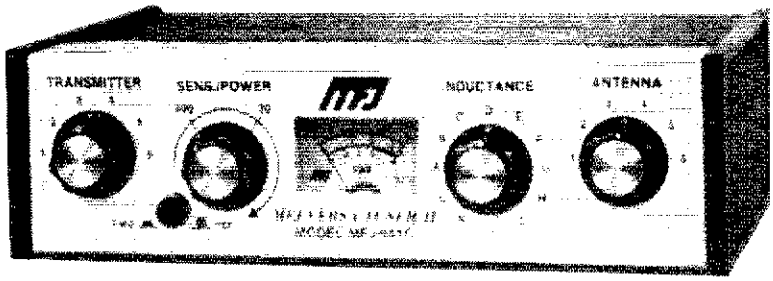
MFJ ANTENNA TUNERS 16 MODELS

MFJ-941C 300 Watt Versa Tuner II

Has SWR/Wattmeter, Antenna Switch, Balun. Matches everything 1.8-30 MHz: dipoles, vees, random wires, verticals, mobile whips, beams, balanced lines, coax lines.



Ham Radio's most popular antenna tuner. Improved, too.

$89.95 (+ $4)

Fastest selling MFJ tuner . . . because it has the most wanted features at the best price.

Matches everything from 1.8-30MHz: dipoles, inverted vees, random wires, verticals, mobile whips, beams, balanced and coax lines.

Run up to 300 watts RF power output.

SWR and dual range wattmeter (300 & 30 watts full scale, forward/reflected power). Sensitive meter measures SWR to 5 watts.

Flexible antenna switch selects 2 coax lines, direct or through tuner, random wire/balanced line, or tuner bypass for dummy load.

12 position efficient airwound inductor for lower losses, more watts out.

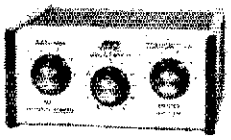
Built-in 4:1 balun for balanced lines. 1000V capacitor spacing.

Works with all solid state or tube rigs.

Easy to use, anywhere. Measures 8x2x6", has SO-239 connectors, 5-way binding posts, finished in eggshell white with walnut-grained sides.

4 Other 300W Models: MFJ-940B, $79.95 (+ $4), like 941C less balun. **MFJ-945, $79.95** (+ $4), like 941C less antenna switch. **MFJ-944, $79.95** (+ $4), like 945, less SWR/Wattmeter. **MFJ-943, $69.95** (+ $4), like 944, less antenna switch. Optional mobile bracket for 941C, 940B, 945, 944, $3.00.

MFJ-900 VERSA TUNER



MFJ-900

$49.95 (+ $4)

Matches coax, random wires 1.8-30 MHz.

Handles up to 200 watts output; efficient air-wound inductor gives more watts out. 5x2x6".

Use any transceiver, solid-state or tube.

Operate all bands with one antenna.

2 OTHER 200W MODELS:

MFJ-901, $59.95 (+ $4), like 900 but includes 4:1 balun for use with balanced lines.

MFJ-16010, $39.95 (+ $4), for random wires only. Great for apartment, motel, camping, operation. Tunes 1.8-30 MHz.

MFJ-949B VERSA TUNER II

MFJ-949B

$139.95 (+ $4)

MFJ's best 300 watt Versa Tuner II.

Matches everything from 1.8-30 MHz, coax, randoms, balanced lines, up to 300W output, solid-state or tubes.

Tunes out SWR on dipoles, vees, long wires, verticals, whips, beams, quads.

Built-in 4:1 balun. 300W, 50-ohm dummy load. SWR meter and 2-range wattmeter (300W & 30W).

6 position antenna switch on front panel, 12 position air-wound inductor; coax connectors, binding posts, black and beige case 10x3x7".

MFJ-962 VERSA TUNER III

MFJ-962

$229.95 (+ $10)

Run up to 1.5 KW PEP, match any feed line from 1.8-30 MHz.

Built-in SWR/Wattmeter has 2000 and 200 watt ranges, forward and reflected.

6 position antenna switch handles 2 coax lines (direct or through tuner), wire and balanced lines.

4:1 balun. 250 pf 6KV cap. 12 pos. inductor. Ceramic switches. Black cabinet, panel.

ANOTHER 1.5 KW MODEL: MFJ-961, $189.95 (+ $10), similar but less SWR/Wattmeter.

MFJ-10, 3 foot coax with connectors, $4.95.

MFJ-984 VERSA TUNER IV

MFJ-984

$329.95 (+ $10)

Up to 3 KW PEP and it matches any feedline, 1.8-30 MHz, coax, balanced or random.

10 amp RF ammeter assures max. power at min. SWR. SWR/Wattmeter, for./ref., 2000/200W

18 position dual inductor, ceramic switch.

7 pos. ant. switch. 250 pf 6KV cap. 5x14x14".

300 watt dummy load. 4:1 ferrite balun.

3 MORE 3 KW MODELS: MFJ-981, $239.95 (+ $10), like 984 less ant. switch, ammeter. **MFJ-982, $239.95** (+ $10), like 984 less ammeter, SWR/Wattmeter. **MFJ-980, $209.95** (+ $10), like 982 less ant. switch.

MFJ-989 VERSA TUNER V

MFJ-989

$329.95 (+ $10)

New smaller size matches new smaller rigs — only 10-3/4Wx4-1/2Hx14-7/8D".

3 KW PEP. 250 pf 6KV caps. Matches coax, balanced lines, random wires 1.8-30 MHz.

Roller inductor, 3-digit turns counter plus spinner knob for precise inductance control to get that SWR down.

Built-in 300 watt, 50 ohm dummy load.

Built-in 4:1 ferrite balun.

Built-in lighted 2% meter reads SWR plus forward/reflected power. 2 ranges (200 & 2000W).

6 position ant. switch. Al. cabinet. Tilt bail.

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MFJ Super Keyboards

5 MODES: *CW, Baudot, ASCII, memory keyer, Morse code practice.* ***TWO MODELS: MFJ-496, $339.95.*** *256 character buffer, 256 character message memory, automatic messages, serial numbering, repeat/delay.* ***MFJ-494, $279.95.*** *50 character buffer, 30 character memory, automatic messages.*

MFJ brings you a pair of 5 Mode Super Keyboards that gives you more features per dollar than any other keyboard available. You can send CW, Baudot, ASCII. Use it as a memory keyer and for MORSE code practice.

You get text buffer, programmable and automatic message memories, error deletion, buffer preload, butter hold, plus much more.

MODE 1: CW

The 256 character (50 for 494) **text buffer** makes sending perfect CW effortless even if you "hunt and peck."

You can preload a message into the buffer and transmit when ready. For break-in, you can stop the buffer, send comments on key paddles and then resume sending the butter content.

Delete errors by backspacing.

A meter gives buffer remaining or speed. Two characters before butter full the meter lights up red and the sidetone changes pitch.

Four programmable message memories (2 for 494) give a total of 256 characters (30 for 494). Each message starts after one ends for no wasted memory. Delete errors by backspacing.

To use the **automatic messages,** type your call into message A. Then by pressing the CQ button you send CQ CQ DE (message A).

The other automatic messages work the same way: CQ TEST DE, DE, QRZ.

Special keys for KN, SK, BT, AS, AA and AR.

A lot of thought has gone into human engineering these MFJ Super Keyboards.

For example, you press only a one or two key sequence to execute any command.

All controls and keys are positioned logically and labeled clearly for instant recognition.

Pots are used for speed, volume, tone, and weight because they are more human oriented than keystroke sequences and they remember your settings when power is off.

Weight control makes your signal distinctive to penetrate QRM.

MODE 2 & 3 (RTTY): BAUDOT & ASCII

5 level Baudot is transmitted at 60 WPM. Both RTTY and CW ID are provided.

Carriage return, line feed, and "LTRS" are sent automatically on the first space after 63 characters on a line. This gives unbroken words at the receiving end and frees you from sending the carriage return. After 70 characters the function is initiated without a space.

All up and down shift is done automatically. A downshift occurs on every space to quickly clear garbled reception.

The buffer, programmable and automatic messages, backspace delete and PTT control (keys your rig) are included.

The ASCII mode includes all the features of Baudot. Transmission speed is 110 baud. Both upper and lower case are generated.

MODE 4: MEMORY KEYER

Plug in a paddle to use it as a deluxe full feature memory keyer with automatic and programmable memories, iambic operation, dot-dash memories, and all the features of the CW mode.

MODE 5: MORSE CODE PRACTICE

There are two Morse code practice modes. Mode 1: random length groups of random characters. Mode 2: pseudo random 5 character groups in 8 separate repeatable lists (with answers).

Insert space between characters and groups to form high speed characters at slower speed for easy character recognition.

Select alphabetic or alphanumeric plus punctuation. You can even pause and then resume.

MORE FEATURES

Automatic incrementing serial number from 0 to 999 can be inserted into buffer or message memory for contests

Repeat function allows repetition of any message memory with 1 to 99 seconds delay. Lets you call CQ and repeat until answered.

Two key lockout operation prevents lost characters during typing speed bursts.

Clock option (496 only) send time in CW, Baudot, ASCII. 24 hour format.

Set CW sending speed before or while sending.

Tune switch with LED keys transmitter for tuning. Tune key provides continuous dots to save finals. Built-in sidetone and speaker.

PTT (push-to-talk) output keys transmitter for Baudot and ASCII modes.

Reliable solid state keying for CW: grid block, cathode, solid state transmitters (-300V, 10 ma Max, + 300V, 100 ma Max). TTL and open collector outputs for RTTY and ASCII.

Fully shielded. RF proof. All aluminum cabinet. Black bottom, eggshell white top. 12"Dx7"Wx1¼"H (front) x3½"H (back). Red LED indicates on.

9-12 VDC or 110 VAC with optional adapter.

MFJ-494 is like MFJ-496 less sequencial numbering, repeat/delay functions. Has 50 character buffer, 30 character message memory. Clock option not available for MFJ-494.

Every single unit is tested for performance and inspected for quality. Solid American construction.

OPTIONS

MFJ-53 AFSK PLUG-IN MODULE. 170 and 850 Hz shift. Output plugs into mic or phone patch jack for FSK with SSB rigs and AFSK with FM or AM rigs. $39.95 (+ $3).

MFJ-54 LOOP KEYING PLUG-IN MODULE. 300V, 60 ma loop keying circuit drives your RTTY printer. Opto-isolated. TTL input for your computer to drive your printer. $29 95 (+ $3).

MFJ-61 CLOCK MODULE (MFJ-496 only). Press key to send time in CW, Baudot or ASCII. 24 hour format. $29.95 (+ $3).

110 VAC ADAPTER. $7.95 (+ $3).

BENCHER IAMBIC PADDLE. $42.95 (+ $4).

A PERSONAL TEST

Give the MFJ-496 or MFJ-494 Super Keyboard a personal test right in your own ham shack.

Order one from MFJ and try it — no obligation. See how easy it is to operate and how much more enjoyable CW and RTTY can be. If not delighted, return it within 30 days for refund (less shipping). One year unconditional guarantee.

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NEW

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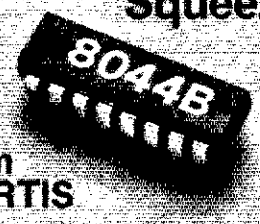

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8044M	(above plus speedmeter function)	19.95
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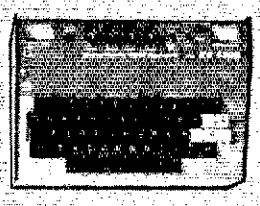
Add $1.75 on the above for U.S. postage and handling.

*Release squeeze during dah: dit follows, and vice versa. (Same as Ten-Tec, Nye, Heath, Accu-keyer and others)



KB-4900 5-MODE KEYBOARD

Sends Morse, Baudot and ASCII from keys or Morse from paddle. Random CW with lists for practice. Meters for speed and 256 key buffer. 256 key message memory in four soft sections. Editing and all US and European proSigns. 110 Baud ASCII, 45 Baud Baudot. Continuous control of speed, weight, pitch and volume. PTT, KOS control. Automatic serial number and time.

KB-4900. Morse, ASCII and Baudot Keyboard ..... FOB $399.95

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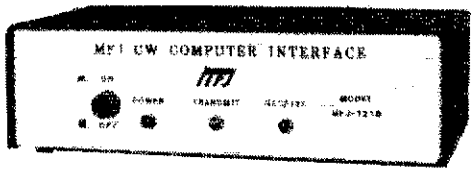
TRS-80* I, III OWNERS:

Send and receive CW with MFJ's new CW transceive program and interface. Just plug-in interface, load program and operate. Gives you Tri-Split screen, 3295 character buffer, 10 memories, "Fist Fixer."

All you need to send and receive CW.



$99.95

*TRS 80 is a registered trade mark of Tandy Corporation

TRS-80 Models I and III CW Transceive program and interface lets you send and receive CW. No modifications to rig or computer.

Tri-Split screen for receive, transmit, message index. On screen transmit/receive "LEDs", transmit speed indicator, "Fist Fixer."

TRANSMIT: 3295 character (or more) buffer. Preload buffer while receiving. Transmit when ready. Ten 199 character memories. Repeat/link memories. Erase character, buffer, screen. 12-55 WPM. Store 2200 characters for group practice.

RECEIVE: Adjustable "Fist Fixer" helps to copy poorly sent CW. Self-adjusting to 100 WPM. Returns to receive when transmit buffer is empty. Store up to 5 screens of received CW.

HARDWARE INTERFACE: Plugs between rig and computer. Noise limiter, 4 pole active bandpass filter, post detection filter, tracking comparator. Keys tube or solid state rigs. Tuning, transmit, ON LEDs. 6x1¾x3 inches. Aluminum cabinet. RF shielded. 9-18 VDC or 110 VAC with optional MFJ-1312 AC adapter, $9.95.

Requires TRS-80 Model I or III with at least 16K. Program supplied on cassette tape.

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Clip and mail coupon today to: WINDPOWER CO. (616) 796-8657
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I have enclosed check or Money Order for $589.00. Please send 200 watt generator, 10' tower, control panel with ammeter and complete instructions.

Also, please, enclose four 12 volt 50 watt lamps, and trickle charger free. I will pay truck freight when generator arrives. If I am not completely satisfied with the generator, I will return it within two weeks, freight prepaid and keep the trickle charger and 12 volt lamps.

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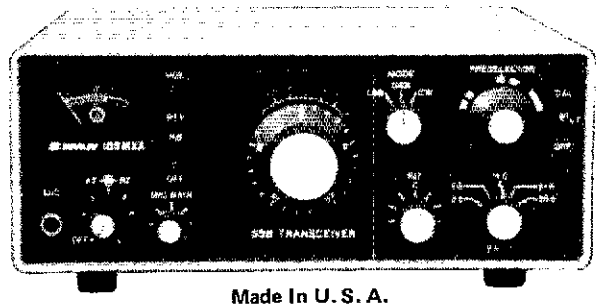

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YAESU FT-101ZD with fan in excellent condition, $599. FV-901DM in excellent condition, $269. MFJ-752B brand new, $59. Galaxy 5 Mk III with AC supply in fair condition, $169. Autek QF-1 in excellent condition, $39. Drake 2B with 2AQ Q-Multiplier in poor condition, $99. Free UPS insured. W7IL, P.O. Box 1941, Eugene, OR 97440. 503-687-9649, evenings.

DRAKE TR7/DR7, PS-7, FA-7's, R7/DR7, all filters, MS-7, MN-2700. Complete station only. $2500. Jim, KA5IVI 1-918-592-3070 days.

DRAKE C-Line, T-4XC, R4C, AC4, MS-4, filters, C-4 console, MN-2000 tuner. Package only. $1350. Jim KA5IVI 1-918-592-3070 days.

SELL: Heath SB-104A transceiver, matching SB-604 speaker, PS-1144 power supply, HDP-121A Desk mike, custom dust covers. Factory allgned. Mint. $750. K4TIV, 1207 Barton Street, Johnson City, TN 37601.

AMATEUR REPAIR — Professional service, reasonable rates, all brands, USA KDK repair center. Amateur Radio Repair Center of I.E.C., Inc., 1020 Brookstown Ave., Winston-Salem, N.C. 27101 919-725-7500.

GOLD, SILVER! Find valuable coins, rings, jewelry with powerful metal detectors. Free catalog. Chuck's Amateur Radio Supply, P. O. Box 44, Madera, CA 93639 209-674-1435.

LEATHER CASES — Genuine leather cases. Hand-made to custom fit the following H/T's: Icom 2A or 2AT, Kenwood TR-2400, Yaesu FT-207, FT-202, Santec HT-1200, Tempo S1 or S1T, Mark II/IV (TTP). We guarantee satisfaction. Call toll free 1-800-638-4466. Comm Center, Laurel, MD.

WANTED: AN—MS connectors. Send list, prompt reply. Mike Belenski, N7CBI P. O. Box 68854, Seattle, WA 98188.

WANTED Sloscan Eqp. K4NBN "No Bad News."

NEW, used: tubes, variable and oil capacitors, transformers, chokes, meters. S.a.s.e. list. K6WZ, 13638 Sproule, Sylmar, CA 91342.

COLLINS KWS-1 w/antenna relay. Excellent $699. 75A-4 mint w/3 filters & speaker $400. CP-1 crystal pack $175. Sonar 2m fm w/9 pairs & p.s. $100. Call Dave K3KD 215-754-6286.

WANTED: High voltage unit or transformer (50 kHz) for HP scope Mod 175A. Rudy Decher, 718 Owens Dr., Huntsville AL 35801.

INFO-TECH Video terminal for RTTY, ASCII & Morse. Model 300 keyboard, M200E & Sanyo 9" video monitor. Mint $800. Call Dave K3KD 215-754-6286.

BIG SALE: Gray Museum cleaning house. QSTs late 1920s $3 each, late 1930/1970s $5 per year plus shipping. Send your needs to: Charles Williams WA8AXQ, 400 Broadway, Cincinnati, OH 45202.

KENWOOD TS-820S, 500Hz filter, VFO-820 few hours use, mint, $825, Datong ASP RF-Processor $150, Datong RFC RF-Processor $100, Ameco PT-2 preamp. $50, N4TR 502-451-5916 after 1800 EST.

FOR SALE: Collins S/Line Rig — 75S-3, 32S-3, 516F-2, SM-1 mike Like new — total use less than 100 hrs. — no modifications $1000. L. D. Walker, P. O. Box 4444, Martinsville, VA 24115.

KWM2 winged, mint $700, Swan 300B, $225., Genave 12/12 w/ps $150, Autek QF1A $50, Raytrack speech clipper $30., HyGain 214 $20., WA4LTG 205-767-0441 after 0130Z.

YAESU FL-101xmit w/extra finals & driver. FR-101 digital rec. 160 - 2 meters all mode w/cw w/n & fm & many extras. Matching speaker/phone patch, cables, manuals & original boxes. Used very little, absolutely mint condition: $800. Palomar Skipper 300 amp. 26-54 MHz uses 4-8950s. For QRP rigs 1-30 watts. No external relay connections. Original box & manual - mint $400. I will ship. WBØVYR s.a.s.e. 913-235-3982.

WANTED: Drake 34-PNB noise blanker (for TR-4). K2IUV, 19 Standish Avenue, Yonkers, NY 10710, 914-779-6425.

COLLINS KWM-380/HF-380 service, modifications and consultation backed by factory training and complete inventory of spare boards and parts. K1MAN, 207-495-2215.

1982 CALLBOOK! Save Big. Order now. US-$17.50. DX-$16.50. Both-$33. K4CLA (shipped December).

DRAKE TC-6, SC-6 Drake TC-2, SC-2 and CPS-1 All for 450.00. Will sell separately. Braun, KI8L, after 5:30 P.M. 419-325-3757.

WILSON TOWER TT-45B w/FB-45B. New unused. Pickup Fort Knox, KY $499 or ship?? WB8GYS/4 502-942-8780.

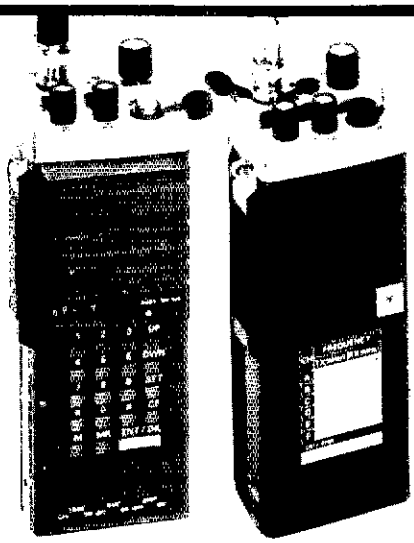
DRAKE R4B, T4XB, MS4, AC4, xtals, manuals. $575. W1RR 1-603-394-7921.

TS-820S/FILTERS - $550, VFO-820 $75, SB-220 $475, or offers? AI9J, 312-473-1400 x328.

QSTs — 1917-1947 (some missing) 1948-1980 - complete. Tubes - send SASE for list. W8BCO, 19339 Riverview, Rocky River, OH 44116.

MUST SELL Heathkit SB 200 linear (10M. band), HW101, PS-23, speaker HS 1661, mike HDP-121A, SWR/wattmeter HM-102, antenna, electronic keyer HD-1410, Drake low pass filter, Dentron Super Tuner - all in excellent conditions. Individuals 40% discount from catalog price. Complete package $600. Also Hi-Gain vertical tower 18-HT $120 WB2JBI. 201-347-5245 after 6 P.M.

BUSINESS WANTED - Entrepreneur/hams interested in buying an active electronics manufacturing business, preferably ham-related. Reply to J. Smallwood, Box 242, Blacksburg, VA 24060 703-951-9030.



YAESU FT-207R (left) 2m FM Hand-held Microprocessor controlled, 800 channels - keyboard entry 144 to 148 MHz, 2½w/200mw output. With Nicad pack, wall charger, flex ant., earphone & strap. 7¼"h × 2⅝"w × 2½"d, 1¼ lbs.

Regular $339 - ***Closeout $249.95***

YAESU FT-404R (right) 450 MHz Hand-held. Six crystal channels within a 3 MHz (tx) or 5 MHz (rx) spread, 430 to 450 MHz. 2½w/200mw output. With NiCad battery pack, wall charger, flexible antenna, case, strap, earphone & 446.0 mHz simplex. 7¼"h × 2⅝"w × 2¼"d, 1 lb

Regular $299 - ***Closeout $179.95***

FT-404R/TTP same features as FT-404R above, plus a factory installed 16-button Touchtone pad

Regular $325 - ***Closeout $199.95***

Accessories for FT-207R & FT-404R:

NC-1A	15-hr drop-in charger	Sale $44.95
NC-3A	15/4 hr drop-in chgr/AC adaptor	Sale 79.95
FBA-1	Battery sleeve for NC-1A/3A	8.00
FNB-1	Extra NiCad battery pack	23.00
NC-9B	Extra 15-hr wall charger	10.00
PA-2	Mobile DC-DC adaptor & charger	39.00
YM-24A	Speaker/microphone	39.00
FTS-32E	32 tone CTCSS encoder	40.00
FTS-32ED	32 tone CTCSS enc/dec	75.00
LCC-7	Leather carrying case for 207R	35.00
LCC-2/3	Leather for 404R/404R/TTP	38.00
TA-2	19" telescoping whip antenna for 207R	9.40
MMB-10	Mobile bracket	15.00

Crystal Certificates (2 per channel required) are $5.00 each when purchased **WITH** FT-404 or FT-404R/TTP. Purchased separately they are $8.00 each (no exceptions).

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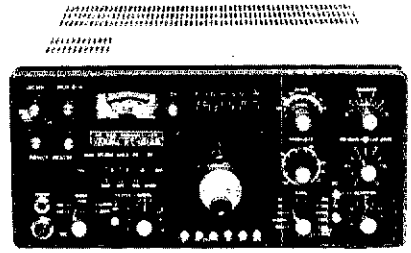
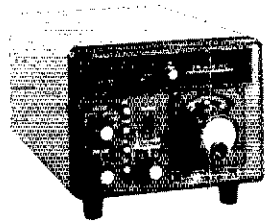
Hurry and order now! Send Check or Money Order. To expedite prompt shipment Call TOLL FREE and use MASTERCARD or VISA; phone COD orders accepted. Prices shown DO NOT include shipping charges.



YAESU FT-101ZD (Mk II) 9-band, 180w, HF Transceiver with AM. Digital & analog readout, variable IF bandwidth, noise blanker, RF speech processor, built-in 117 VAC & 13.5 VDC w/optional DC-DC converter. Uses FT-902DM accessories. 13½"w × 7"h × 13"d, 33 lbs.

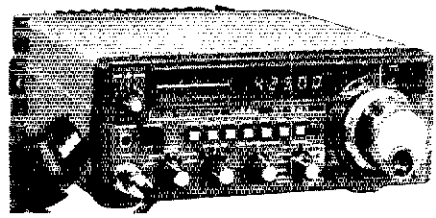
Regular $889 - ***Closeout $749.95***



YAESU FV-101Z External VFO for the FT-101Z/ZD, FT-901/902 series transceivers. Enjoy the convenience and versatility of operating "separates"

Precision tuning mechanism with analog dials that read to 1 kHz. Clarifiers with ± 2.5 kHz offset for TX, RX, or Transceive frequencies. VFO Shift feature allows ± 8 kHz shift from main dial frequency to check for activity. Six fixed frequency positions - crystals (optional) can be varied with ± 200 Hz fine tuning control. VFO status is continually shown by LED indicators. Supplied with connecting cable. 6"h × 8½"w × 13"d, 10 lbs

Regular $175 - ***Closeout $129.95***

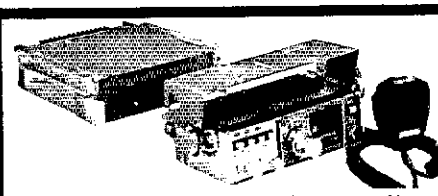


YAESU FT-707 8-band HF Transceiver for 80 to 10m, including WARC bands. Rated 240w DC SSB/CW, 80w AM. LED digital or analog readout & Led level meter. Scan mic., VOX, semi-break-in, calibrator, sel. AGC, noise blanker, clarifier, variable I.F. bandwidth, crystal control provision. 13.5 VDC/15A. 3¾"h × 9½"w × 9¾"d, 15 lbs.

Regular Price $810 - ***Sale $689.95***

Accessories for FT-707

FP-707	Power Supply	Sale $145.95
FV-707M	Digital VFO w/ 12 memories	Sale 249.95
FC-707	8-band antenna tuner	Sale 119.95
FRB-707	Relay box	39.00
MMB-2	Mobile mounting bracket	20.00
MR-7	Mounting rack	20.00
XF8.9HC	600 Hz CW filter	45.00
XF8.9HCN	350 Hz CW filter	50.00



YAESU FT-720RVH 25 watt 2m FM Transceiver. Microprocessor controlled, 144 to 147.99 MHz. Priority channel, ± 600 KHz offsets, four memory channels plus a "receive memory" for odd splits. Up/down scanning of dial & memory channels controlled from microphone. 1750/1800 Hz tones, LED display and indicators. Combination control head and 144 MHz/25w RF deck which detaches for remoting or to use optional 720RU 440 MHz/10w RF deck. Optional switching box (S-72) for using both decks for two band operation. With microphone, wire stand, mobile mount, DC cord w/cig plug. 13.8 VDC/6½ A. 6"w × 2"h × 10"d, 5½ lbs.

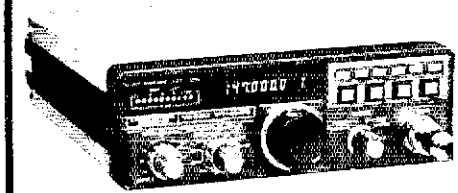
Regular $429 - ***Closeout $349.95***

FT-720RU 10 watt 440 MHz FM Transceiver. As 720RVH above, but for 440 to 449.975 Mhz. Combination control head with 720RU RF deck. Optional 720 RVH deck for 144 MHz/25w and optional S-72 for two bands. 13.5 VDC/4A.

Regular $449 - ***Closeout $359.95***

Accessories for FT-720R:

720RVH	144 MHz/25 watt RF deck	Sale $205.95
720RU	440 MHz/10 watt RF deck	Sale 225.95
S-72	RVH/RU switching box	Sale 79.95
E-72S	6½' cable for remoting RF deck	35.00
E-72L	13' cable for remoting RF deck	40.00



FT-480R Microprocessor controlled SSB/FM/CW 2m Transceiver. Covers 143.5-148.5 Mhz, 30 watts input. Two VFOs, four memory channels & priority with scan. Clarifier, up/down scanning controls & tone button on microphone. LED readout & S/PO indicator. "SAT" switch for precise zeroing of transmit frequency. 13.8vdc @ 4A. 2¾"h × 7"w × 9½"d, 5½ lbs.

Regular Price $529 - ***Sale $476.95***

FT-680R Microprocessor controlled SSB/FM/CW/AM 6m Transceiver. Similar to FT-480R shown above. Covers 50-53.999 Mhz, 20 watts input.

Regular Price $529 - ***Sale $476.95***

FT-780R Microprocessor controlled SSB/FM/CW UHF Transceiver. Similar to FT-480R shown above. Covers 430-449.00 MHz, 30 watts input.

Regular Price $785 - ***Sale $699.95***

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ATTENTION ATV, SSTV, RTTY and Specialized Communications buffs! A5 MAGAZINE has new owner and new format. Six issues $7.50, $10 Foreign. WB9QCD Mile Stone, PO Box H, Lowden, IA 52255. Our 15th year!

WANTED: RCA TacTec vhf/uhf radio. Schaaf, 807 Sunbeam Circle, Oneida, WI 54155.

SALE: FT-101EX, fan, external VFO, speaker/patch, cw filter, extra crystals. $625. WD5ABG, 303-469-2525.

CUSTOM SERVICE Improved Collins 75S-3B & 75A-4. Overall S/N improved: cascade mech. filters, nonoverlead RF-IF-mixer circuits, AGC, & audio LPF resulting in superior receivers, $225 each. Specialist Collins 62S-1 & Drake TR-6. WA6JRA, Goda Laboratory, 1815 N. Woodside Street, Orange, CA 92665. 714-637-3989.

ICOM-710 (Japanese domestic version of IC-701, 100 watts, 160 thru 10 meters) $800; RM-1 remote controller (same as RM-2) $100. Both for $850. English manuals with both. Bob Dildine, W6SFH 707-542-7619.

SELL: YAESU FT101E, YC601, YO100, FV101B, $700, Clipperton-L $475, Microlog AKB-1E, AVR-2, w/CRT $775. Jon, KB9ZC, 815-939-7885.

NATIONAL NCX-3 $125; Hallicrafters SR-150 $250; Hammarlund HX-50A $125; Gonset III 6M Communicator $75. All excellent. F. R. Claus W3QM, 310 McKinney Road, Wexford, PA 15090.

WANTED: Ham receiver and/or transmitter such as National, Hammarlund, others built in 1930s or 1940s. Will give good home. Please send lowest price with letter to WA4IOW/5 Jerry Shore, Box 64303, 5609 Twitty Street, Lewisville, TX 75056.

STANDARD SRC-146A 2 meter handheld with TouchTone pad, desk charger, mobile charger, commercial grade leather case, remote microphone, 10 sets of crystals, collapsable 19 in and rubber ducky antennas. All for $150. WA7TIG, John Banes, 21817 NE 154th, Woodinville, WA 98072. 206-788-4266.

SWAN 350D — digital; 200 watts SSB/CW; 80-10 meters — mint condition; two years old. — $350. KA9N 815-732-2501.

SELL SURPLUS equipment and electronic parts. List S.A.S.E. W2EZM, 431 Oakland, Maple Shade, NJ 08052. 609-663-8137.

ESTATE SALE, send SASE for 6 page list. W6IRK, 625 Tufts, Burbank CA 91504.

COLLINS KWM-2, 312B-5 PTO and 516F power supply $900. TKO keyer $20, Knight T-100 xmtr $60. K9KJE, 317-255-8814, 5701 Kingsley Drive, Indpls, IN 46220.

NATIONAL NC-240D and speaker $150; National HFS and P.S. $95; Clegg Thor 6 and P.S. $95; Heath Apache $125; all mint. Nathaniel Baldwin 1915 Type C headphones, original Teleplex code machine with 6 tapes, best offers. F. R. Claus, W3QM, 310 McKinney Road, Wexford PA 15090.

2-METER TELESCOPING handheld 5/8 gain antenna. 7-3/4" collapsable, 45" extended, BNC connector, tuned matching network molded into base. Really increases range. $13 postpaid. Unique Electronics, Box 541, Stratford, Ont. CANADA N5A 6T7.

LOW POWER AMP 5 watts in gives 10.0 plus out. 160-10 meters solid state. Not homebrew. KA7ADE, 208-237-6230.

TRADE COLLINS 75A4 mint receiver for complete set of precision machinist tools from retired toolmakers, machinists. Sell 3000 hard to find new receiving tubes at $1 each. W5QJT, 6020 Isabella. E.P. TX 79912.

ROSS'S NEW factory sealed carton specials for November: R.L. Drake Co. R-71/DR-7 $1346, L-7 $949.90, MN-2700 $290, 700E $950, TR-7/DR-7 $1250, UV3-144-220-440 $950. ETO Alpha 76A $1580, 77DX$3820. Encomm Santeck HT-1200 $305. Tempo S1-T $229, S4T-12 $355. Hustler 4-BTV $76, G6-144B $68, 3-TBA $180. ICOM-251A $589.90, 701 $895, IC-720A $1155, IC-211 $539, 255A $300, IC22U $255, 2 KL $1460, IC-730 $710. Kantronics' Field Day $369, Varifilter $115, Signal Enforcer $148. Kenwood SP-180 $50, TR-7730 $299.90, VFO-180 $140, AT-180 $148, TS-830S $869.90. All prices cash plus shipping. Closed Monday at 2:00. Ross Distributing Company, Preston, ID 83263 208-852-0830.

ASTRO 103, PSU-6A sp/ps, c.w. filter, Shure 444, Complete service manual. Immaculate condition, used very little. $975, 203-281-6038.

COLLINS 75S-1, 32S-1, 516F-2, 312B-4, complete station only $795. Drake C-line + 795. Rick, K5UR, 501-968-7373.

DRAKE T4XC, R4C, AC4, MS4, with crystals and filters $950, HD73 $75. Ken WB6CSW, 714-873-5727.

FOR SALE: Kenwood TS-180 w/PS-130 and MC-35 mobile mic. Also Heathkit HW-101 w/PS and D-104 mic. Steve WD8IXE, 513-433-8090.

ROSS'S USED equipment specials for November: Swan 102BX $738, 260 $279. Ten-Tec 509 Argonaut $239, OmniD ser B new display $679, 240 160 conv. $80, 244 Digi readout $140. Yaesu FTV-250 $189, FRG-7 $219, FT-207R $219, FT-101ZD $639, YO100 $179, FT-221 $359, FT-221R $378, FT-625RD $579. Heathkit HW7QRP $68, HW8QRP $109, SB-303 $110, SB-310 $210, SB-634 $189.ICOM IC-245 $209.90. IC245SSB $309. IC-21A and DV21 $289, IC-245SSB $289, IC-211 $429, IC-211 $390. Kenwood R599A/2M cov. $319, TS-120S $500, TS-520S/CW $599. All prices cash plus shipping. Closed Monday at 2:00. Ross Distributing Company, Preston ID 83263. 208-852-0830.

COLLINS F455FA05 500 cycle filter, $95. Rick, K5UR, 501-968-7373.

ROBOT 70, $200. Swan SW240, TCU split UFO, AC power supply, $280. Autek QF-1, $40. 4-811 2KW 10-80 linear $300. K1JMH, 72 Caputo Road, North Branford, CT 06471. 203-484-0560.

CLOSEOUT — Store demonstrator, 1-KWM-380 — full Collins 1-yr. Warranty with 3 extra filters, $3370 value, closeout price — $2300. Adirondack Radio Supply, Inc. 185 West Main Street, Amsterdam, NY 12010. 518-842-8350.

WANTED: Drake L-4B · top dollar. Call collect 617-227-5228 eves. N1BJO.

FOR SALE: Yaesu FT101, Swan 1040V antenna with 80m hat, Heathkit dummy load, Mucronta SWR/ watt meter, coax. $560. 301-592-7985. KA3CZV.

SPECTRUM SCR-4000 UHF repeater with Wacom duplexer. $1800. Must pick-up. Call 317-643-0479. WA9IVB.

FOR SALE Apple II PC board, complete parts w/assembly manual less ROM, RAM $495. Applesoft card $125. T. Kanai, 3 Dur Dr 133, Bethlehem PA 18015.

HEATHKIT HG-10 VFO switchable grid or cathode keying, good condition, $75. WB8YTQ John, 906 Broadway, Bedford OH 44146.

TEMPO-ONE HF transceiver. Good condition $379 with AC supply. Realistic DX-160 SWR/wattmeter $35. HN-31 dummy load $12. N3AIS 302-239-4984.

YAESU FTV-107R Transverter with 2m, unused, in carton, warranty cards: $250 (or trade for HF linear). Tom Redmon, KC4NX, 404-636-9485 (day), 404-921-3414 (night).

SALE: HEATH SB-101, SB-600, excellent condition $350. HW-2036 Transmitter/Micoder II $125. K4TBM 615-928-3277.

NOSTALGIC OM willing to pay any fair price for mint National NC-125 and Globe Scout 65B to recreate first station. Also looking for RME 4300. Working condition and dust not important so long as units are cosmetically mint. WA1YIW, South 4149 Sundown Dr, Spokane WA 99206. 509-922-2448.

SALE: KENWOOD TR-9000 with internal Janel pre-amp, BO-9 module, PS20, SP 120. Excellent condition $500. KB5XG 918-872-2088.

HEATHKIT HW-16 90 watt CW transceiver, $135. Panasonic RF-2800 portable 3.2-30MHz & AM/FM broadcast receiver with digital readout, $200. Hal Van Kipuzk, 507-683-4493.

KENWOOD TS-130V QRP Xcvr with cw filter and PS-20 power supply, mint, $495. WB7VOO, 602-298-4820.

FOR SALE: QST magazines, 1922 through 1980. All in ARRL binders. Estate of Ken Hiler, 2SQ/W4SQ. Best offer. Write Mrs. J. Kenneth Hiler, 2407 Parsons Ave., Melbourne FL 32901.

FOR SALE: Kenwood TS-520S with AC/DC, cw filter, fan; DG-5 display; AT-200 tuner; SP-820 speaker. All mint, original boxes, operating and service manuals. First $800 cashier's check, MO, will take. I will ship. Will consider separate sale. Steve WB4OMM, 904-767-4833 after 6 P.M.

SELL: DRAKE FS-4 synthesizer $225. Yaesu FRG-7 Gen Cov Rcvr $185. ICOM IC-255A 2mtr Transceiver $240. Microlog AKB-1 Keyboard $225. Drake TR-72 2 mtr Transceiver with touchtone mike 8 sets xtals $115. All like new. W2UPJ 201-922-2621 anytime.

WANTED: HAMMARLUND HX-50 transmitter; reasonable: Fred, WA2VJL, 442 Englewood, Buffalo NY 14223.

HAMMARLUND SP-600 with service manual but without cabinet. Needs work. Best offer over $100, you pay freight. Robert Tucci, 240 Center Avenue, Burgettstown PA 15021. Tel 412-947-9798.

WANTED: APPLE or TRS-80 32K or above with disk drives and printer. Call WB9IKM 1-515-672-2121 or home 1-515-673-5360, Oskaloosa, IA 52577.

KENWOOD TS-520S with cw filter, VFO-520, $800. RCA AR-88 shortwave receiver, pick-up or you ship $100. KC5OI, Box 604, Roswell NM 88201. 505-622-3453.

SELL: HEATH SB200 — wanted: 75M vertical — WA8JWR,1021 E. Scottwood, L-104, Burton MI 48529.

COLLINS S-Line, round emplem, 75S-3B with 500 Hz cw filter, 32S-3, 312B-4, 516F-2, manuals, cables, $1195, Rob, K5XA. 504-261-4660.

WANTED: 50' or better crank-up. WA5WUJ, 773 Rosa, Metairie LA 70005.

SALE: SB-201 w/10M. Used little; original owner; must sacrifice $395, plus shipping. W9JLD, Route 1, Windfall IN 46076.

MODEL 28ASR wired and reconditioned for Amateur use. $250. WB1AKU, Howard. 203-232-6485.

CENTURY 21, keyer, callpractor $235. KA6PYZ 415-673-9572.

COLLINS 75S3B like new $450, with a set of Tubsters installed $500. W7ID, Jeff 208-375-9267.

COLLINS OWNERS: Replace your 6AU6/7543 VFO tube with a guaranteed solid-state, voltage-regulated "Tube-Sub" only $19.95 postpaid. Ace Electronics, Box 6320, Minneapolis MN 55420.

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HAVE an interesting item you think would make a good Stray? Submit it to ARRL Hq. by the 10th of the second month preceding desired publication. If photos are included, use good quality, black-and-white ones. Above all, the material should be of interest to most QST readers!

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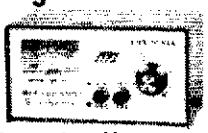

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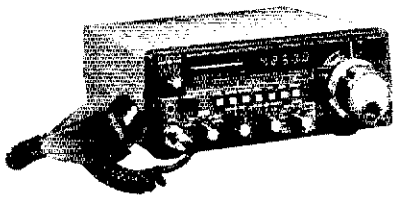

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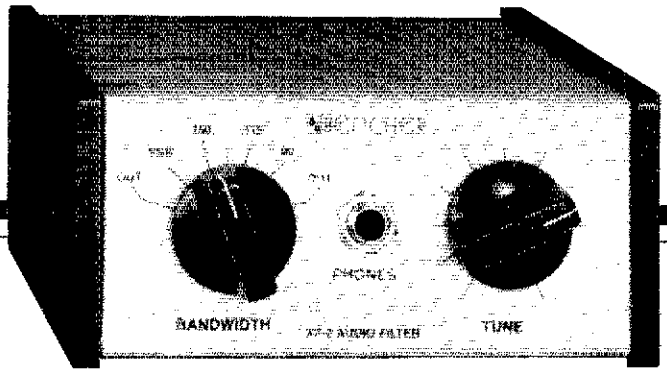

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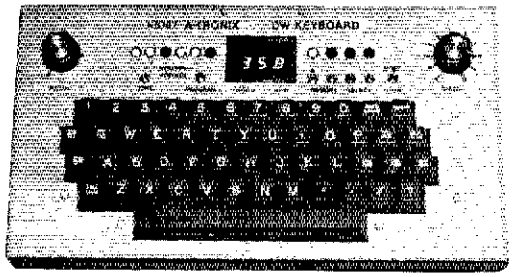

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YAESU FT-901/902. See "73", Sept. 1981
HEATH SB104A See "Ham Radio", April 1981
KENWOOD TS820 See "CQ", March 1981

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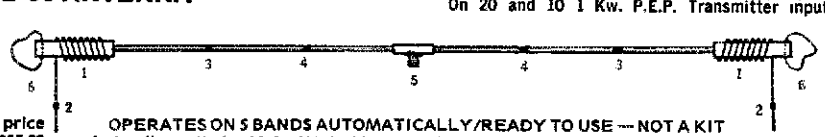

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1KW—4:1 Impedance	$12.00
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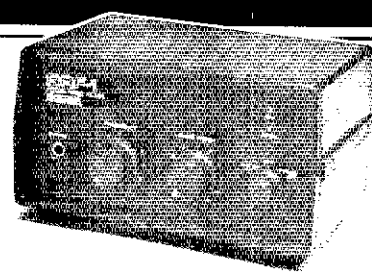
The MCLA-1 incorporates both a Mike Compressor and Linear Amplifier. By connecting the MCLA-1 between your microphone and transmitter either linear amplifier or compression action is possible. When the Function Switch is in the Compressor position, low voice levels are amplified and high voice levels are compressed. In the Linear position, microphone sensitivity is improved.

Specifications:
COMPRESSOR:

Current Drain	Less than 4mA
Input Impedance	600 ohms
Frequency Characteristics	100 — 10,000Hz, ‡ 0.2 dB
Distortion	Within 0.4% at 300 — 3,000Hz
Dynamic Range	More than 46 dB

LINEAR AMPLIFIER

Input/Output Impedance	600 ohm (High Imp. Mike avail.)
Frequency Characteristics	300 — 10,000Hz, ‡ 0.5 dB
Gain	25 dB (12V)
Power Source	DC9V (006P or ext.)
Accessories Inlcuded	* 4-pin mike plug, *3ft. long power cable
Dimensions	8"(W) x 4"(H) x 5½"(D)
Net Weight	2.6 lbs. (1.2 kgs)

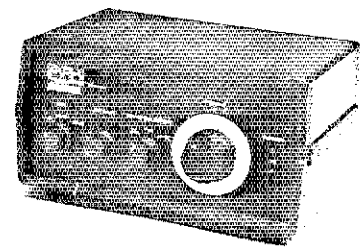


ACTIVE AUDIO FILTER MODEL AAF-1 ..... $65.

By connecting the AAF-1 between a receiver and an external speaker (or earphones), you can reduce unnecessary or undesired audio signals from your receiver; reduce noise and reduce beat frequency interference. The AAF-1 circuitry consists primarily of IC's and incorporates two separate filtering functions, band-pass and notch, both of which have variable frequency ranges.

Specifications:

Filters	1) Band pass filter 2) Notch filter
Center Frequency Shift Width	Between 200 and 2,500Hz
Variable Bandwidth Range	B.P.F. 100 — 10,000Hz (-12 db) NOTCH 70 — 1,500Hz (-12 db)
Input Impedance	8 — 600 ohms
Output Impedance & Power	8 ohms 1W max.
Semi-Conductor Used	5 ICs, 1 Tr., 7 Diodes, 1 LED
Power Source	DC 9V (006P or ext.) 150mA max.
Accessories Included	* 3ft. long connector cable with plugs * Plug adaptor * 3ft. long power cable
Dimensions	8"(W) x 4"(H) x 5½"(D)
Net Weight	2.6 lbs. (1.2 kgs)



PRE-SELECTOR MODEL PR-1 ..... $80.

The PR-1 Preselector, when connected between an antenna and transceiver or receiver, will improve the selectivity of weak signals and will assist in reducing image interference.

The PR-1 is usable with any transceiver equipped with an antenna change-over relay.

Specifications:

Frequency Range	3-30MHz in 3 bands, 3-7MHz, 7-14MHz, 14-30MHz
Gain	20 db at 7MHz, variable through control of RF Gain
Semi-Conductor Used	3 FET's, 5 Trs., 11 Diodes, 1 LED
RF Attenuation	20dB & —10dB
Input/Output Impedance	50-75 ohms
Relay Rated	200W, CW continuous
Power Source	117V AC, 60Hz
Dimensions	8"(W) x 4"(H) x 5½"(D)
Net Weight	3.1 lbs. (1.4 kgs)

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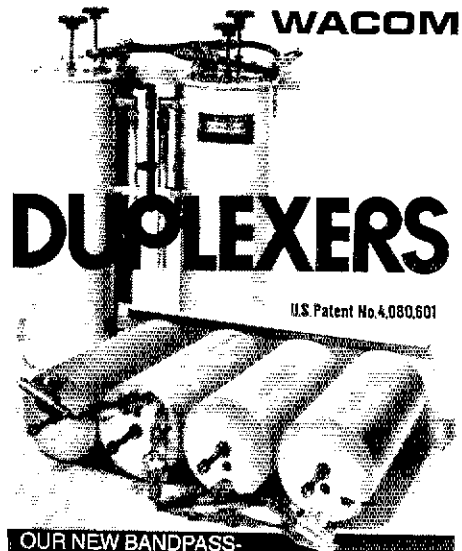

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MADISON Houston Comvention '81 specials: Icom IC25A $309; IC730 $729; IC720A/AC $1298; Rockwell KWM380 $3095/free filter; Santec HT1200 $199; IC22/U $150 (limited); Robot 800A $749; Digitran keypads KWM380 $12; Cubic 103 $1195; Drake TR7/DR7 $1349; Call: TS830S, TR7730; TS 130S plus antenna tuner AT130 $759; Telrex beams: list-10%; GE572B $38; GE614B $10.95; Kenwood service manuals-stock. Antique tubes — call; Belden RG8foam 8214 36¢/ft; 8267 RG213 43¢/ft; MiniRG8-9258 19¢/ft; 9405 heavy rotor cable 45¢/ft; Amphenol PL259 silverplate $1. Complete service facilities. All items guaranteed. Prices fob Houston, include sufficient postage. Madison Electronics, 1508 McKinney, Houston TX 77010. 1-713-658-0268, 1-800-231-3057 6-10 PMCT.

FOR SALE: TR-9000 xcvr, PS-20 power supply, BO-9 system base, $400, K5MUG, 504-928-1458.

WANTED: GALAXY V transceiver handbook Bell-Howell tape recorder. Cash offer. E.H. Bremer W8DJ, Box 142, Douglas MI 49406.

FOR SALE: TS-830S xcvr, AT-230 tuner, MC-50 mike, all for $900. K5MUG, 504-928-1458.

FOR SALE: KWM-2, 516F-2, Waters notch filter, DX-Eng. speech processor, D-104; $650. R4B, T4XB, MS-4, AC-4 D-104; $650. WB2PMP/4, Dave Propper, 305-741-8546, 8901 NY 24th Ct., Sunrise FL 33322.

COLLINS R-389/URR wanted. Robert Holzapfel, WA8GJH, 7249 National Road, New Paris OH 45347.

FOR SALE: Argonaut 509, good condition. Will ship. $195. W0MZC, 26 Princeton Circle, Longmont CO 80501.

WANTED — Collins F455FA-60 6-kHz filter. Durant Imboden KA0JFF, 3325 Dupont Ave., South Minneapolis MN 55408.

HEATHKIT GR-78 general coverage receiver $75. GR-110 vhf scanning monitor, plus 8 crystals $100. HD-19 hybrid phone patch $25. Manuals included. You pay shipping. Paul, K3IVZ 412-864-1788.

FOR SALE: 1934 McElroy Mac-Key, $95; Valiant I, $145; 204BA, $100; Swan 160X, 117XC, $385; HQ170AC, $155; Super-pro, $95; Bug Similar Blue Racer, $45; BC312, $50. Murch Transmatch, $95; Viking I, VFO, $80; Viking II, VFO, $80; Pierson KP-81 receiver, $50; Hammarlund 4-20 xmtr, $55; Collins 75A4A, W2VCZ/MODS., .500, 2.7, 3.1, $450; Johnson transmatch, $55; 180 foot BC tower, $1,350; Pair 100th's, KW, $200; 100 foot pneumatic mast, trailer-mounted, guys, compressor, $3,000; Mint upgraded SP200, $200; Mint CE20A, $55; 10B, $25; BC610E, $150; All F.O.B. Want Telrex 646/20M, 346/40M 257/80M, Elmac 1000T. K8CCV, 216-427-2303, 6-9 P.M. weeknights.

HEATH SB-104A with crystal filter, no PS, excellent condition, $350. I ship. Ron, N7CE, 503-644-7528.

QF-1A filter. Have two. Sell one $50. 609-893-0376.

NATIONAL NCX-5, VX-501, XCU-27, Jeath phonepatch, manuals, excellent $350. U-ship. Ken, KC9AU 608-5424 after 5 P.M.

HEATHKIT - HW-101, cw filter, PS23 supply, D-104 microphone $395. HW-2036A 2-meter synthesized xcvr, Micoder microphone, spare microphone, $250. Bill, WB2OXU, 914-723-0783.

YAESU FT-101EE with D-104 mic. Mint $675; Turner +2 mic; Heath HD-1410 iambic keyer, HD-15 patch; Lambda MM-2 monitor scope. Make offers. Call Andy Burkbuchler 215-691-2961.

WANTED: Telrex 10M523 and 15M532. KA4HNV, 803-877-1428.

QST's, 1940 through 1975, good, best reasonable offer for lot only. Walt Dauksher, W2OKX, 114 Inwood Ave., Point Lookout NY 11569.

ARGONAUT 509 $200. Swan 350D with VX-II VOX $325. I ship. KA6IYE 707-445-9554.

DRAKE TR-22 with nicads. $80. Call Andy Burkbuchler 215-691-2961.

SELL: Drake T4XB, factory aligned, retubed, with manual, Heath watt-meter, Denton 160-10 tuner, Astatic D104 mike. All in excellent condition. Complete package $375. WA2DGU 212-925-3426.

HAMMARLUND HQ-180A, excellent condition, manual and speaker. J. W. Kemper, 412 Maple, Danville KY 40422. 606-236-3488.

COLLINS: Mint 75S-3, $395. KWM-2, $599., 516F-2 power supply $150. Magnum Six processor, $125. Spectronics DD-1C, $125. HO-10 monitor scope, $125. Processor and DD-1C sold only with KWM-2. W3NV, 8258 Brittany Place, Pittsburgh PA 15237.

HEATHKIT SB-101, SB-600, and HP-23 ps with all manuals $300. Mark WB4CSK, 1839 Dunroamin' Lane, Fayetteville TN 37334. 615-433-5114.

SELL: TRS-80 16K L2 $425 SSTV keyboard (W0LMD) $150 RTTY. cw interface for TRS-80. 609-655-0835, W2IZY.

COLLINS: KWM-2, 516F2, winged, all modifications, plug-in relays. Excellent, $575. W2ZZG 518-673-3676.

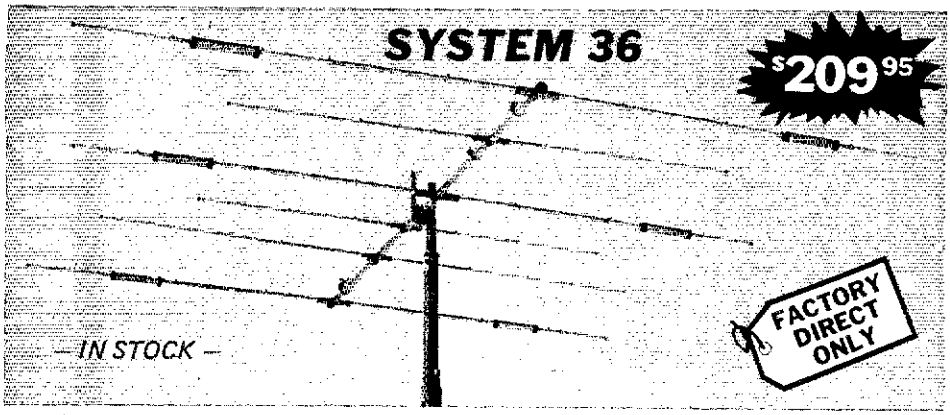
SELL: Mint Drake TR-4 with blanker, AC-4, MS-4, fan and Compreamp. $385 — you ship. Joe WA5HSC, 3625 Shell, Midland TX 79703. 915-694-6110.

FOR SALE: Murch UT-2000A Transmatch, excellent condition, U-ship. $85. Tom, WB7RMU, 509-787-2003.

REGENCY HB-2A FM 2-meter transceiver $82. P.P. 48. Want 1000 and/or 100 kc. Callibrater. K4JCX, 121 Maple, Oak Ridge TN 37830.

INTERESTED in satellite communications? Contact ARRL Hq. for information about the OSCAR program.

WILSON SYSTEMS INC. MULTI-BAND ANTENNAS



A trap loaded antenna that performs like a monobander! 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	Boom (O.D. x Length)	2" x 24' 2½"	Wind Loading @ 80 mph	215 lbs.
Maximum power input	Legal Limit	No. of Elements	6	Maximum wind survival	100 mph
		Longest Element	28' 2½"	Feed method	Coaxial Balun (supplied)
VSWR @ resonance	1.3:1	Turning Radius	18'6"		
Impedance	50 ohm	Maximum mast diameter	2"	Assembled weight (approx)	53 lbs.
		Surface area	8.6 sq. ft	Shipping weight (approx)	62 lbs.

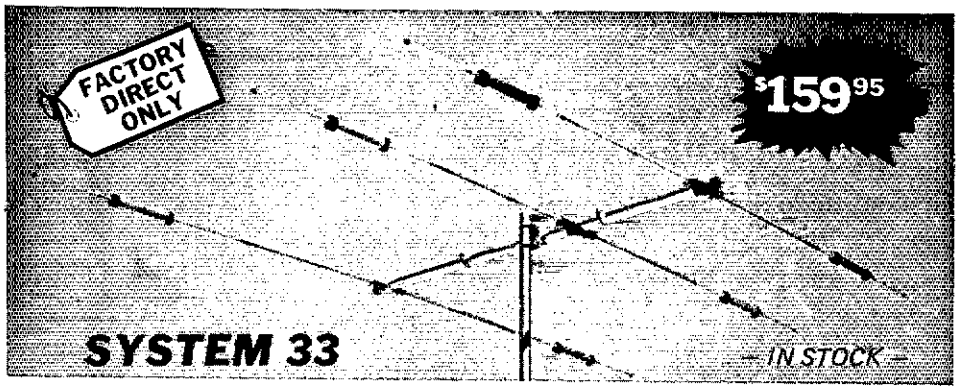
NEW!

ADD 40 OR 30 METERS TO YOUR TRI-BAND WITH THE NEW 33-6 MK

$59.95

– IN STOCK –

Now you can have the capabilities of 40-meter or 30 meter operation on the System 36 and System 33. Using the same type high quality traps, the new addition will offer 200 HKZ of bandwidth at less than 2:1 SWR. The new 33-6 MK will fit your present SY36 or SY33, and using the same single feed line.



Capable of handling the Legal Limit, the "SYSTEM 33" is the finest compact tri-bander available to the amateur. Designed and produced by one of the world's largest antenna manufacturers, the traditional quality of workmanship and materials excells with the "SYSTEM 33". New 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 loading at 80 mph	114 lbs.
Maximum power input	Legal Limit	No. of elements	3	Assembled weight (approx)	37 lbs.
		Longest element	27'4"	Shipping weight (approx)	42 lbs.
VSWR at resonance	1.3:1	Turning radius	15'9"	Direct 52 ohm feed – no balun required	
Impedance	50 ohms	Maximum mast diameter	2" O.D.	Maximum wind survival	100 mph
		Surface area	5.7 sq. ft.		

WILSON SYSTEMS, INC.

4286 S. Polaris Ave., Las Vegas, Nevada 89103

Prices and specifications subject to change without notice.

ORDER FACTORY DIRECT 1-800-634-6898

$59.95

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 hot dipped galvanized base mount bracket to attach to vent pipe or to a mast driven in the ground.

Note:
Radials are required for peak operation.
(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 swaged aluminum tubing
- Automatic bandswitching
- Mast bracket furnished
- SWR: 1.1:1 or less on all bands

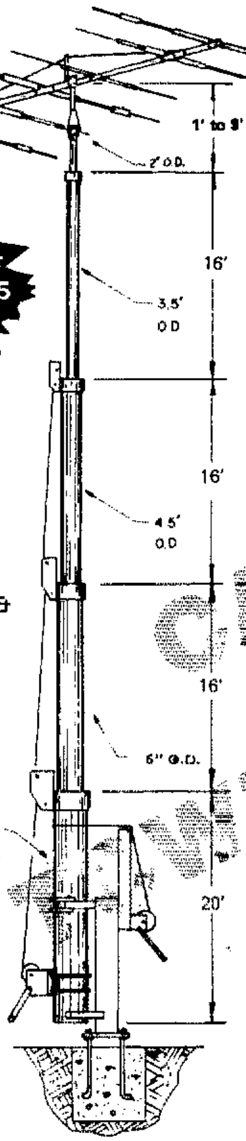
GR-1

$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 and heavy duty egg insulators, instructions. The GR-1 will increase the efficiency of the GR-1 by providing the correct counterpoise...

WILSON SYSTEMS TOWERS

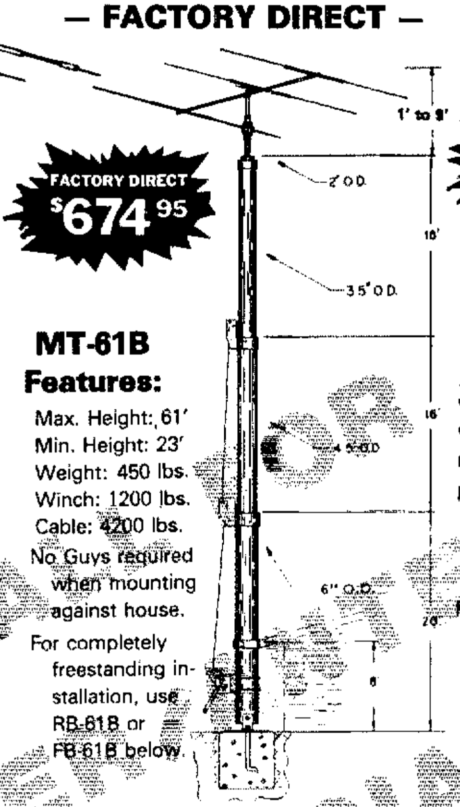
— FACTORY DIRECT —



ST-77B Features:

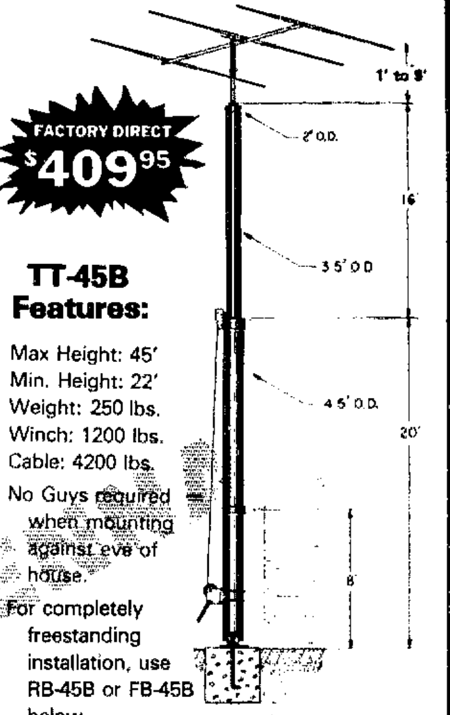
Max. Height: 77′
Min. Height: 24′
Weight: 700 lbs.
Winch: 1500 lbs.
Cable: 6400 lbs.
Requires RB-77B & will be totally freestanding

Recommended Rotor: High Gain Roto-Brake



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.



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.

CALL FOR WEEKEND SPECIAL

WIND LOADING			
Tower	Height	Sq. Ft.	
ST-77B	69	16	Square Footage Based on 50 MPH Wind
	77	10	
MT-61B	53	18	
	61	12	
TT-45B	37	18	
	45	12	

BASE CHART		
TOWER	WIDTH	DEPTH
TT-45B	12″ x 12″	30″
FB-45B	30″ x 30″	4½′
RB-45B	30″ x 30″	4½′
MT-61B	18″ x 18″	4′
FB-61B	3′ x 3′	5½′
RB-61B	3′ x 3′	5½′
ST-77B	See Below	Bases
RB-77B	3½′ x 3½′	6′

Wilson Systems uses a high strength carbon steel tube manufactured especially for Wilson Systems. It is 25% stronger than conventional pipe. The tubing size used is 2″ & 3½″ -.095; 4½″ & 6″ -, 8″ -.134. All tubing is cold 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.

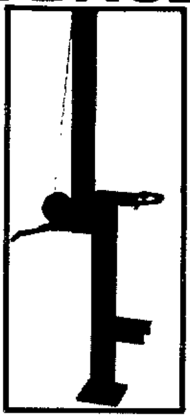
The ST-77B cannot be mounted against the house and must be used with the rotating tilt-over base RB-77B shown below.

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.

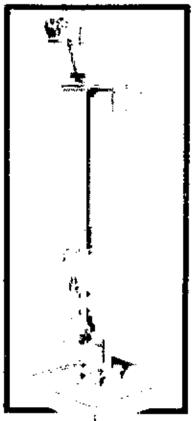
FB-45B.. 112 lbs... 209^{95}
FB-61B.. 189 lbs... 299^{95}



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... 289^{95}
RB-61B.. 229 lbs... 379^{95}
RB-77B.. 300 lbs... 569^{95}



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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Specifications Subject to Change Without Notice

WSI WILSON SYSTEMS, INC.
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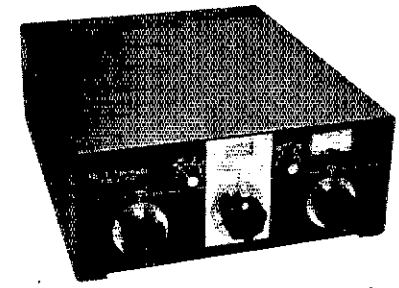
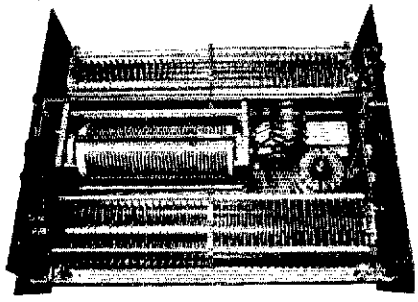
The Ultimate Transmatch - Model UT-2000B





Specifications

- Continuous tuning 10-160 meters
- Front panel function switch -in and out - dummy load (not supplied) - ground
- Handles any antenna system, dipoles, random wires, verticals, whips, beams, open wire line
- Built in heavy duty 4 to 1 balun, 3 cores
- Ceramic rotary inductor, #8 gauge wire
- Turns counter for precise tuning
- 4000 volt capacitors
- Built in line sampler- no external bridge needed
- Full legal power on all bands
- Provides an SWR of 1 to 1 to the transmitter
- Gray cabinet, dark gray panel
- 12"w x 15½"d x 5"h
- Shipping weight: 13 lbs
- Price **$248.50** & shipping

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UT2000A - 10-80 meters - $159.95 & shipping
UT2000A-LS - 10-80 meters - $188.00 & ship.
68A Multiband Antenna 10-80M $54.50 P.P.

Now Available - Components

A - capacitor 8¼"x3¼"x3 $48.00 & shipping
A (split capacitor) 10"x2¾"x3 $56.00 & shipping
B - capacitor 14¼"x2¾"x3" $68.00 & shipping
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RS20A 16 amps continuous, 20 amps ICS	87.20
RS20M same as RS20A + meters	105.50
RS35A 25 amps continuous, 35 amp ICS	131.95
RS35M same as RS35A + meters	151.95
TELEX HEADSETS-HEADPHONES	
C1210/C1320 Headphones	22.95/32.95
PROCOM 200 Headset/dual Imp. MIC	77.50
PROCOM 300 lt/wt Headset/dual Imp. mic	69.95
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200 mw in, 25 watts out 2m Amp	82.95
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B108 10 in, 80 out, All Mode, Pre-Amp	CALL
B1016 10 in, 160 out, All Mode, Pre Amp	CALL

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AV3 New 10-15-20m Vertical	41.50
ARX 2B New Ringo Ranger 2m	34.00
A32-19 2m "Boomer" DX Beam	75.95
220B 220 MHz "Boomer"	68.95
214B Jr. Boomer 144-146 MHz	62.10
214FB Jr. Boomer 144.5-148 MHz	62.10
A147-11 11-Element 2m	34.50
MINIQUAD HQ-1	132.95
ALLIANCE HD73 Rotor	93.95
CDE HAM IV ROTOR	169.95
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432 16LB 16 elem. 430-434 MHz beam/balun	60.70
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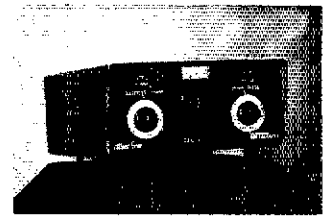

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KENWOOD 599A xmtr, rcvr. Excellent. $525 takes both. Lowry, Brown's Lane, Old Lyme CT 06371.

SELLING: Very good Heathkit SB-102, HP-23A, SB-600, $290. Also....ICOM-22S with Synthacoder-22, good condition, $165. WA4KBE, 82 Donna Ave., Pittsfield MA 01201. Call after 6 P.M. 413-442-7593.

H/P Model 120B oscilliscope and manual. W8QW, 305-334-8496.

SELL: Kenwood TS-820S with cw filter $510 — Dentron Clipperton-L $165 — Millen Transmatch 92200 $60 — Leader 3" scope LBO-310-A $60 — Kenwood clock HC-10 $35 — Virginia Electronic Research audio filter SL-56 $30 — Palomar VLF converter $30 — will ship UPS prepaid — W2MEI 212-864-9299.

YAESU FT-101ZD with fan and cw filter, mint, $575. FV-101Z VFO, mint, $97. Ten-Tec Argonaut QRP Xcvr, 208A cw notch filter, 206A calibrator, all very good, $350. Ten-Tec 247 antenna tuner, mint, $43. KA7BMB, 602-298-4820.

DRAKE TR-22C 10 crystal pairs, mobile mount, linear amplifier. W8QW, 305-334-8496.

FACTORY OVERRUN - Coaxial cable 1 million ft in stock, 96% shielding: RG-6A/U $140/M', RG-11/U $145/M', RG-8X (Mini-8, white) $104/M', RG-58A/U $69/M', RG-59/U $49/M', RG-214/U $850/M'. Nemal Electronics, 5685 SW 80th Street, Miami FL 33143. 305-661-5534.

YAESU FT-707 in original carton, perfect condition. Includes 600 Hz cw filter and AC power supply. $750. W2KK, 2201 Duvall Rd., Woodbine MD 21797. 301-854-6014.

KENWOOD Line, mint in factory cartons, TL-922A with 10 meters, 3 months old, $1100, TS-820S $700, R-820 $700, SM-220 with BS-8 $325, SP-820 $50. AT-200 $115. Yaesu FTV-650B $175. Ameco TX62 and VFO $100 or any best offers on items. Bob, WB9WSH, Box 1256, Milwaukee WI 53201. 1-414-529-2599.

FOR SALE: Ten Tec Century 21 transceiver with manual and original carton excellent cndx $175. KA3EWR, Jim Vuccolo, 142 West Brown St. Castanea PA 17726 or call after 4 717-748-7490.

HAMMARLUND HX-50A, HQ-170Avhf, D104, dipole $375 WB2YRL.

YAESU FT101ZD, with WARC frequencies, mike and fan, mint condition, $625. John, W3MA, Box 270, RD 2, Malvern PA 19355. 212-644-0806.

FOR SALE: Alpha 76PA, 25 hours running time. $1125; Heath equipment all in perfect condition, IT-1121 curve tracer $60; IO-101 vectorscope $50, GT-1217 dailer $20; pair GDA-1158-2 PLL ultrasonic detectors, $25 each; IO-104 triggered oscilloscope +95; ETA/ET/EE-3400 microprocessor trainer with 4K expansion $210; W8PW, 7 Ent Rd., Bedford MA 01730. 617-274-6019.

MAIL ORDER BUSINESS for sale. Contact W4OLI at Gotham antennas. (813) 584-8489.

WANTED: Drake MN2000 and Heath HO-10. W3MA, Greentree rd, Box 270, RD 2, Malvern PA 19355.

DRAKE TR3/AC3PS good condition $300. K6XO, 415-792-5736.

DRAKE STATION: TR7/DR7 (late model), PS7, 2xFA7, SL500, MS7, SP75, 7077, service manual - absolute mint condition — $1450. J. Ross 609-397-3255 or 201-788-5777.

DGM — Morse video display new $285. Dentron — Super Tuner $75. Hallicrafters HA-5 VFO with 2 & 6 meters $50. KA9BNX, A.P. Wayda, 5718 North Hill Drive, Sussex WI 53089. 414-538-1346.

WANTED — Hornet TB-750 beam parts, 7094, 866AX tubes. KØHQW, 65 Dellbrook, O'Fallon MO 63366.

1982 CALLBOOKS (Continental 48-shipped prepaid). US $17.50, DX $16.50, both $33. K4CLA, 562C Oak, Lexington SC 29072.

YAESU FT-101ZD, FV101Z VFO, cw filter, fan. Mint $699. Johnson KW matchbox $109. Includes shipping, K1BW/1. 203-222-0866.

ARGONAUT 509, 208 CW filter; $300. New Yaesu FT-207R, nicads, mobile antenna;$165. NØBYC; 612-487-1128.

WANTED: the following military manuals for private collection: ARC-6 ARC-7 ARC-8 ARC-10 ARC-11 ARR-1 ARR-4 ARR-6 ARR-8 ATT-9 ARQ-1 ARQ-2 ARQ-3 ARQ-4 ARQ-5 APR-1 APR-3 APR-5 APR-6 APR-7 APT-1 APT-2 APT-4 APT-5 APT-6 APA-2 APA-3 APA-4 APA-7 APA-9. Also others. Send me your list. Dean Soderling, 6725 Portland, Richfield, MN 55423.

WANTED — Collins 30S-1 linear, SM-3 mike. Excellent to mint only. Will pickup within 200 miles. K4HCA, 27 Jefferson Dr., Flanders NJ 07836. 201-584-2547.

WANTED: dial cord diagrams, meter for Hallicrafters SX-24. Maria Gloria, 442 Englewood, Buffalo, NY 14223.

TELETYPE Model 28 ASR with reperf and also 2 sets of gears, $295 (you pick up). Tektronix Type 317 oscilloscope with hi voltage probe, $95. Heathkit IG-72 audio generator, $35. Dave, AI1P, Southington CT. 203-621-5771.

TEN-TEC Century 21 excellent $240, Vibroplex Original $25, Ameco cw/mon oscillator $10. W4MGG, 2941 Kedron, Winston-Salem, NC 27106.

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PSU-6 Supply 139 mfe
300B Cygnet Xcvr 329 m
350 Xcvr 199 v
350C Xcvr 289 m
500 Xcvr 249 f
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HF-700S Xcvr 329 f
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14-117 DC supply 99 f
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600R Custom Rcvr 249 e
CAF Audio notch 19 m
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206 Calibrator 19 m
208 Ext CW filter 19 m
405 50w Linear 119 m
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276 Calibrator 19 mfc
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242 External VFO 99 w
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FT-301S DIG 20w Xcvr 369 w
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FT-301AD Dig Xcvr 469 f
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FP-4 Power supply 35 c
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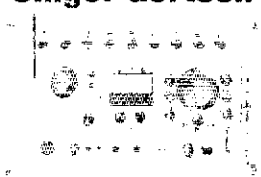

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f = Orlando, FL 32803; 621 Commonwealth Ave	(305) 894-3238	1-800-327-1917	1-800-432-9424
c = Clearwater, FL 33515; 1898 Drew Street	(813) 461-4267		
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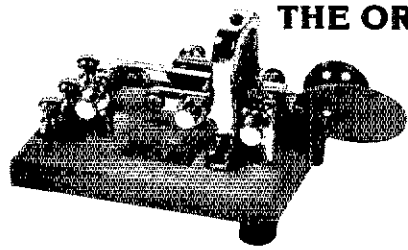

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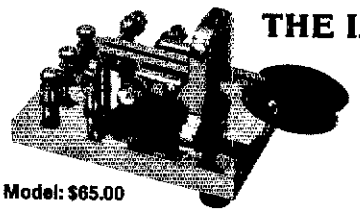

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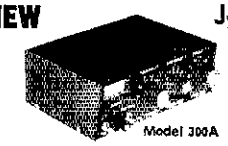

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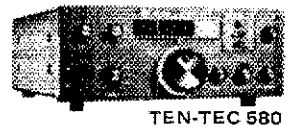
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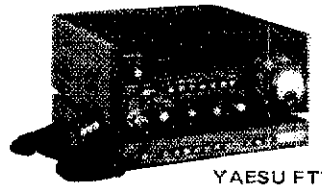
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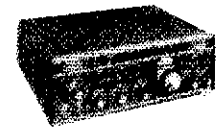
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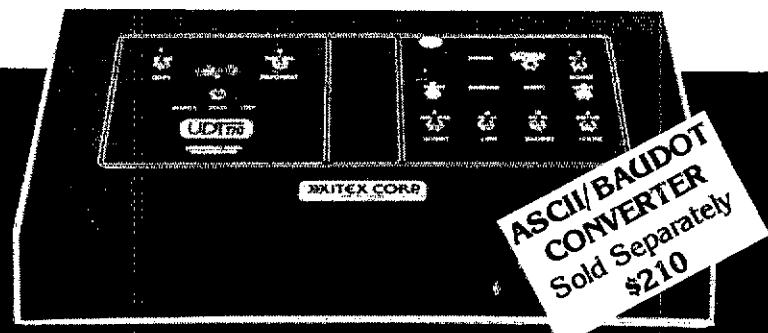

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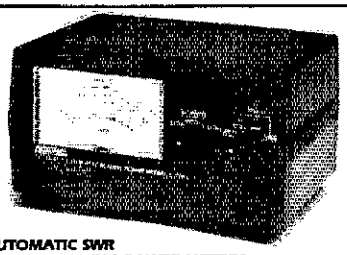

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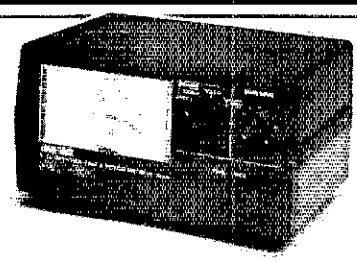

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Frequency Coverage 50-150MHz
RF Power Range ..... 0-20, 200W ± 10% accuracy
Power Requirements ..... 12V DC (for meter illumination)
Accessory Included ..... 6ft. long connector cable and velcro for mobile mounting
Dimensions ..... 5½"(W) x 2¾"(H) x 1½"(D). Meter
3⅝"(W) x 2½"(H) x 1¾"(D) Coupler
Net Weight ..... 0.45 lbs. (200 grams) Meter
0.67 lbs. (300 grams) Coupler

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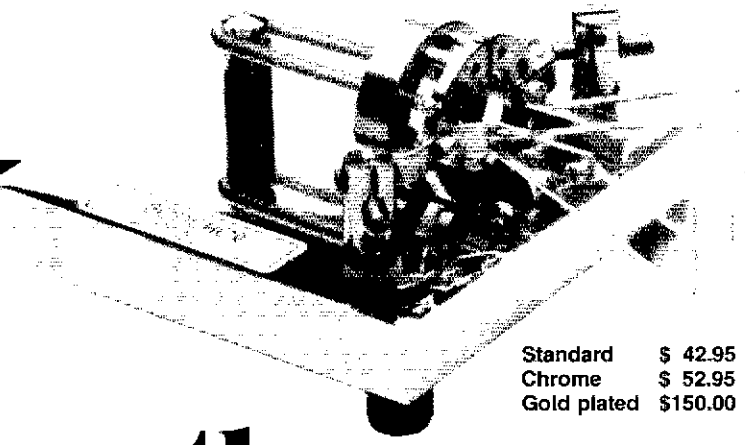

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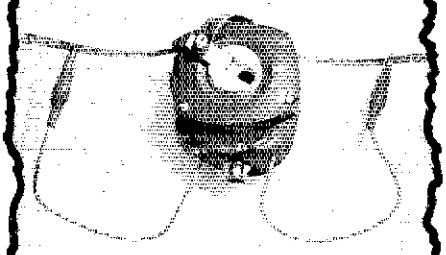

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PD-4010	40,20,10/15	66	33.95	29.95
PD-8040	80,40/15	140	45.95	41.95
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Dipole shorteners - only, same as included in SD models				
S-80	80/75			$11.95/pr
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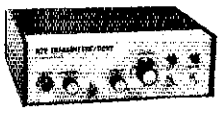

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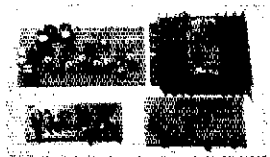

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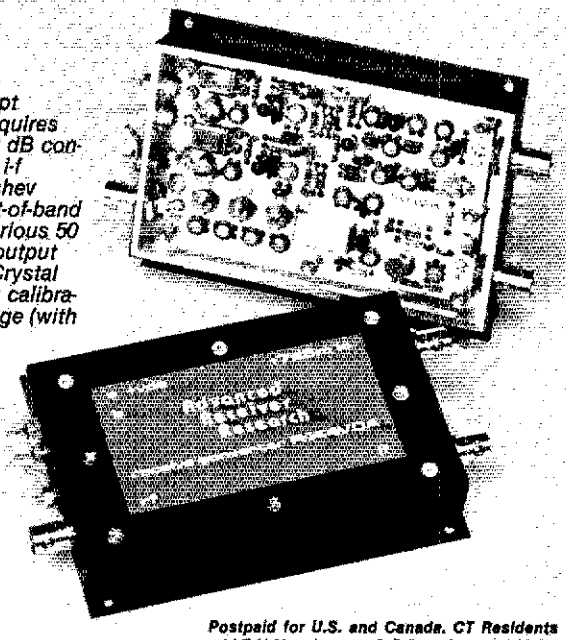

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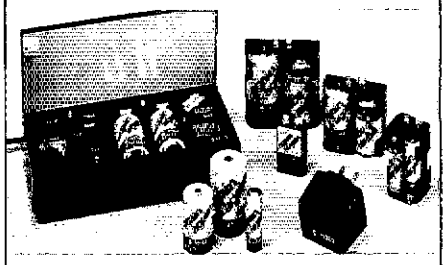

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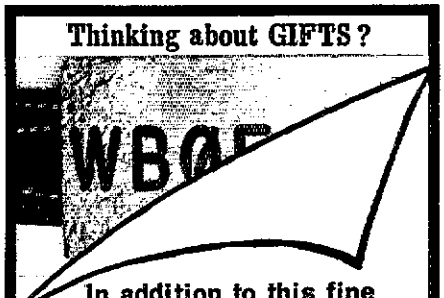

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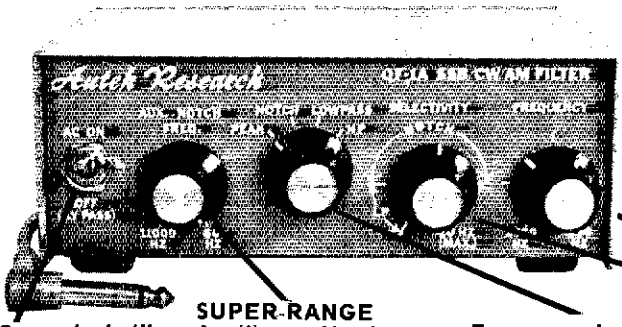

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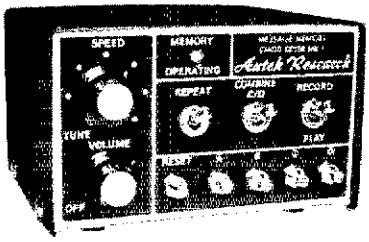

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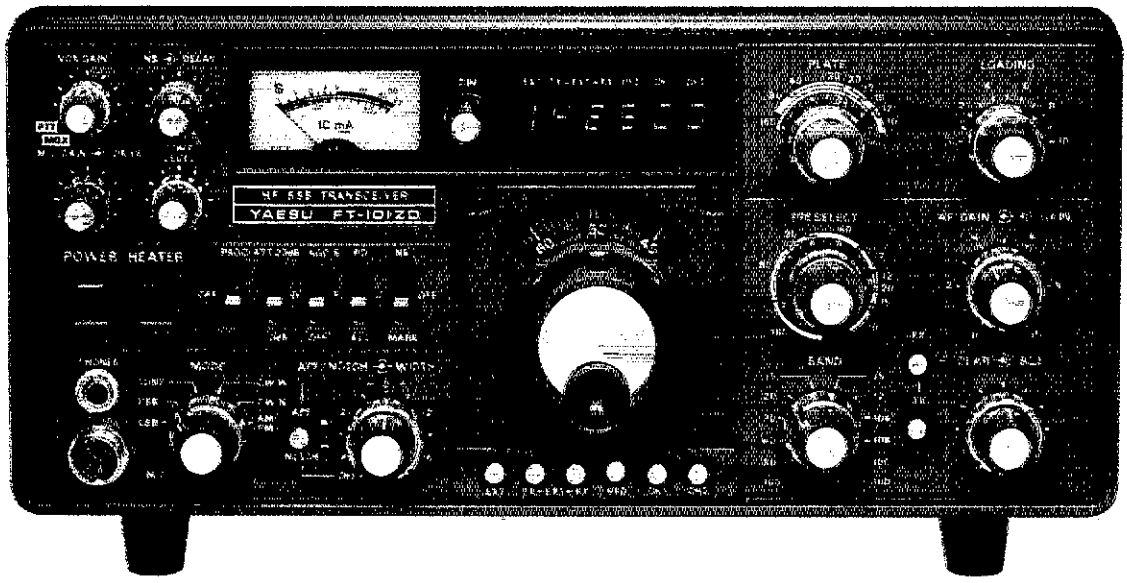

The FT-101ZD Mk III is the latest chapter in the success story of the FT-101 line. Armed with new audio filtering for even better selectivity, the FT-101ZD now includes provision for an optional FM or AM unit. Compare features and you'll see why active operators everywhere are upgrading to Yaesu!

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Diode Ring Front End
The FT-101ZD now sports a high-level diode ring mixer in the front end. This type of mixer, well known for its strong signal performance, is your assurance of maximum protection from intermod problems on today's crowded bands.

WARC Bands Factory Installed
The FT-101ZD Mk III comes equipped with factory installation of the new 10, 18, and 24 MHz bands recently assigned to the Amateur Service at WARC. In the meantime, use the 10 MHz band for monitoring of WWV!

RF Speech Processor
Not an additional-cost option, the FT-101ZD RF speech processor provides a significant increase in average SSB power output, for added punch in those heavy DX pile-ups. The optimum processor level is easily set via a front panel control.

Worldwide Power Capability
Every FT-101ZD comes equipped with a multi-tap power transformer, which can be easily modified from the stock 117 VAC to 100/110/200/220/234 VAC in minutes. A DC-DC converter is available as an option for mobile or battery operation.

Convenience Features
Designed fundamentally as a high-performance SSB and CW transceiver, the FT-101ZD includes built-in VOX, CW sidetone, semi-break-in T/R control on CW, slow-fast-off AGC selection, level controls for the noise blanker and speech processor, and offset tuning for both transmit and receive. The Mk III optional FM unit may be used for 10 meter FM operation, or choose the optional AM unit for WWV reception or VHF AM work through a transverter (AM and FM units may not both be installed in a single transceiver).

Full Line of Accessories
See your Yaesu dealer for a demonstration of the top performance accessories for the FT-101ZD, such as the FV-101Z External VFO, SP-901P Speaker/Patch, YR-901 CW/RTTY Reader, FC-902 Antenna Tuner, and the FTV-901R VHF/UHF Transverter. Watch for the upcoming FV-101DM Digital Memory VFO, with keyboard frequency entry and scanning in 10 Hz steps!

Nationwide Service Network
During the warranty period, the Authorized Yaesu Dealer from whom you purchased your equipment provides prompt attention to your warranty needs. For long-term servicing after the warranty period, Yaesu is proud to maintain two fully-equipped service centers, one in Cincinnati for our Eastern customers and one in the Los Angeles area for those on the West Coast.

Note: A limited quantity of the earlier FT-101ZD (with AM as standard feature) is still available. See your Yaesu dealer. FT-101ZD Mk III designates transceivers bearing serial #240001 and up, with APF/Notch filter built in and AM/FM units optional.

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Price And Specifications Subject To Change Without Notice Or Obligation

YAESU
The radio.

YAESU ELECTRONICS CORP., 6851 Walthall Way, Paramount, CA 90723 ● (213) 633-4007
YAESU Eastern Service Ctr., 9812 Princeton-Glendale Rd., Cincinnati, OH 45246 ● (513) 874-3100

Dyna-"mite."

Miniaturized, 5 memories, memory/band scan

TR-7730

The TR-7730 is an incredibly compact, reasonably priced, 25-watt, 2-meter FM mobile transceiver with five memories, memory scan, automatic band scan, UP/DOWN manual scan from the microphone, and other convenient operating features.

TR-7730 FEATURES:

- **Smallest ever Kenwood mobile**
  Measures only 5-3/4 inches wide, 2 inches high, and 7-3/4 inches deep, and weighs only 3.3 pounds. Mounts even in the smallest subcompact car, and is an ideal combination with the equally compact TR-8400 synthesized 70-cm FM mobile transceiver.
- **25 watts RF output power**
  Even though the TR-7730 is so compact, it still produces 25 watts output for reliable mobile communications. HI/LOW power switch selects 25-W or 5-W output.
- **Five memories**
  May be operated in simplex mode or repeater mode with the transmit frequency offset ±600 kHz. The fifth memory stores both receive and transmit frequency independently, to allow operation on repeaters with nonstandard splits. Memory backup terminal on rear panel.
- **Memory scan**
  Automatically locks on busy memory channel and resumes when signal disappears or when SCAN switch is pushed. Scan HOLD or microphone PTT switch cancels scan.
- **Extended frequency coverage**
  Covers 143.900-148.995 MHz in switchable 5-kHz or 10-kHz steps, allowing simplex and repeater operation on some MARS and CAP frequencies.
- **Automatic band scan**
  Scans entire band in 5-kHz or 10-kHz steps and locks on busy channel. Scan resumes when signal disappears or when SCAN switch is pushed. Scan HOLD or microphone PTT switch cancels scan.
- **UP/DOWN manual scan**
  With UP/DOWN microphone provided, manually scans entire band in 5-kHz or 10-kHz steps.
- **Offset switch**
  Allows VFO and four of five memory frequencies to be offset ±600 kHz for repeater access (or to be operated simplex) during transmit mode.
- **Four-digit LED frequency display**
  Indicates receive and transmit frequency during simplex or repeater-offset operation.
- **S/RF bar meter and LED indicators**
  Bar meter of multicolor LEDs shows relative receive and transmit signal levels. Other LEDs indicate BUSY, ON AIR, and REPEATER offset.
- **Tone switch**
  Activates internal subaudible tone encoder (not Kenwood-supplied).

Optional accessories:

- **MC-46** 16-button autopatch (DTMF) UP/DOWN microphone
- **SP-40** compact mobile speaker
- **KPS-7** fixed-station power supply

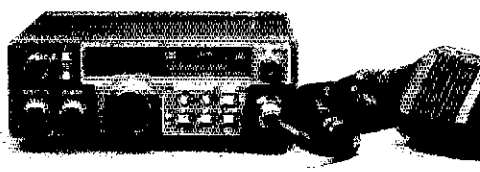
More information on the TR-7730 and TR-8400 is available from all authorized dealers of Trio-Kenwood Communications 1111 West Walnut Street, Compton, California 90220.

KENWOOD
...pacesetter in amateur radio

Synthesized 70-cm FM mobile rig

TR-8400

- **Synthesized coverage of 440-450 MHz**
  Covers upper 10 MHz of 70-cm band in 25-kHz steps, with two VFOs.
- **Offset switch**
  For ±5 MHz transmit offset on both VFOs and four of five memories, as well as simplex operation. Fifth memory allows any other offset by memorizing receive and transmit frequencies independently.
- **DTMF autopatch terminal**
  On rear panel, for connecting DTMF (dual-tone multifrequency) touch pad (for accessing autopatches) or other tone-signaling device.
- **HI/LOW RF output power switch**
  Selects 10 watts or 1 watt output.
- **Virtually same size as TR-7730**
  Perfect companion for TR-7730 in a compact mobile arrangement.
- **Other features similar to TR-7730**
  Five memories, memory scan, automatic band scan (in 25-kHz steps), UP/DOWN manual scan, four-digit LED receive frequency display (also shows transmit frequency in memory 5), S/RF bar meter and LED indicators, tone switch, and same optional accessories.



Specifications and prices are subject to change without notice or obligation