April 1986 $3.00

QST

devoted entirely to Amateur Radio

THE GREAT ARMADILLO RUN OF 1986

THE TEXAS DX SOCIETY

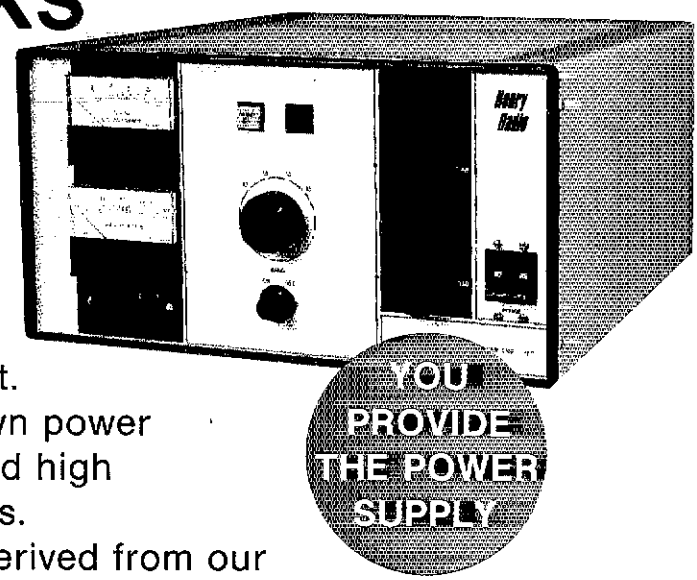
THE TEXAS SESQUICENTENNIAL

04
843655 9

HENRY REPORT #4

NEW!!

...RF DECKS WITHOUT POWER SUPPLY



A long time need has been met.
Thousands of Amateurs own power supply components, but need high quality state-of-the-art RF modules.
Here are six new models derived from our current amplifier line that will fill that need.

- **2K Classic "X" RF - *3.5 to 30 MHz**
- **3K Classic Mk II "X" RF - *3.5 to 30 MHz**
- **2002A RF - 144-148 MHz**
- **2004A RF - 420-440 MHz**
- **3002A RF - 144-148 MHz**
- **3004A RF - 420-440 MHz**

*10 meter band deleted in U.S.

You can now have the bands you need at the price you can afford. We provide the RF deck! You provide the power supply. Let us send you a brochure providing complete technical information.

Of course, all our present model complete amplifiers are still available. This new group of RF modules simply strengthens and expands what was already the best and broadest line of Amateur power amplifiers.

Henry amateur amplifiers are available from Henry Radio and select dealers throughout the U.S. and are being exported to amateurs all over the world. In addition to our broad line of commercial FCC type accepted amplifiers we offer special RF power generators for industrial and scientific users. Call or write Ted Shannon or Mary Silva for full information.

We stock these plus many other fine names:
AEA • ARCO • ARRL • ASTRON • B & K • B & W • BIRD • CDE • CONNECT-SYSTEMS • CUSHCRAFT • EIMAC • HAL • HUSTLER • HY-GAIN • ICOM • KENWOOD • LARSEN • NYE • ROBOT • TEMPO • VIBROPLEX • YAESU

58 YEARS OUT OF SERVICE

Henry Radio

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

KENWOOD

...pacesetter in Amateur radio

WAIT! 220 MHz Coming soon!

Power-Full...70 Watts!

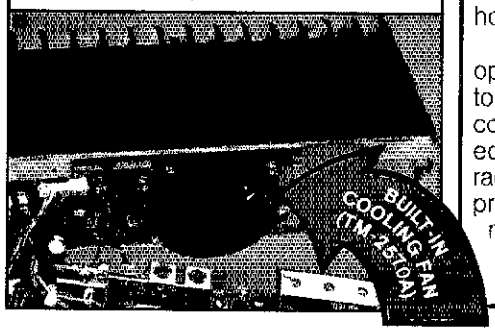
TM-2570A/2550A/2530A

Sophisticated FM transceivers

Kenwood sets the pace again! The all-new "25-Series" brings the industry's *first* compact 70-watt 2-meter FM mobile transceiver. There is even an *auto dialer* which stores 15 telephone numbers! There are three power versions to choose from: The TM-2570A 70-watt model, the TM-2550A for 45-watts, and the 25-watt TM-2530A.

- **First** 70-watt FM mobile (TM-2570A)
- **First** mobile transceiver with telephone number memory and auto-dialer (up to 15 telephone numbers)
- Direct keyboard entry of frequency
- Automatic repeater offset selection according to the ARRL 2-meter band plan —**a Kenwood exclusive!**
- Extended frequency coverage for MARS and CAP (142-149 MHz; 141-151 MHz modifiable)
- 23 channel memory for offset, frequency and sub-tone
- Big multi-color LCD and back-lit controls for excellent visibility
- Front panel programmable 38-tone CTCSS encoder **includes 97.4 Hz** (optional)
- 16-key DTMF pad, with audible monitor
- Center-stop tuning—**another Kenwood exclusive!**
- Frequency lock switch
- **New** 5-way adjustable mounting system
- **Unique** offset microphone connector —relieves stress on microphone cord
- HI/LOW Power switch (adjustable LOW power)
- Compact DIN size

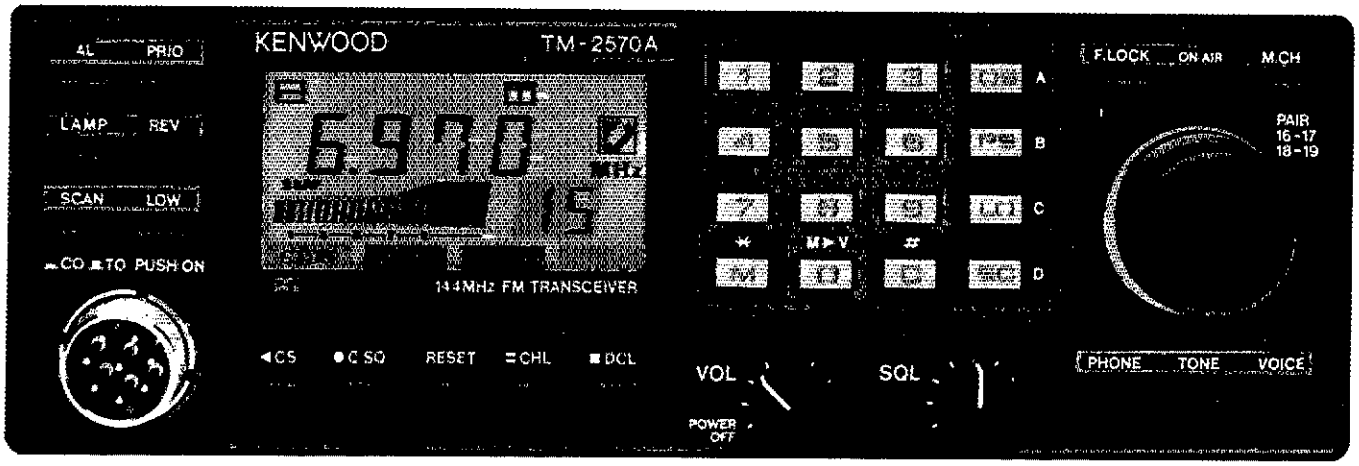
Large heatsink with built-in cooling fan (TM-2570A)



DCL Introducing... Digital Channel Link

Compatible with Kenwood's DCS (Digital Code Squelch), the DCL system enables your rig to **automatically** QSY to an open channel. Now you can automatically switch over to a simplex channel after repeater contact! Here's how it works:

The DCL system searches for an open channel, remembers it, returns to the original frequency and transmits control information to another DCL-equipped station that switches **both** radios to the open channel. Microprocessor control assures fast and reliable operation. The whole process happens in an instant!



Actual size front panel

Optional Accessories

- **TU-7** 38-tone CTCSS encoder
- **MU-1** DCL modem unit
- **VS-1** voice synthesizer
- **PG-2K** extra DC cable
- **PG-3A** DC line noise filter
- **MB-10** extra mobile bracket
- **CD-10** call sign display
- **PS-430** DC power supply for TM-2550A/2530A
- **PS-50** DC power supply for TM-2570A
- **MC-60A/MC-80/MC-85** desk mics.
- **MC-48** extra DTMF mic. with UP/DWN switch
- **MC-42S** UP/DWN mic.
- **MC-55** (8-pin) mobile mic. with time-out timer
- **SP-40** compact mobile speaker
- **SP-50** mobile speaker
- **SW-200A/SW-200B** SWR/power meters
- **SW-100A/SW-100B** compact SWR/power meters
- **SWT-1** 2m antenna tuner

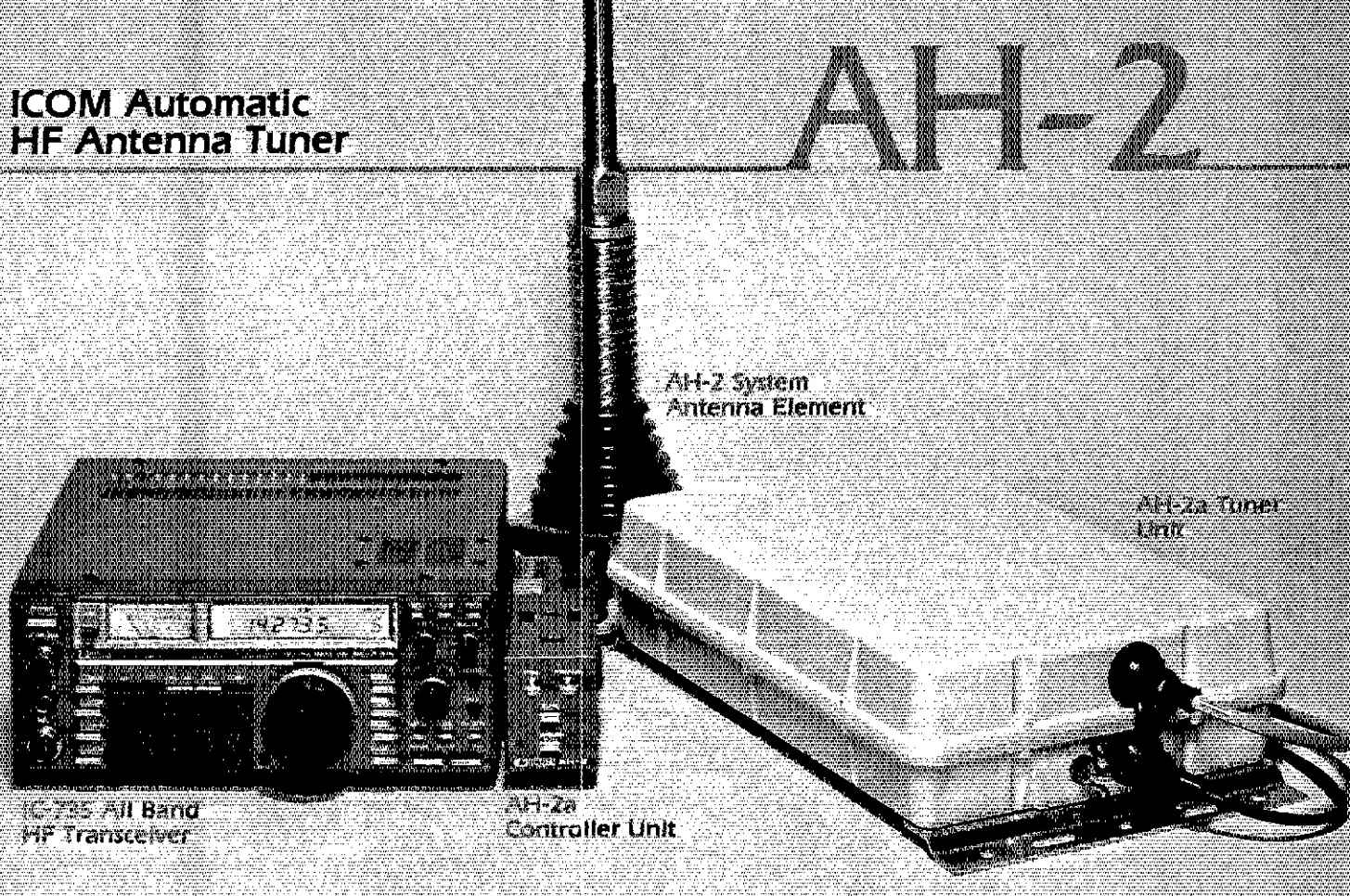
Complete service manuals are available for all Trio-Kenwood transceivers and most accessories. Specifications and prices are subject to change without notice or obligation

KENWOOD

TRIO-KENWOOD COMMUNICATIONS
1111 West Walnut Street
Compton, California 90220

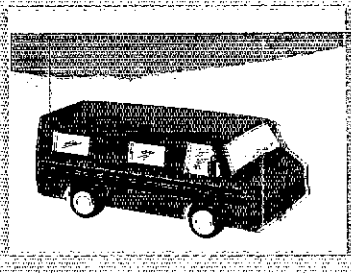
ICOM Automatic HF Antenna Tuner

AH-2



ICOM presents the AH-2 automatic antenna tuning system for the IC-735 all band HF transceiver. The AH-2 is ideal for mobile operators since there is no manual antenna tuning needed...an advantage in inclement weather. Also, the AH-2 system enables auto tuning in areas where antennas are limited, such as apartments and condominiums.

The ICOM AH-2 System combines advanced matching techniques and rugged construction for indoor or outdoor

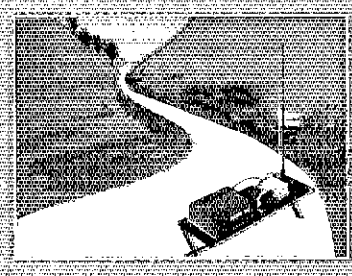


use to match frequencies from 3.5MHz to 30MHz. The system includes an antenna element, and the AH-2a tuner and controller units.

The AH-2a Tuner Unit enables optimum matching conditions via its built-in 8-bit microcomputer and LC (coil/capacitor) circuit. More than 260,000 LC combinations are possible.

The AH-2a Controller Unit easily attaches to the side of the IC-735 HF transceiver. By simply pushing the TUNE button on the front panel of the AH-2a controller unit, the controller automatically tunes from 10 to 80 meters in less than six seconds. It can also be used on the 160 meter band with an extension of the stainless steel whip.

The AH-2a tuning unit is housed in a durable weather-resistant case and is capable of storing tuning information for eight different frequencies. Retreiving tuning data from the memories is accomplished in less than one second!



The AH-2a can be purchased separately to accommodate the ham who already has a bumper mount and whip antenna, or the apartment/condo dweller who wants to match a random wire.

The antenna element includes sturdy bumper mounts which hold the 107 inch stainless steel whip in place, plus all the necessary hardware.

For the ideal mobile station, look at the IC-735 transceiver and the AH-2 automatic antenna system...they're quite a match.

ICOM

First In Communications

ICOM America, Inc. 2380-116th Ave NE, Bellevue, WA 98004 / 3331 Towerwood Drive, Suite 307, Dallas, TX 75234

All stated specifications are approximate and subject to change without notice or obligation. All ICOM radios significantly exceed FCC regulations limiting spurious emissions.-AH21285

April 1986 *Volume LXX Number 4*

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OUR COVER

If you haven't worked all 3076 US counties yet, here's your chance: a Texas DX Society project called The Great Armadillo Run of 1986. Clockwise from top left: hams (and everything else!) are scarce in this part of Oklahoma; K5RC, and N5RP with KE5FI, during a previous (statewide) Run; K5TU; the armadillo, running; and K5VRK/m. See p 73 (and Oct 1985, p 50).

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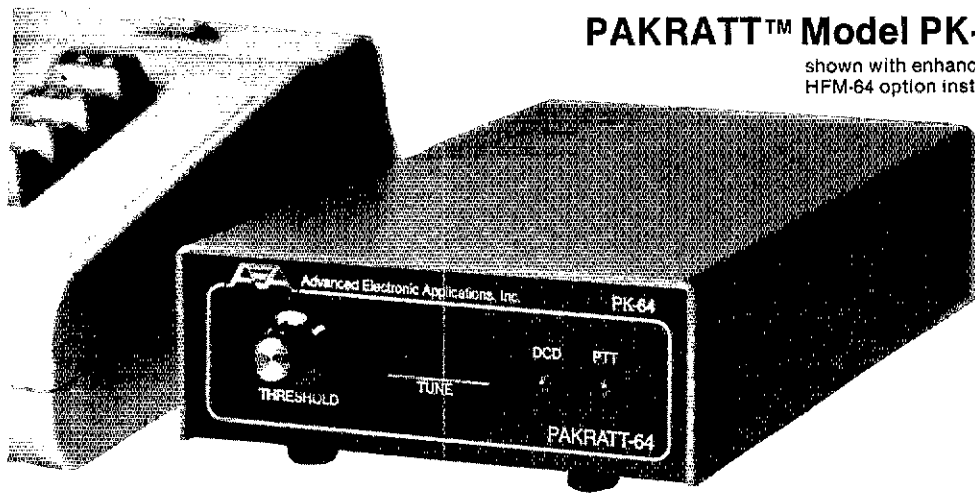
OPERATING

DEPARTMENTS

TOO GOOD TO BE TRUE?

PAKRATT™ Model PK-64

shown with enhanced HFM-64 option installed



★ MORSE ★ BAUDOT ★ ASCII ★ AMTOR ★ PACKET ★

FIRST FIVE MODE DATA CONTROLLER

The Pakratt model PK-64 by AEA is the world's first computer interface that offers Morse, Baudot, ASCII, AMTOR *and* Packet all in one box (hardware *and* software included) at a price many competitors charge for Packet alone (from $219.95 Amateur net). Do not let the low price fool you; coming from any other company but AEA it WOULD be too good to be true. The PK-64 works with virtually any voice transceiver. The Pakratt is the easiest of any to hook up and have operating in just a few minutes.

In Packet mode, the PK-64 offers virtually all the features of every other Packet controller on the market, plus many important features left out by others due to cost constraints. For example, we have included a hardware HDLC, true Data Carrier Detect (DCD), multiple connect with up to ten stations simultaneously and full implementation of version 2.0 of the AX.25 protocol.

Because the PK-64 was designed specifically for the Commodore 64 (or C-128 and SX-64) computer, we have been able to do many things not economically feasible with general RS-232 interface controllers. For example, the Pakratt includes true split screen operation with on-screen status indicators and an on-screen tuning indicator.

ENHANCED HFM-64 MODEM OPTION

The standard PK-64 will operate all modes with a phase-lock-loop (PLL) detector roughly equivalent to all popular packet modems in the marketplace (except we have included extra filtering). The enhanced HFM-64 modem option offers true independent dual channel filtering with A.M. detection (like the famous CP-100 Computer Patch™). The enhanced HFM-64 option also offers a hardware LED tuning indicator (like the CP-100) and a front panel variable threshold control for setting maximum sensitivity under various band conditions. We recommend the HFM-64 option for anyone keenly interested in weak-signal heavy-QRM HF operation. For anyone desiring to operate FM RTTY with the standard North American tone pair or CW receive, the HFM-64 is required. The HFM-64 is field installable with no soldering or test equipment required.

WORKS WITH THE POPULAR C-64 COMPUTER

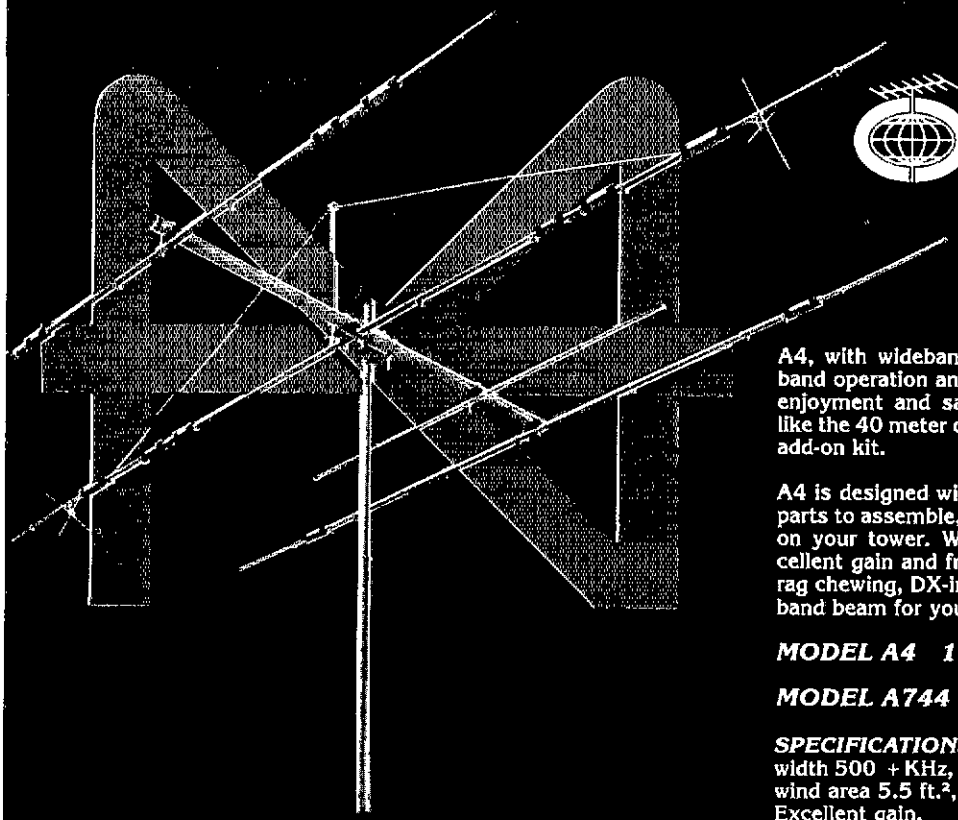
AEA designed the PK-64 around the low-cost C-64 because of the special architecture features making it especially suited to Amateur Radio applications. The C-64 should not be viewed as a mainframe, but rather a very economical accessory to your data communications system. Many owners of expensive computers such as IBM, TANDY, APPLE, KAYPRO, ATARI, etc., are now buying the low cost C-64 and dedicating it to their operating position. They simply cannot find software for their machine that even approaches the power and user friendliness of the PK-64. Plus, think of the convenience of having only one controller and keyboard to go from one mode to another without having to redo cabling!

The PK-64 is so complete that all you need to do is wire up a microphone connector to the end of a cable (provided) and you are ready to go. There is no need to track down special terminal software, cabling or even a power supply. It all comes with the PK-64. So do not be the last on your block to own the most exciting new product in years. See the PK-64 at your favorite dealer or write for our specification sheet now.

Prices And Specifications Subject To Change Without Notice Or Obligation

Advanced Electronic Applications, Inc.
P.O. Box C-2160, Lynnwood, WA 98036-0918
(206) 775-7373 Telex 6972496 AEA INTL UW

AEA Brings you the Breakthrough!



cushcraft
CORPORATION

A4, with wideband performance, easy installation, 4 band operation and moderate price will give you more enjoyment and satisfaction from your hobby. You'll like the 40 meter operating possibilities with the A744 add-on kit.

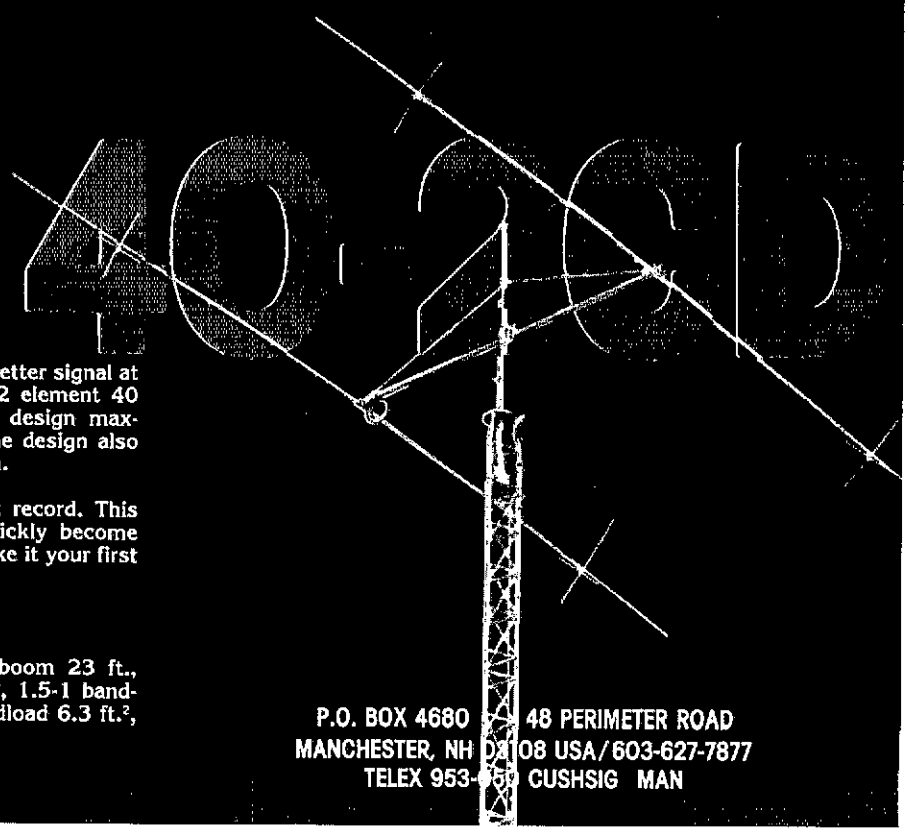
A4 is designed with you in mind because it has fewer parts to assemble, less weight and minimum wind load on your tower. With the 18 ft. boom, A4 gives excellent gain and front-to-back ratio. If your interest is rag chewing, DX-ing or contesting, A4 is the perfect 4 band beam for you.

MODEL A4 10, 15, 20 METERS

MODEL A744 40 METER ADD ON KIT

SPECIFICATIONS SWR 1.2-1 bandwidth 500 + KHz, boom 18 ft., longest element 32 ft., wind area 5.5 ft.², turn radius 18.4 ft., weight 37 lbs. Excellent gain.

MORE CONTACTS, MORE SATISFACTION WITH *CUSHCRAFT BEAMS*



More contacts, less interference and a better signal at the receiving end are yours with this 2 element 40 meter Skywalker Yagi. The computer design maximizes gain and reduces side lobes. The design also gives low SWR with excellent bandwidth.

Holder of the North American contact record. This compact two element antenna has quickly become "the most wanted" 40 meter beam. Make it your first choice.

MODEL 40-2CD 40 METERS

SPECIFICATIONS boom 23 ft., longest element 42 ft., beamwidth 70°, 1.5-1 bandwidth 180 KHz, turn radius 24 ft., windload 6.3 ft.², weight 40.7 lbs. Excellent gain.

P.O. BOX 4680 48 PERIMETER ROAD
MANCHESTER, NH 03108 USA/603-627-7877
TELEX 953-[illegible] CUSHSIG MAN

KENWOOD

...pacesetter in Amateur radio

NEW! Computer Interface!

"DX-cellence!"

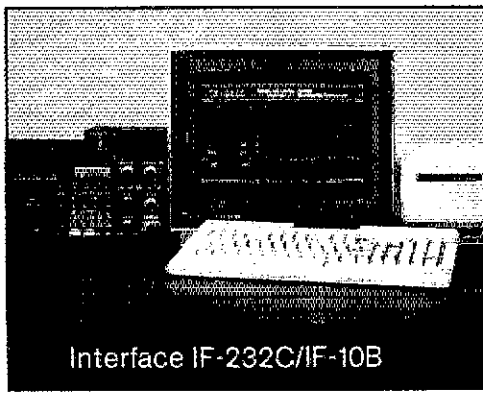
TS-940S

The new TS-940S is a serious radio for the serious operator. Superb interference reduction circuits and high dynamic range receiver combine with superior transmitter design to give you no-nonsense, no compromise performance that gets your signals through! The exclusive multi-function LCD sub display graphically illustrates VBT, SSB slope, and other features.

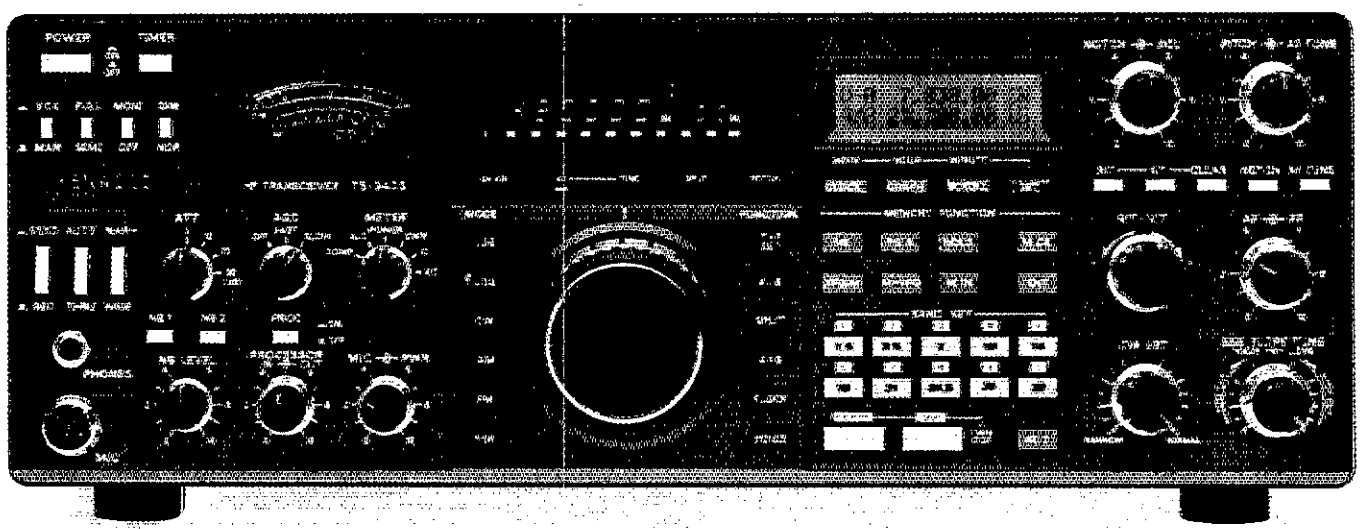
- **100% duty cycle transmitter.** Super efficient cooling system using special air ducting works with the internal heavy-duty power supply to allow continuous transmission at full power output for periods exceeding one hour.
- **High stability, dual digital VFOs.** An optical encoder and the flywheel VFO knob give the TS-940S a positive tuning "feel."
- **Graphic display of operating features.** Exclusive multi-function LCD sub-display panel shows CW VBT, SSB slope tuning, as well as frequency, time, and AT- 940 antenna tuner status.
- **Low distortion transmitter.** Kenwood's unique transmitter design delivers top "quality Kenwood" sound.
- **Keyboard entry frequency selection.** Operating frequencies may be directly entered into the TS-940S without using the VFO knob.
- **QRM-fighting features.** Remove "rotten QRM" with the SSB slope tuning, CW VBT, notch filter, AF tune, and CW pitch controls.
- **Built-in FM, plus SSB, CW, AM, FSK.**
- **Semi or full break-in (QSK) CW.**
- **40 memory channels.** Mode and frequency may be stored in 4 groups of 10 channels each.
- **Programmable scanning.**
- **General coverage receiver.** Tunes from 150 kHz to 30 MHz.
- **1 yr. limited warranty.** Another Kenwood First!

Optional accessories:

• AT-940 full range (160-10m) automatic antenna tuner • SP-940 external speaker with audio filtering • YG-455C-1 (500 Hz), YG-455CN-1 (250 Hz), YK-88C-1 (500 Hz) CW filters; YK-88A-1 (6 kHz) AM filter • VS-1 voice synthesizer • SO-1 temperature compensated crystal oscillator • MC-42S UP/DOWN hand mic. • MC-60A, MC-80, MC-85 deluxe base station mics. • PC-1A phone patch • TL- 922A linear amplifier • SM-220 station monitor • BS-8 pan display • SW-200A and SW-2000 SWR and power meters.



Interface IF-232C/IF-10B



Complete service manuals are available for all Trio-Kenwood transceivers and most accessories.
Specifications and prices are subject to change without notice or obligation.

More TS-940S information is available from authorized Kenwood dealers.

KENWOOD

TRIO-KENWOOD COMMUNICATIONS
1111 West Walnut Street
Compton, California 90220

KENWOOD

...pacesetter in Amateur radio

NEW! computer interfaces!

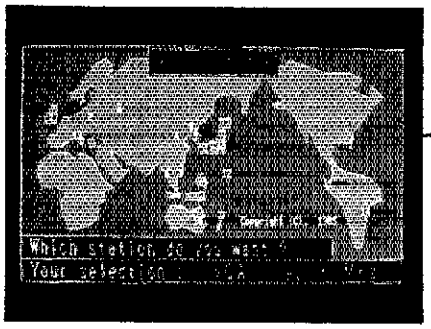
Complete Control...

IF-232C Level translator

IF-10A Computer interface for TS-711A/TS-811A
IF-10B Computer interface for TS-940S
IC-10 IC kit for TS-440S computer control

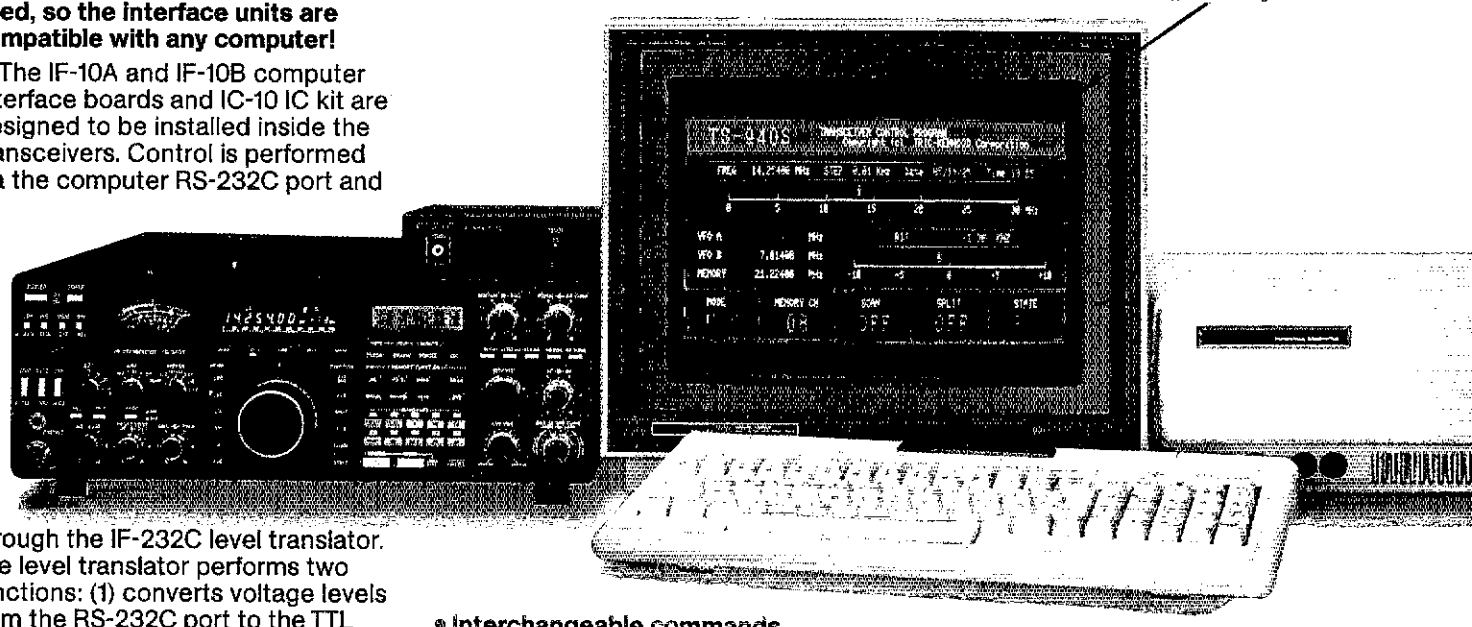
Attention "computing" hams! The Kenwood IF-Series computer interface units will enable you to connect your TS-711A, TS-811A, TS-940S, or TS-440S transceivers to your home computer. RS-232C standard is used, so the interface units are compatible with any computer!

The IF-10A and IF-10B computer interface boards and IC-10 IC kit are designed to be installed inside the transceivers. Control is performed via the computer RS-232C port and through the IF-232C level translator. The level translator performs two functions: (1) converts voltage levels from the RS-232C port to the TTL levels in the transceiver, (2) and acts as a noise supressor. A complete interface "kit" would include the appropriate computer interface units (IF-10A, IF-10B, or IC-10) and the IF-232C level translator.



Short Wave Listener's map and directory—simply select the QTH you'd like to listen to, and the pre-programmed frequency is "dialed up."

Display frequency, band, and mode data. Control your rig via keyboard!

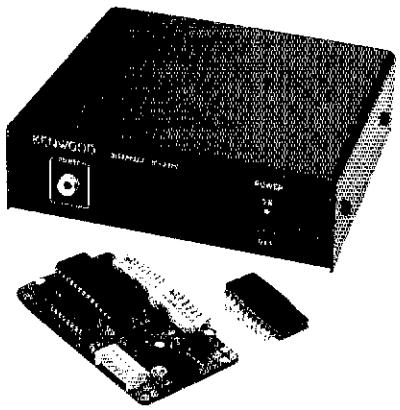


The applications of automated station control are almost endless! Just imagine...work DX from your hand-held...operate OSCAR "automatically"...remote operation of your station...or put together the "ultimate" contest station....

CRT display shown is a sample program, not available from Trio-Kenwood Communications.

Complete service manuals are available for all Trio-Kenwood transceivers and most accessories. Specifications and prices are subject to change without notice or obligation.

- **Interchangeable commands**
This means that one program may be used with several rigs, to minimize program changes.
- **Simultaneous operation of the computer and transceiver is possible**



- **Powerful, easy-to-understand instruction set**
- **Wide variety of commands**
Memory input and recall, frequency selection, frequency step, sub-tone frequency, offset, antenna tuner, DCS, scan, and many, many more functions are accessible with the Kenwood computer interface unit!
- **AC-10 AC power adapter (optional)**

More IF-232C and computer interface information is available from authorized Kenwood dealers.

KENWOOD

TRIO-KENWOOD COMMUNICATIONS
1111 West Walnut Street
Compton, California 90220

Directors

Canada
THOMAS B. J. ATKINS, VE3CDM,
55 Havenbrook Blvd, Willowdale, ON M2J 1A7
(416-494-8721)
Vice Director: Harry MacLean, VE3GRO,
500 Riverside Dr, London, ON N6H 2R7
(519-473-1668)

Atlantic Division
HUGH A. TURNBULL,* W3ABC, 6903 Rhode Island Ave, College Park, MD 20740 (301-927-1797)
Vice Director: James M. Mozley, W2BCH, 126 Windcrest Dr, Camillus, NY 13031 (315-488-9051)

Central Division
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Vice Director: Howard S. Huntington, KØKM, 65 South Burr Oak Dr, Lake Zurich, IL 60047

Dakota Division
Howard Mark, WØOZC, 11702 River Hills Dr, Burnsville, MN 55337 (612-890-6302)
Vice Director: Richard Whiting, WØTN, 4749 Diane Dr, Minnetonka, MN 55343 (612-870-2071)

Delta Division
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Vice Director: Lionel A. "Al" Oubre, K5DPG, Star Route A, Box 185-E, New Iberia, LA 70560 (318-367-3901)

Great Lakes Division
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Vice Director: Allan L. Severson, AB8P, 1275 Ethel Ave, Lakewood, OH 44107 (216-521-1565)

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THE AMERICAN RADIO RELAY LEAGUE, INC

The American Radio Relay League, Inc., is a noncommercial association of radio amateurs, organized for the promotion of interest in Amateur Radio communication and experimentation, for the establishment of networks to provide communications in the event of disasters or other emergencies, for the advancement of the radio art and of the public welfare, for the representation of the radio amateur in legislative matters, and for the maintenance of fraternalism and a high standard of conduct.

ARRL is an incorporated association without capital stock chartered under the laws of the State of Connecticut, and is an exempt organization under Section 501(c)(3) of the Internal Revenue Code of 1954. Its affairs are governed by a Board of Directors, whose voting members are elected every two years by the general membership. The officers are elected or appointed by the Directors. The League is noncommercial, and no one who could gain financially from the shaping of its affairs is eligible for membership on its Board.

"Of, by, and for the radio amateur," ARRL numbers within its ranks the vast majority of active amateurs in the nation and has a proud history of achievement as the standard-bearer in amateur affairs.

A bona fide interest in Amateur Radio is the only essential qualification of membership; an Amateur Radio license is not a prerequisite, although full voting membership is granted only to licensed amateurs in the US and Canada.

All membership inquiries and general correspondence should be addressed to the administrative headquarters at 225 Main Street, Newington, CT 06111 USA
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Telex: 650215-5052 MCI,
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"It Seems to Us . . ."

Packet Fever

I was off packet radio for six months—from July until just after Christmas.

Now I'm back on. And after just six months, I know how Rip Van Winkle must have felt!

To say that activity has grown would be an understatement akin to saying that the Bears edged past the Patriots in the Super Bowl. The long-heralded Packet Radio revolution is upon us, and is having a dramatic effect on the way we operate. The revolution is still in its infancy, but a strong and healthy tyke it is! At the moment packet radio has a case of regulatory sniffles, but this should clear up once the regulators accept that they have a prodigy, not a problem child, on their hands.

Best estimates are that there are now 14,000 packet stations on the air. That number probably will grow by a couple of thousand in the time it takes to print and mail this issue of *QST*. In some parts of the country, 145.01 MHz is almost never quiet, even in the middle of the night; whenever the 20-meter band is open, you'll hear packet signals on 14.103 MHz.

Why all the fuss about packet radio? If your impression of packet is that it's a glorified form of RTTY, you may well wonder why. But it isn't.

Perhaps the best way to illustrate the potential of the medium is to relate it to a scenario familiar to most of us. You're showing off your equipment to a non-ham friend who says, "My Uncle Joe in Oshkosh is a ham. Why don't you give him a call and let me say hello?" You then have to explain that if you knew Uncle Joe's call sign, what frequency he might be listening on, and when he tended to operate—and if the propagation gods were in a good mood that day—it might be worth a try. Otherwise, the best bet is to make a sked, by letter or phone call or perhaps by radiogram. Your friend leaves somewhat bewildered that with all that equipment, you have to rely on the Postal Service or the phone company to set up a contact! Your tales of swapping signal reports with Outer Baldonia, or of chatting regularly with a bunch of guys you've never laid eyes on who live six states away, aren't likely to convince him of your mental stability.

Enter packet radio. At some point in the not too distant future, you may be responding to your friend this way: "Your Uncle Joe in Oshkosh? Sure. Let's use packet radio to access the Call Directory data base maintained by the local club, and find out what his callsign is. Then we can address a message to him, and send it to him the same way. It will take just a few seconds to find out if he's home. If he's not, we can leave a message on his equipment, or, if it's not hooked up, on his local packet radio bulletin board system (PBBS). He'll either pick it up himself, or someone else will deliver it to him." Of course, this is simply an illustration of the medium's capabilities, not an example of the highest use to which it can be put. But if we could do that, think what we could do in providing backup communications when natural disasters disrupt or overload normal channels in the future!

How far in the future? Well, that depends. For one thing, it depends on the outcome of an FCC rulemaking proceeding, PR Docket 85-105. In a Report and Order in this proceeding which was scheduled to become effective March 14, FCC wrote into Part 97 of its Rules an interpretation which had been applied for several years to repeater autopatches. As applied to repeaters, the interpretation—which had been strongly objected to by ARRL when adopted in 1978—prohibited the operation of a repeater under automatic control (i.e., without a control operator present and supervising communications at a control point) during autopatch operation. The newly adopted rules would extend that prohibition to all stations operating under automatic control.

Since the primary purpose of PR Docket 85-105 was to permit operators of stations transmitting digital communications above 50 MHz to use automatic control, the proceeding itself was welcomed by packeteers; indeed, the rulemaking was initiated at League request. To now, VHF packet digipeaters (stations programmed to retransmit packets when requested to do so by instructions at the front of the packet) have operated under the repeater rules, and it's been common practice to operate them under automatic control. FCC knows this, and has never taken exception to the practice on VHF and higher. But packet operations are not completely analogous to repeaters, so it seemed best to have rules that specifically authorized the practice rather than to rely on rules that were written before packet radio was envisioned—hence, the League's request for rulemaking. That the third-party issue would be raised by the Commission in this context was completely unanticipated. Because there's no way to ensure that your digipeater won't have third-party traffic addressed to it by others, the effect is to require that a control operator be on duty to review the traffic—to determine whether he or she needs to be on duty!

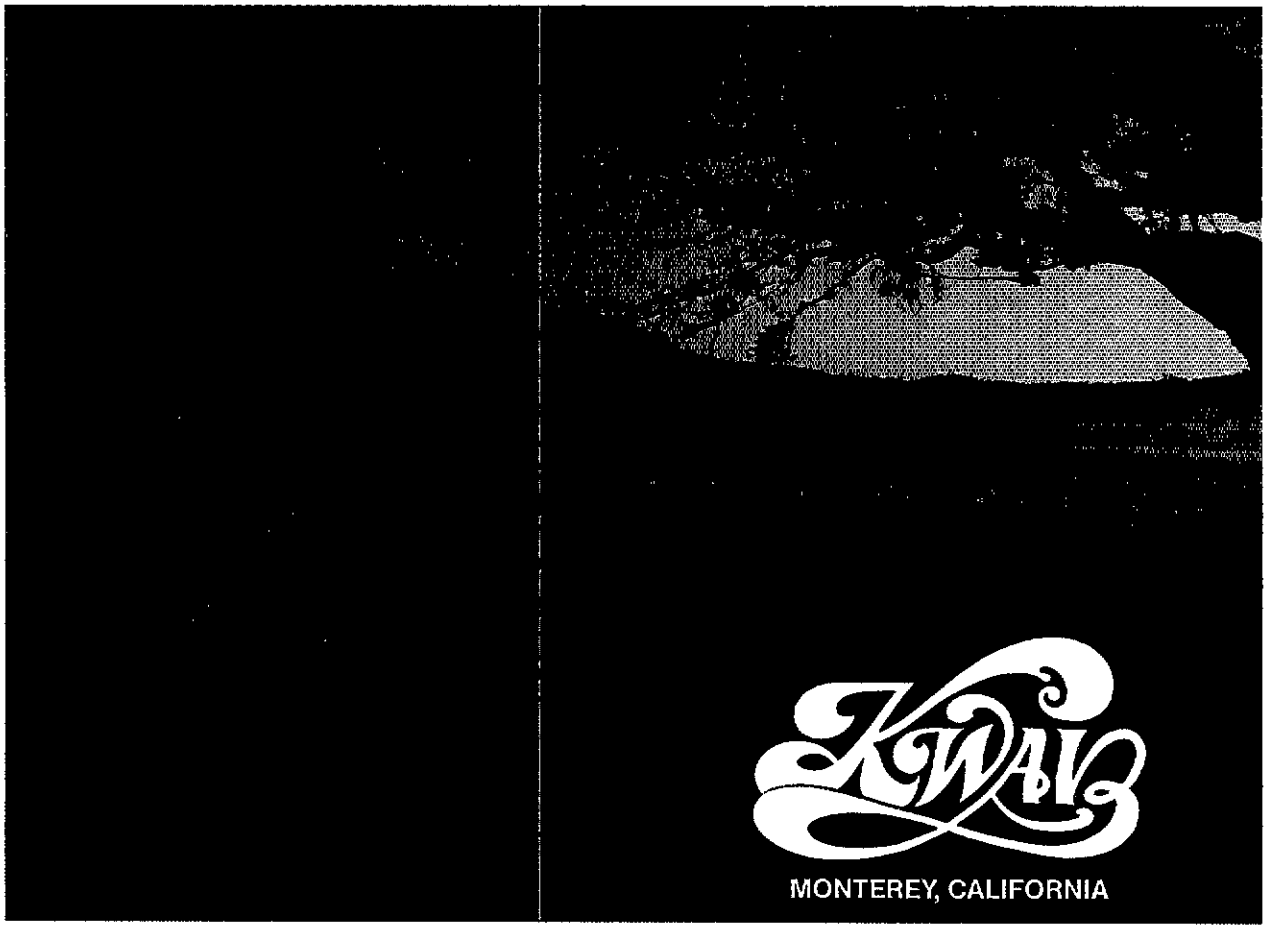
At its January meeting, the ARRL Board authorized President Price to "take such actions as may be necessary and appropriate to cause FCC Docket 85-105 to be amended to correct its restrictive and crippling effect on the development of packet radio and packet-radio emergency communications caused by requirements for the control operator to be present at domestic intermediary points for transmission of third-party traffic." So far, three steps have been taken.

First, a Petition for Reconsideration was filed February 24 seeking correction of the offending rule. A number of clubs and individuals did the same thing—FCC staff tells us they received 19 such petitions!

Second, President Price, Washington Area

(continued on page 11)

EIMAC Tubes Provide Superior Reliability at radio station KWAV — over 112,000 hours of service!



Ken Warren, Chief Engineer at KWAV reports that their 10 kW FM transmitter went on the air in November, 1972, equipped with EIMAC power tubes. The original tubes are still in operation after over 13 years of continuous duty!

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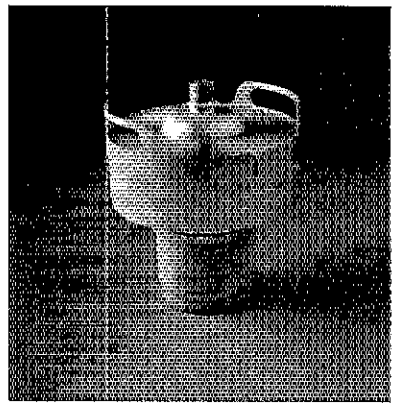

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UP FRONT in QST

Congratulations to James Rautio, AJ3K (left), of Liverpool, New York, on receiving an ARRL Pewter Cup Award for technical excellence. Jim received the award in recognition of his five-part series, "The Effect of Real Ground on Antennas," which appears in February, April, June, August and November 1984 *QST*. Atlantic Division Director Hugh Turnbull, W3ABC, is shown presenting the pewter cup to Jim at a January meeting of the Salt City DX Association in Syracuse.

Spread-Spectrum Primer

Come June 1, radio amateurs will be able to try their hand at spread-spectrum techniques, so now may be a good time to bone up on the rules and regulations that will be in effect. For instance, the FCC has clearly spelled out what methods and bands amateurs may use in spread-spectrum work. See this month's Happenings for details.

Scholarships Available for 1986-87 School Year

If you're an amateur looking for financial support in pursuing a higher education, help may not be very far off. The Foundation for Amateur Radio (FAR), of Washington, DC, plans to award 21 scholarships for the 1986-87 academic year. Licensed radio amateurs may compete for these awards if they are enrolled or have been accepted for enrollment in an accredited university, college or technical school. Most of the scholarships require the applicant to have at least a General class license. The scholarships range from $350 to $900, with preference given in some cases to residents of specific geographical areas or who are pursuing certain study programs.

Composed of 50 local Amateur Radio clubs, the Foundation fully funds two of these scholarships from the proceeds of its annual hamfest. It also administers, without cost to the donors, seven scholarships for the Quarter Century Wireless Association, two each for the Dade Radio Club (Florida), the Baltimore Amateur Radio Club and the Department of State Radio Club, and one each for the Radio Club of America, the Richard G. Chichester Memorial, the Young Ladies Radio League, the Edmund Redington Memorial, the Amateur Radio News Service and the Columbia (Maryland) Amateur Radio Association.

Additional information and an application form can be requested, by a letter or QSL/postcard postmarked prior to May 31, 1986, from FAR Scholarships, 6903 Rhode Island Ave, College Park, MD 20740.

FCC Proposes to Extend Credit to Written Portion of Exams

As it stands, you can get credit toward a Technician or higher-class license for passing the code portion of an exam, but not the written portion unless it results in a new license. But there's a good chance that will change. In response to a petition, the FCC has proposed that examination credit be given for both written and code elements administered under the Volunteer Examiner Program (PR Docket 86-63). See this month's Happenings for details.

It Seems to Us ...

(continued from page 9)

Coordinator Williams, and I met with FCC Commissioners and staff on February 27 to explain the serious negative impact of the third-party prohibition. Commission staff regards their action as a well-meaning attempt to protect the Amateur Radio packet network from exploitation by non-amateurs and commercial interests who might use the packet radio network for their own purposes. Of course, no one is more concerned about such exploitation than the League, but to respond by preventing the network from developing is to throw the baby out with the bath water. To protect the network, it is only necessary to screen the messages at the point of introduction; to require that they also be screened at every relay point is like drilling holes in a pipeline every few feet so you can check that what you put into one end of the pipe hasn't changed along the way! In fact, the packet radio "pipeline" already has such features; any packet station can monitor what's happening on a channel, and the software in use permits the logging of activity so that inappropriate packets can be traced back to their source. Besides, even if a control operator were on duty he'd be hard pressed to read in real time the traffic bursting back and forth at 1400 words per minute!

The third ARRL action was the filing with FCC, on February 28, of a Petition for Extraordinary Relief as a followup to the in-person meetings. This Petition points out that if the new rules are permitted to become effective on March 14, it will have a chilling effect on packet radio development from which the movement may never recover. Yet, it will take some time—perhaps months—for the Commission to review and respond to the blizzard of Petitions for Reconsideration.

The League's Petition for Extraordinary Relief requests that digital stations operating above 50 MHz and using the AX.25 or a compatible protocol be permitted to retransmit third-party traffic while under automatic control until the Commission is able to act on the League's Petition for Reconsideration. Of course, introduction of traffic into the network could occur only through a station with a control operator on duty.

While we're not assured of prompt or favorable Commission action, everyone we spoke to about the problem expressed support for packet radio development. By the time you read this, W1AW may be carrying good news. Check out the W1AW bulletins—perhaps on your local PBBS!—*David Sumner, K1ZZ*

League Lines

The ARRL has petitioned the FCC to reconsider the part of its *Report and Order* in Docket 85-105 which stipulates that "no amateur station may be operated under automatic control while transmitting third-party traffic."

In its petition the ARRL stated that "technology has overtaken some aspects of ... the Commission's Rules, particularly in regard to automatic control, and pointed out that most digital communications use speeds of at least 1200 bits per second, which translates to about 1400 WPM. Thus, it would be ***impossible*** for a control operator using a video display terminal (VDT) or a printer to carefully monitor the communications, assuming an average reading speed of 300 WPM. The ARRL believes that there must be some safeguards against unsupervised third party traffic, but that such traffic should be controlled at the point of its introduction into a packet network, not its subsequent repeated automatic relays throughout the network. Stay tuned for the FCC's response.

The ARRL also filed a Petition for Extraordinary Relief asking the FCC to temporarily exempt packet radio from the third-party control provisions of its Report and Order in PR Docket 85-105. The Petition was made to allow automatically controlled amateur packet radio operations to continue while the FCC considers some 19 Petitions for Reconsideration filed by Amateur Radio operators and groups, including the ARRL.

QEX, the ARRL's Technical Newsletter, is changing to a magazine format. The March issue included 28 pages, and premiered a new above-50-MHz experimenters column by W3HQT. *QEX* is still available to ARRL members for $6 yearly (to nonmembers for $12) and will be sold singly in some radio stores.

February 8 brought one of the most intensive auroras in many years. For those amateurs who work their DX on the bands above 50 MHz, it was a day that will be talked about for a long time to come. On 6 and 2 meters, literally thousands of QSOs were made spanning half of the continent and affecting all 50 states. On 6 meters a number of transcontinental contacts were due to a rare form of propagation known as auroral E. KH6s were worked as far east as Minnesota and Texas and HC2FG in Ecuador had a field day working stateside stations.

For more details on this history-making day, see The World Above 50 MHz in May *QST*.

Affiliated Clubs, have you sent in your 1986 Annual Report yet? Help us serve you best by keeping us updated on your club's affiliation information. Contact Leo Kluger, WB2TRN, at HQ's Club Services Department if you need forms.

Attention instructors: ***Have you recently conducted a license class which included students under 13 years old?*** Headquarters wants to learn more about what did or did not work in teaching these students. We need to know how the math and electronics concepts were presented, and what reference and visual aids materials were used. If you have some experience in teaching Amateur Radio to preteens, please contact Larry Wolfgang, WA3VIL, at Headquarters.

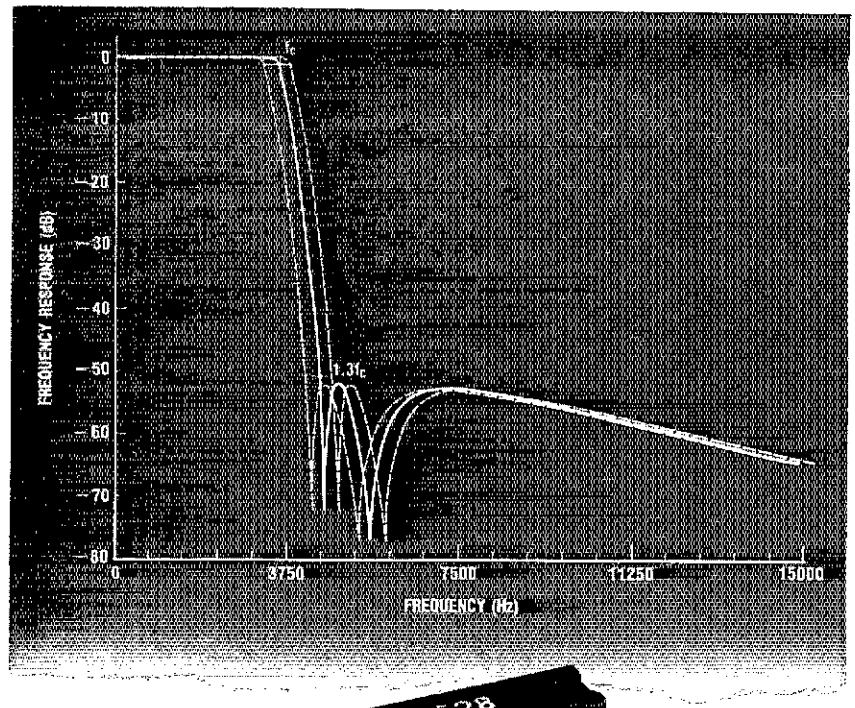
Are you confused about the structure of the ARRL Field Organization? A new pamphlet, appropriately entitled "The ARRL Field Organization," is now available free from HQ. It presents in detail the various kinds of station- and section-level appointments available to interested members, and explains the National Traffic System (NTS) and the Amateur Radio Emergency Service (ARES). If you're interested in public service, and don't understand how the Field Organization works, this pamphlet is must reading for you!

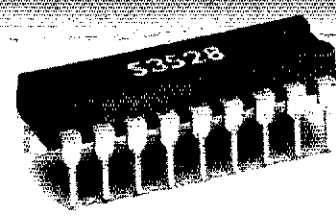
The FCC has released a *Report and Order* in FCC Docket 85-87 ***declaring federal preemption of local regulation of satellite antennas.*** As with PRB-1, in which FCC declared a limited federal preemption of state and local regulation pertaining to Amateur Radio antennas, this order ensures that local regulations do not unreasonably interfere with the federal right to construct and use antennas to receive satellite signals. Regulation of transmitting antennas is preempted in the same manner, except that state and local health and safety regulations are not preempted.

The Technical Department at Headquarters has an opening for a Laboratory Engineer. We are looking for a licensed amateur with RF or analog design ability and a BSEE or ASEE degree, or equivalent experience. Annual salary range from $21,476-30,056. Contact Chuck Hutchinson, K8CH, at ARRL HQ.

How many entries will be found in the new 1986-87 Repeater Directory? 10,321 to be exact, an increase of over 1,000 from last year's Directory. The new *Repeater Directory* will be available in late April.

SuperSCAF and Son—A Pair of Switched-Capacitor Audio Filters





(photograph courtesy Gould AMI Semiconductors, copyright 1985)

Been looking for an audio filter that's a great performer and is easy to build? Here are two that fill the bill nicely!

By Rich Arndt, WB4TLM and Joe Fikes, KB4KVE

179 Wildwood Dr
Sanford, FL 32771

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Altamonte Springs, FL 32701

Nothing is more frustrating than trying to copy a weak signal in heavy QRM except, perhaps, losing it altogether. A good audio filter can be tremendously helpful in separating the weak signals from the strong ones. The two switched-capacitor filters (SCFs) presented here reflect the needs of different users. SuperSCAF is a self-contained audio filter with thumbwheel frequency selection at 100-Hz intervals, a built-in audio power amplifier and an ac-operated power supply. JuniorSCAF is much smaller and simpler. Junior is designed to be added internally to a receiver and use the receiver's audio amplifier and power supply. Both filters feature high performance and simple construction. Experienced builders can assemble either one in a weekend.

The heart of these audio filters is a pair of ICs recently introduced by AMI, the S3528 and S3529. These two ICs can be used together to form an SCF band-pass filter with excellent characteristics. The low-pass and high-pass cutoff frequencies, f_{cl} and f_{ch}, are selected by digital inputs to the ICs at increments of approximately 100 Hz throughout the audio band.

The theory of operation of switched-capacitor filters has been well presented in past issues of *QST* and other amateur and professional electronic journals.[1-4] We will discuss SCF theory only briefly here. Primarily, we will examine the significant features of the S3528 and S3529 and will discuss the construction and use of an audio filter incorporating these devices.

Switched-Capacitor Filters

Whenever an electrical signal is modified in some way (except for pure amplification or attenuation), we say that we have "processed" the signal. Signal processing may be accomplished by continuous or discrete processes. We refer to the continuous process as "analog signal processing" and to the discrete process as "digital signal processing." Examples of analog signal-processing circuits are mixers, detectors, and frequency-selective circuits made from inductors and capacitors. Active filters using op amps, resistors and capacitors also fall into the analog category.

Digital signal processing, on the other hand, relies on a series of "snapshots" or samples of the signal in order to perform a given function. These individual samples are combined and manipulated in a way that yields some desired result. Digital signal processing is used in computerized speech, TV image enhancement and radar. An important part of digital signal processing is digital filtering, which is functionally equivalent to analog filtering. One of several practical digital-filter implementations is the SCF.

The SCF works by storing discrete samples of an analog signal as a charge on a capacitor. This charge is transferred from one capacitor to another down a chain of capacitors forming the filter. The sampling and transfer operations take place at regular intervals under control of a precise frequency source or clock. Filtering is achieved by combining the charges on the different capacitors in specific ratios and by feeding charges back to the prior stages of the capacitor chain. In this way, filters of much higher performance (and complexity) may be synthesized than is practical with analog filters.

The AMI S3528 and S3529

AMI has produced a number of ICs for the telecommunications industry that contain complete SCFs. Two of these circuits, the S3528 and S3529, are of particular interest to the amateur community because of their flexibility and performance. Within the S3528, we find a seventh-order elliptical low-pass filter, a clock generator, a program-

[1]Notes appear on page 19.

mable-clock frequency divider and a pair of buffer amplifiers that are helpful in getting the signal into and out of the IC. The S3529 is similar to the S3528 except that it contains a high-pass filter instead of a low-pass filter. Attenuation is designed to be greater than 51 dB at frequencies above 1.3 f_{cl} for the low-pass filter or below $f_{ch}/1.3$ for the high-pass filter, where f_{cl} and f_{ch} are the low- and high-pass filter cutoff frequencies, respectively. (In a band-pass configuration, f_{ch} is less than or equal to f_{cl}.) This frequency response characteristic may be seen in the title photo.

A key feature of the S3528 and S3529 pair is the ability to digitally select f_{cl} and f_{ch}. Any of 64 different cutoff frequencies may be selected by setting a 6-bit control code. This code addresses an on-chip ROM whose output controls the frequency divider. In the S3528, the sampling frequency is obtained by dividing the 3.58-MHz clock to equal 40 f_{cl}. In the S3529, the sampling frequency is 44 f_{ch}.

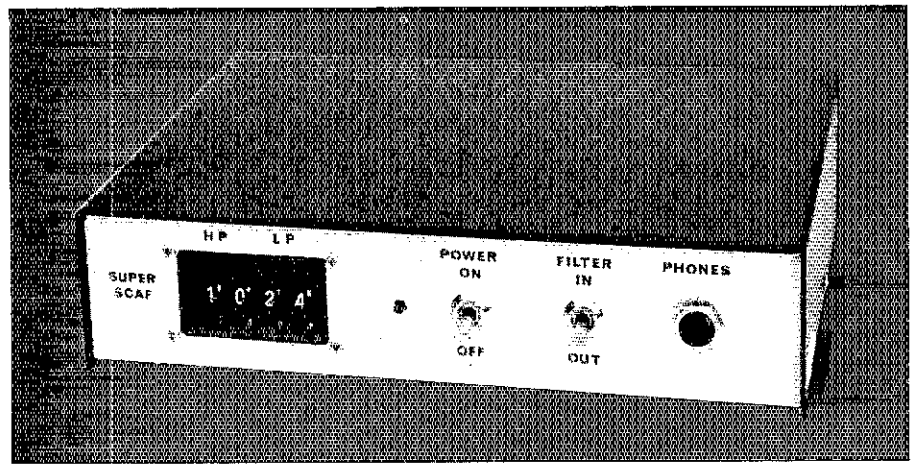
An especially nice set of cutoff frequencies is available in the voice range below 3900 Hz. With a common 3.58-MHz TV color-burst crystal and binary-coded decimal (BCD) inputs, f_{cl} is about 100 times the BCD code on the S3528, and f_{ch} is about 91 times the BCD code on the S3529. Setting the code of both filters to the same value gives a filter whose upper-frequency cutoff is 100 times the switch setting and whose width is 10% of the passband center frequency.

This selection scheme works for all BCD codes between 01 and 39. As you may have observed, there are other digital codes, such as 0B and 2E hexadecimal, which lie outside the BCD code set. What happens if you specify one of these codes? You get more frequencies! Some lie between the 100-Hz intervals; others lie outside the 100- to 3900-Hz range, up to 22 kHz. A complete list of codes and frequencies is given in Table 1. Note that codes 35 and 38 deviate from the 100-Hz pattern.

An interesting bit of insight may be gained into the workings of SCFs by examining the possibility of spurious signals in the filter's output. As it happens, there are a few BCD switch combinations that produce very low-level spurious output signals, or "birdies." A few of these artifacts of the digital-filtering process can be heard, although they are much too weak to interfere with communication.

One birdie can be heard when the high-pass switch is set to 00. From Table 1, we see that f_{ch} is 40 Hz. In this case, the S3529 sampling frequency is 1760 Hz. At low-pass switch settings above 16, the tone can be heard. Another can be heard when the high-pass switch is set to 01 and the low-pass switch is set to 39. Here, the sampling frequency of the high-pass filter is 4004 Hz. This is close enough to the low-pass cutoff to get through. Other combinations such as 09/10, 10/11 and 11/12 give rise to weak birdies through the aliasing and quantizing process. An explanation of these signals is beyond the scope of this article.

We were curious about the possibility of the clocks and switched signals causing interference to the station receiver, TVs and so on. Fortunately, we were able to have SuperSCAF tested for emissions at a local facility; it proved to be "clean as a whistle."



SuperSCAF is a stand-alone unit that contains a switched-capacitor filter, an audio power amplifier and an ac-operated power supply.

Table 1
S3528 and S3529 Cutoff Frequencies

BCD Code	High-Pass Cutoff Frequency (f_{ch}) (Hz)	Low-Pass Cutoff Frequency (f_{cl}) (Hz)
00	40	44
01	91	100
02	182	200
03	273	300
04	363	399
05	455	500
06	546	601
07	635	699
08	726	799
09	822	904
10	914	1005
11	1005	1105
12	1099	1209
13	1179	1297
14	1271	1398
15	1355	1491
16	1453	1598
17	1535	1688
18	1627	1790
19	1731	1904
20	1808	1989
21	1892	2081
22	1985	2183
23	2086	2295
24	2198	2418
25	2260	2486
26	2392	2632
27	2465	2711
28	2543	2797
29	2625	2887
30	2712	2983
31	2805	3086
32	2905	3196
33	3013	3314
34	3129	3442
35	5423	5965
36	3254	3579
37	3389	3728
38	5811	6392
39	3537	3891
Additional Hex Codes		
0A	433	476
0B	227	250
0C	904	994
0D	935	1028
0E	957	1053
0F	1043	1147
1A	1334	1467
1B	1402	1542
1C	1565	1721
1D	1768	1945
1E	1849	2034
1F	2034	2237
2A	2136	2350
2B	2325	2557
2C	3697	4067
2D	4067	4474
2E	4519	4971
2F	5085	5593
3A	6779	7457
3B	8135	8949
3C	9039	9943
3D	13559	14915
3E	16270	17897
3F	20338	22372

(courtesy Gould AMI Semiconductors, copyright 1985)

Circuit Description

The block diagrams for the two filters are shown in Fig 1. Both Super and Junior use an identical band-pass filter circuit. Junior's passband is set by binary DIP switches on

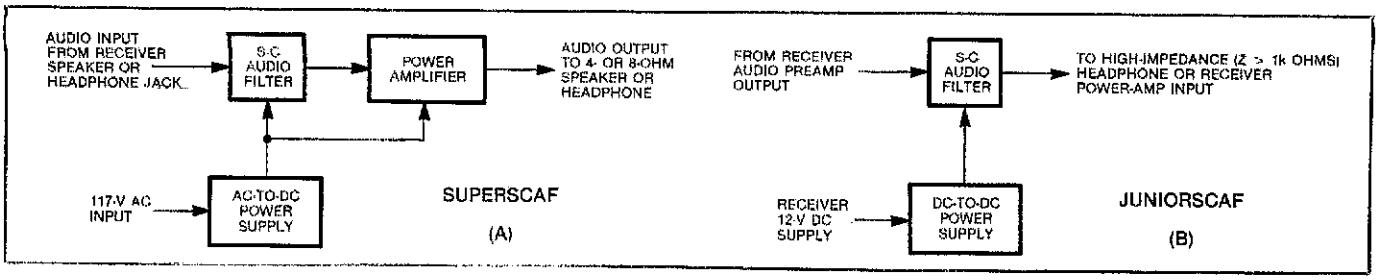


Fig 1—Block diagrams of SuperSCAF (A) and JuniorSCAF (B).

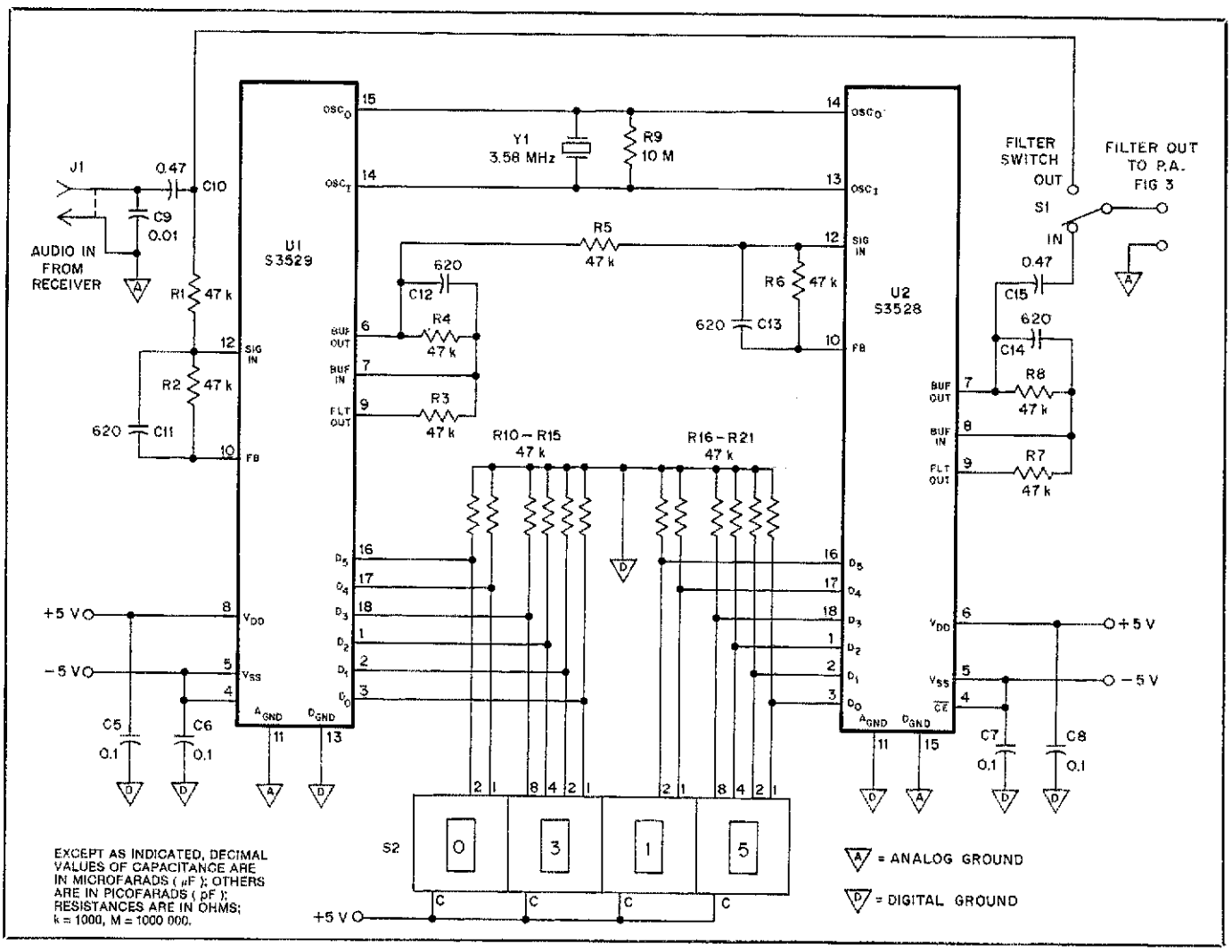


Fig 2—Schematic diagram of the filter sections for SuperSCAF and JuniorSCAF. This circuit, offering simplicity and ease of construction, is used for both filter units.

J1—Phono jacks.
J3—¼-inch phone jack.
R10-R15, R16-R21—47-kΩ × 7 resistor packs used (one resistor in each pack not connected).
S1—SPDT toggle.
S2—BCD thumbwheel switch (SuperSCAF); C & K 342710640-01904 or equiv. For JuniorSCAF, two 6-position DIP PC-mount switches are used.
U1—AMI S3529 programmable high-pass filter.
U2—AMI S3528 programmable low-pass filter.
Y1—3.58-MHz TV color-burst crystal.

the PC board. SuperSCAF's passband is controlled by thumbwheel switches on the unit's front panel. Super also has its own audio power amplifier and ac-operated power supply. In reading the following circuit descriptions, keep in mind that SuperSCAF is a self-contained unit that accepts low- or high-impedance inputs and delivers 1.5 W of audio output at 8 ohms. Junior, on the other hand, has a high-impedance output circuit. It can drive high-impedance phones directly, but doesn't have the "oomph" to drive a speaker.

Refer to Figs 2-4. The input signal to SuperSCAF is obtained directly from the speaker output or the headphone jack of your receiver. The signal is passed first into the S3529 high-pass filter and then into the S3528 low-pass filter. A pair of switches sets the frequency of each filter. The filters are followed by an audio power amplifier. Switching is provided to bypass the filter if desired.

As with any digital filter, it is necessary to band limit the input signal to prevent aliasing. The combination of receiver IF-stage filters and a bit of high-frequency rolloff in the audio sections of most receivers is sufficient to prevent problems. C11 and R2 are used in conjunction with

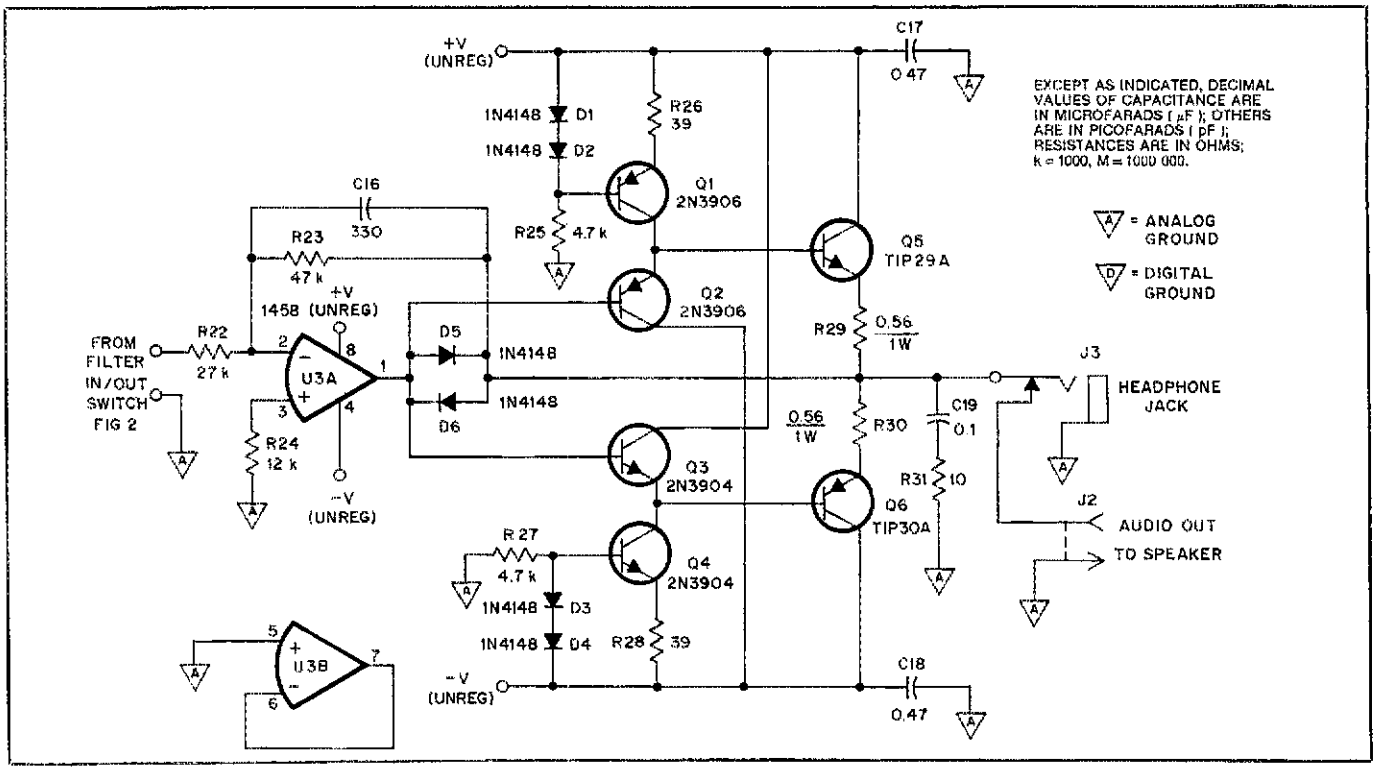


Fig 3—The SuperSCAF audio-amplifier schematic diagram.
D1-D6, incl—1N4148 silicon diode.
J2—Phono jack.
Q1, Q2—2N3906.
Q3, Q4—2N3904.
Q5—TIP29A.
Q6—TIP30A.
U3—MC1458 dual op amp.

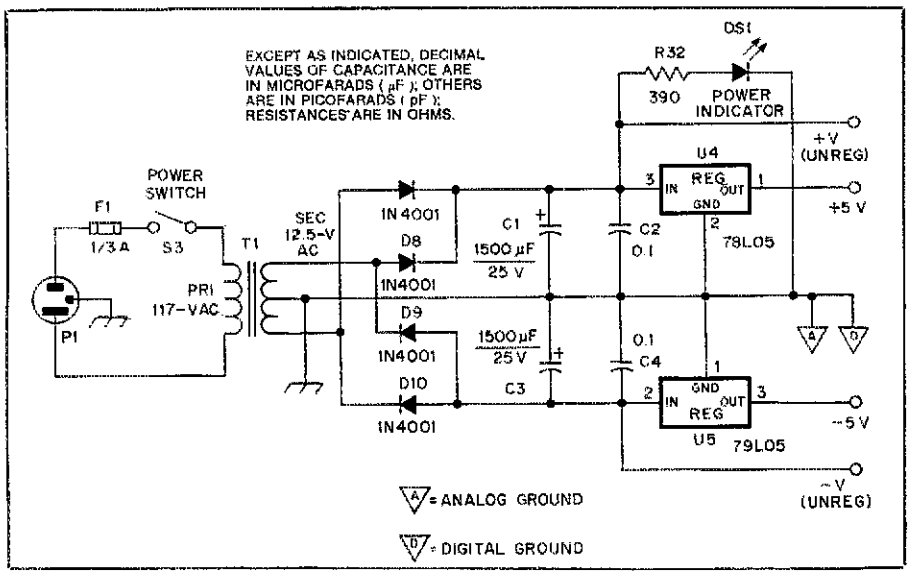


Fig 4—Schematic diagram of the power supply designed for use with the SuperSCAF.
D7-D10, incl—1N4001.
DS1—LED.
S3—SPST toggle.
T1—117-V pri; 12.5-V sec, 1A (RS 273-1505 or equiv).
U4—78L05 5-V positive regulator.
U5—79L05 5-V negative regulator.

the input op amp of the S3529 to form a simple analog low-pass filter, just in case. The six frequency-select lines to each IC are pulled to digital ground by 47-kΩ resistors, representing a logic low. The BCD switches then selectively apply +5 V to the lines, depending on the code, to indicate a logic high.

Both ICs share a common 3.58-MHz crystal and 10-MΩ resistor. In addition to economy, this scheme ensures that both filter ICs operate synchronously from the same clock. The output signal of the S3529 is smoothed by the analog low-pass filter made up of R4, C12 and the output buffer. An additional stage of analog filtering is provided by R6, C13 and the input buffer of the S3528.

The low-pass filter functions similarly. Output from the low-pass filter is smoothed by the S3528 output op amp, R8 and C14. The filtered signal is then passed to the power amplifier.

Although monolithic audio amplifier ICs are readily available, a discrete-component power amplifier (Fig 3) was designed for SuperSCAF. (This choice was dictated by the split power supply discussed later.) The power amplifier is basically a voltage amplifier composed of U3 followed by a current amplifier. Q2 and Q3 act as drivers for the output transistors, Q5 and Q6. Q1 and Q4 act as constant-current sources for the driver collector and output transistor base nodes. Short-circuit protection (1A) is provided by the current-limiting action of D5 and D6. The power amplifier will deliver a maximum of 1.5 W to a 4- or 8-ohm load, more than enough for a comfortable listening level. Trying to drive the amplifier beyond 1.5 W output will result in distortion.

A split power supply (Fig 4) is used to simplify the input and output signal-return path and to accommodate the ±5-V supply requirements of the S3528 and S3529. Supply voltages for the S3528 and S3529 are obtained from a pair of low-current complementary regulators. Separate analog and digital grounds are used to prevent digital noise from appearing on the analog ground return. The two ground systems are joined at the power supply.

JuniorSCAF (see Figs 2 and 5) is ideal for QRP work. Since the power amplifier

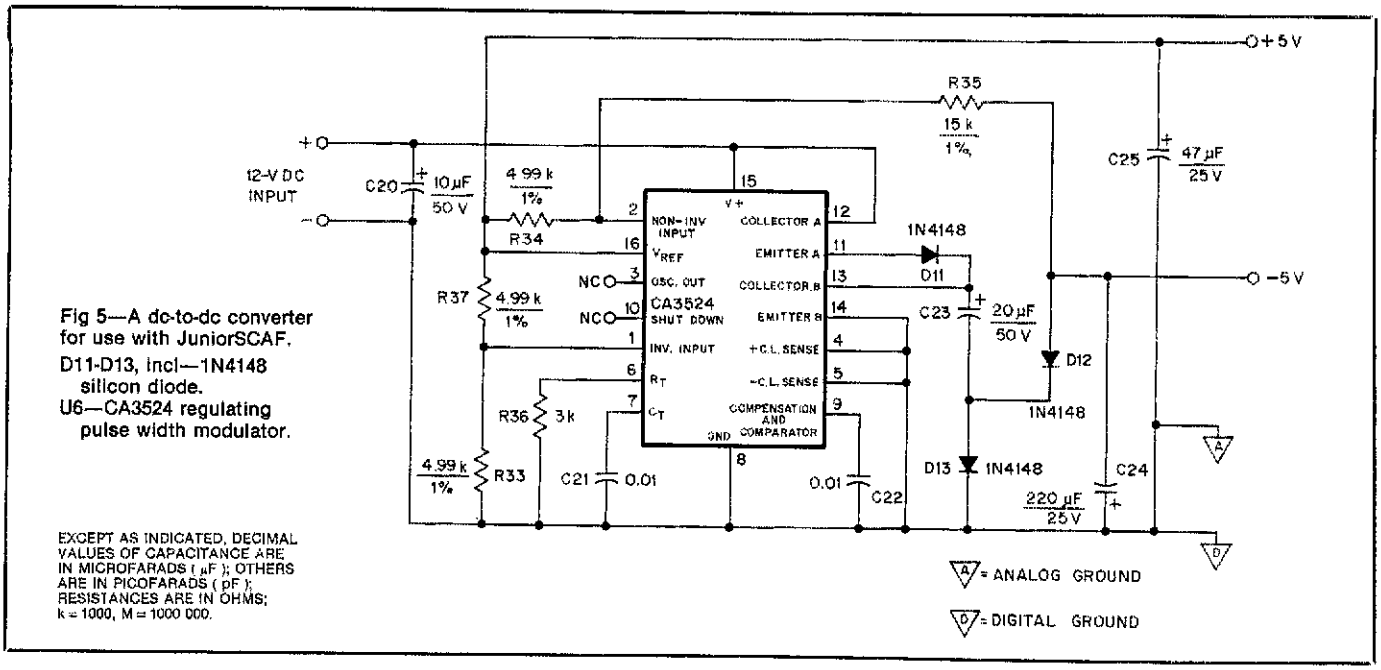
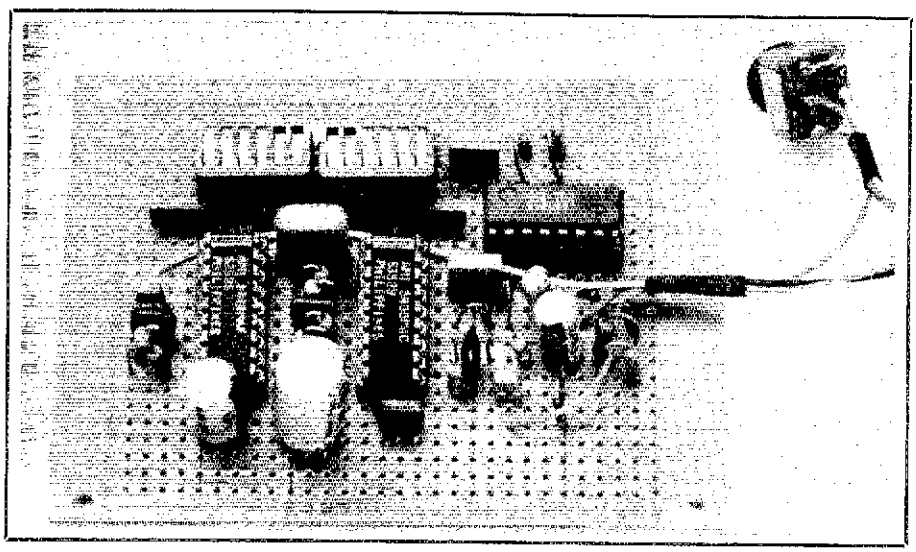


Fig 5—A dc-to-dc converter for use with JuniorSCAF.
D11-D13, incl—1N4148 silicon diode.
U6—CA3524 regulating pulse width modulator.

EXCEPT AS INDICATED, DECIMAL VALUES OF CAPACITANCE ARE IN MICROFARADS (µF); OTHERS ARE IN PICOFARADS (pF); RESISTANCES ARE IN OHMS; k = 1000, M = 1000 000.



JuniorSCAF is designed to use a host receiver's 12-V dc supply and audio power amplifier.

accounts for most of the operating current, its elimination allows the two complementary 5-V dc power supplies to be derived from a simple dc-to-dc converter operating from a 12-V dc source within the receiver.

Although JuniorSCAF is the simpler of the two filters, to install it in a receiver it is necessary to break the signal path between the receiver's audio preamplifier and power amplifier. The output from the preamp is coupled to Junior's input. Junior's output is connected to the receiver's audio power amplifier input. Also, it's necessary to tap into a well-filtered supply of between +12 to 40-V dc to obtain operating power. Because these details vary widely from receiver to receiver, we can't offer more specific installation instructions. Unless you are comfortable cutting leads and traces inside your equipment (or can find a friend to do it for you), we suggest you build SuperSCAF instead.

Construction

Assembling these filters is straightforward. Although the layout is not critical, it's always best to keep leads as short as possible. PC boards, BCD switches and kits of parts are available from the authors.[4] If you decide to use perf board instead of the PC board, be aware that the pinout of the S3528 is slightly different from that of the S3529.

An interior view of the SuperSCAF is shown in Fig 6. A metal box is used as an enclosure for the prototype. Metal is preferred to plastic because of its strength and also because it offers a degree of RFI protection. Remember that the filter may be required to work in an area of high RF-signal strength.

The rectangular hole for the BCD switches is cut with a nibbling tool. Drill a pilot hole large enough to accommodate the nibbler in the center of the BCD switch mounting location. Next, the sides of the switch hole are cut by the nibbler. Finally, the edges of the hole are filed until smooth. Although we used several types of BCD switches during the course of the project, the one we like best is made by C & K components (see parts list). This switch is small, but has a smooth feel and clearly legible digit markings. The high- and low-pass switch positions have stops installed that limit the range to between 00 and 39, matching the filter's operating range.

After holes for the other switches, jacks, power cord and LED are drilled, these components are mounted and connected to the circuit board. We like the looks of a small (1/8-inch diam) LED ac-power indicator. A hole for the LED must be drilled for a snug fit. The LED is then held firmly in place by a drop of glue on the back. Color-coded ribbon cable works nicely for attaching the switches and LED to the circuit board.

The circuit board is mounted to the bottom of the case by stand-offs. To dissipate the heat and prevent thermal runaway, the output transistors *must* be mounted to heat sinks. We used the rear of the case as a heat sink (see Fig 6). The output transistors must be insulated from the chassis by mica washers and an insulating screw washer to prevent short-circuiting the supply voltages. Use thermally conducting silicon grease on both sides of the mica washers.

For safety reasons, a 3-wire power cord should be used. Connect the ground conductor (green) to the chassis and connect the neutral conductor (white) directly to the

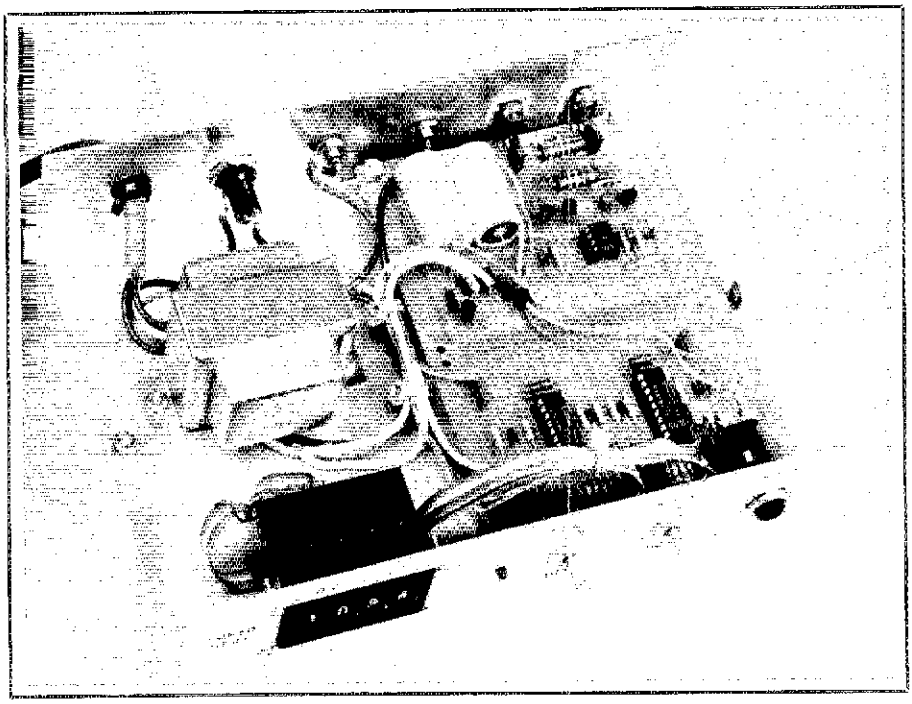


Fig 6—An interior view of SuperSCAF. Note the mounting of the audio-amplifier output transistors; the rear panel of the enclosure is used as a heat sink. The enclosure used for SuperSCAF is a Radio Shack part (RS 270-272).

primary of the power transformer. Solder the hot (black) wire to the spring contact at the rear of the fuse body. Connect the sleeve terminal of the fuse to the power switch. Be sure that the power connection is wired in this manner. Failure to do so may result in a serious shock hazard.

Performance and Operation

Connect the receiver speaker output to the AUDIO IN jack. Plug the speaker into the AUDIO OUT jack. Use shielded audio cable to reduce the possibility of introducing RFI into the filter.

The SuperSCAF and Junior are a pleasure to use. If you mate them with an older rig and operate CW, you'll be surprised by the sudden quiet in the shack. Under many conditions, noise and QRM simply disappear. We became aware of ac hum in one of our receivers only after SuperSCAF made it go away! The filter even does a respectable job on the woodpecker and "sons of the woodpecker." There is no artificial ringing, only the residual noise within the filter passband.

The effect of the filter on SSB signals is not as dramatic, but certainly noticeable and worthwhile. Simply set the switches to 03/27 and eliminate trash outside that frequency range. When conditions get rough, experiment with a narrower passband. Setting the low side of the passband below 02 is never needed and is an open invitation to aliasing.

The most significant operation difference between SuperSCAF and Junior is the passband switching. If Junior is mounted inside a receiver, it is inconvenient to change the passband during operation. We recommend that Junior be set up for a passband of about 500 Hz for CW and switch settings of 03/24 (300-2400 Hz) for SSB.

An obvious advantage of the thumbwheel switching scheme is direct passband readout. Another is the ability to adjust the upper and lower cutoff points in small steps, hearing the effect as you go. For narrow-band interference such as "tuner-uppers," the interference will often disappear at a particular step. At 24, you hear him, at 23, he's gone. For wideband interference, the effect is not as dramatic.

On CW, RTTY and other narrow-band modes, the filter performance is spectacular (see Fig 7). We both work a lot of CW and have older rigs with SSB crystal filters having passbands that are much too wide for comfortable code reception. With SuperSCAF, we get tremendously improved selectivity.

Your new-found selectivity requires changes in operating habits. If the filter is set so that the passband is narrow, say 07/07 (about 70 Hz wide), the band may seem empty. The problem is that your accustomed tuning rate may be too fast for such a narrow bandwidth. You may tune completely across a station during the time between code elements and never hear the

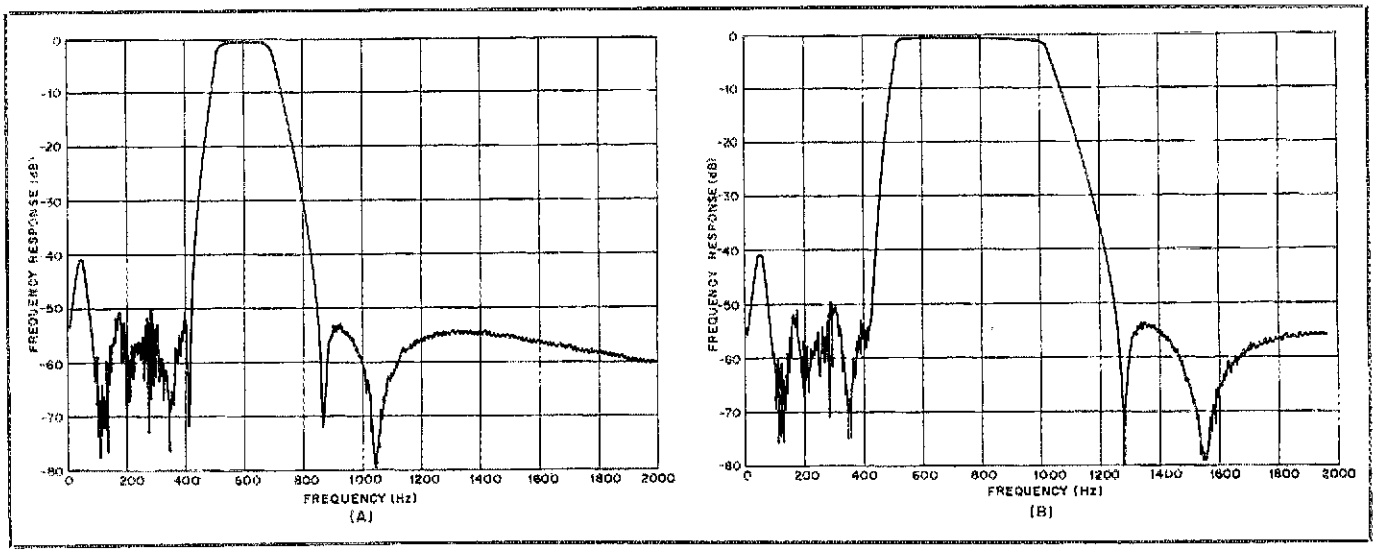


Fig 7—Spectral plots of the SuperSCAF response made in the ARRL lab. Note the steep filter skirts. For both plots, the center frequency is 1 kHz; vertical divisions are each 10 dB and horizontal divisions are each 200 Hz. At A, the front-panel switches are set to 05/06; at B, 05/09. These settings equate to passband widths of about 200 and 500 Hz, respectively.

signal. The solution is to search the band using a relatively wide passband or with the filter bypassed. When you find a "live one," close the passband around him. We often use a setting of 05/09 for search, and then narrow the passband to 07/07 for the QSO.

Be alert to frequency drift, particularly when you turn things over to the other station. It's very easy for one of you to slip outside a 70-Hz passband. If the other station is not where you expect it, widen the filter passband to re-acquire the signal, then narrow the passband on the new frequency. Also, experiment with disabling the AGC if your receiver allows that. Sometimes a strong signal within the IF passband will grab your AGC and reduce the incoming signal levels to practically nothing. You might not hear the interfering station, but you'll know it's there.

Summary

The possibilities presented by monolithic SCFs are numerous. We have built several variations on the theme presented here, and all have worked well. One unit was powered by a pair of 9-V batteries and used an IC power amplifier instead of the discrete amplifier of Fig 3. Another unit included a tone decoder to supply a digital signal to a computer for receiving Morse code and RTTY. That unit was mounted in the transceiver's companion speaker box.

At the outset, our goal was to design an easily constructed audio filter with excellent performance. We are pleased with the results in every way—we hope you will be, too.

Notes

[1]R. Schellenbach and F. Noble, "Switched-Capacitor Filters—An Emerging Technology for Amateur Radio Use," *QST*, Mar 1984.

[2]R. Olsen, "Digital Signal Processing for the Experimenter," *QST*, Nov 1984.

[3]AMI Telecommunications Design Manual, Gould AMI, 1982 3800 Homestead Rd, Santa Clara, CA 95051.

[4]J. Conner, "Switched-Cap Filters Mate With Microprocessors," *Electronic Products Magazine*, Sep 3, 1984.

[5]We wish to thank Don Fisher, W4PLA, and the NCR Corporation Emission Testing Service, Lake Mary, Florida, for providing the FCC Part 15j Class B test data for the SuperSCAF audio filter.

[6]The following parts are available from AFtronics, PO Box 785, Longwood, FL 32750: Thumbwheel switch module, $25.50; S3528, $8.95; S3529, $8.95; CA3524E, $4.45; SuperSCAF PC board, $12.75; JuniorSCAF PC board, $8.75. Allow six weeks for delivery. Include state and local sales tax where applicable and $2 for shipping and handling. Send a business-size SASE for information on complete parts kits for SuperSCAF and JuniorSCAF

Richard Arndt is a Senior Engineer at Stromberg-Carlson, Lake Mary, FL, and is involved in the design of telecommunication products. His design experience includes such products as modems, data multiplexers, telephones, telephone systems and video terminals. Rich first acquired his Amateur Radio license at age 16 (1968) and has since enjoyed operating CW primarily, and building and testing homemade gear.

Rich also holds a First Class Radio Telephone license and a Real Estate Salesman license, and is a senior at the University of Central Florida pursuing a BSBA, majoring in finance. Aside from electronics, he also enjoys racketball, camping and other outdoor activities. Rich and his wife Diane recently shared the joy of the birth of their first child, a boy they named Jason.

Joe Fikes holds BS and MS degrees in physics from the University of Alabama. He is employed as a Principal Engineer at Litton Laser Systems, Orlando, FL. His work is primarily in the design and analysis of electro-optical systems that use lasers. Joe also did computer simulation work for Martin Marietta Aerospace and Reflectone, Inc, a flight-simulator manufacturer.

While in high school, Joe held Novice (WN4GQT) and Technician (WA4GQT) class licenses, but was unsuccessful in getting on the air or upgrading. As a consequence, both licenses expired. Then, a little over a year ago, Joe took the Novice exam along with his two sons, Bill, KB4KVF, and Josh, KB4KVG. "I can't describe how thrilled I was to get a call sign next to that of my two boys," says Joe. A month later, he went to take the Advanced class exam. A last-minute decision to take the 20-WPM code test resulted in Joe being awarded his Extra Class license, "but, I kept my Novice call sign (KB4KVE). I wanted to stay next to my two boys."

Strays

I would like to get in touch with...

☐ anyone with a schematic or manual for a Tempo RBF-1 power and SWR meter. Keith McKay, NØFKF, Stalker Lake, Battle Lake, MN 56515.

☐ anyone with instructions and schematics for the Macrotronics Terminal RTTY program and RTTY software for TRS-80 Model IV computer. Dennis Watters, WBØTAX, HHC, 10th Engineer Bn (Combat), APO New York 09701.

☐ anyone with a schematic for a Knight R-55A receiver. Cornelius Washington Jr, KRØZ, 5617 Vernon Ave, St Louis, MO 63112.

☐ anyone with schematics or manual for a Hallicrafters FPM 300 (Safari). Bob Sethman, WA3QYV, 92 Allen Plan, Donora, PA 15033.

☐ anyone with a schematic or parts list for a Vista X-RD power supply. William Champlin, WD6FUZ, 4603 Darien St, Torrance, CA 90503.

☐ anyone with a schematic for a Yaesu FT-290R or FT-690R. Lt Arnal Cook, N9AKX/EA7, Box 2, FPO New York 09540.

☐ anyone with a source for 11-inch expansion boards and hardware and software for CW, RTTY, AMTOR or packet radio for the Tandy 1000. Brad Bradford, WB9LFD, 906 Parkway Dr, E Peoria, IL 61611.

☐ anyone with a manual or circuit diagram for an EICO 239 solid-state FET-TVM. E. H. Strieter, W6FZO, 3040 Rohrer Dr, Lafayette, CA 94549.

☐ any hams who served in the US Coast Guard in the Loran System during and after WW II, or any other users of Loran. Robert Lund, KAØDIG, 8541 Able St NE, Blaine, MN 55434.

***QST* congratulates...**

☐ the following radio amateurs on 50 years as ARRL members:

- Norman Smaha, W6CSI, of Redwood City, California
- Leon Faber, W7EH, of Phoenix, Arizona
- Laney Huggins, W5GBS, of Kingland, Texas
- Leon Lustyk, W2PZU, of Rochester, New York
- Erle D. Parker, Jr, K4JF, of Clearwater, Florida
- Harold Gross, W2AFM, of Glen Oaks, New York

QEX: THE EXPERIMENTERS' EXCHANGE

☐ Calling all experimenters! Do you want the latest on high-level technical developments taking place in Amateur Radio? *QEX* will bridge this gap if you are interested in playing a role to extend the technical frontiers of Amateur Radio.

The March issue includes articles on

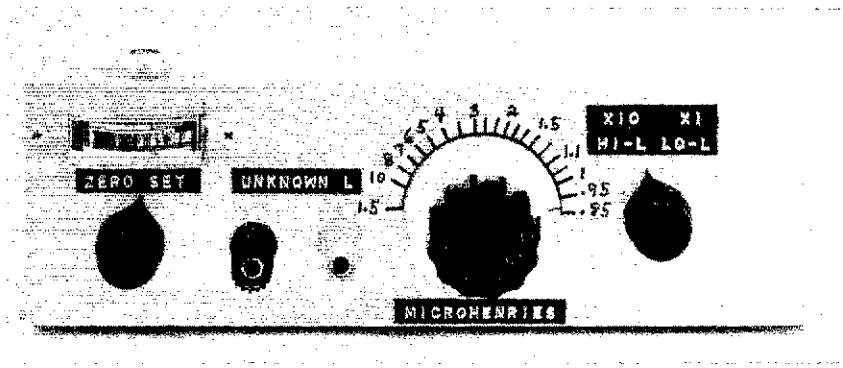
- "Predicting Tropospheric Openings Using Meteorological Parameters," by Richard Miller, VE3CIE
- "The Michigan Packet Radio Band Plan," by James Brooker, NI8E
- "Project Linkup: A Program Synopsis," by Vern Riportella, WA2LQQ

February 1986 meant the close of four successful years of *QEX*. At the same time, it also meant a rebirth of the publication. March 1986 *QEX* premiered with a face change. A new VHF/UHF column by Bill Olson, W3HQT, column material on new products and patents are added features to the articles already mentioned. Won't you join us for our second leg of the journey?

QEX is edited by Paul Rinaldo, W4RI, and Maureen Thompson, KA1DYZ, and is published monthly. The special subscription rate for ARRL members remains $6 for 12 issues; for nonmembers, $12. There are additional postage surcharges for mailing outside the US; write to Headquarters for details.

• *Under Construction*

A Tester for Coil Inductance



Part 6: Laboratory-grade L and Q meters cost thousands of dollars. Let's build an inexpensive L and relative-Q measuring unit for our amateur workshop.

By Doug DeMaw, W1FB
ARRL Contributing Editor
PO Box 250, Luther, MI 49656

How often have you been uncertain about the inductance of a homemade coil? There are times when we aren't sure of the core material we select from our parts supply—the cores *do* become mixed up on occasion and leave unanswered a question about the core permeability. Maybe we don't trust the A_L factor when winding a toroid and would feel more confident if we could measure the inductance of the completed coil. Those of you who are fortunate enough to have access to a Q meter need not worry about building a homemade test unit. But for those frugal souls, like me, who can ill-afford $250 for an old, used Q meter, or a few thousand bucks for a new Q and L tester, we can build a satisfactory unit for a few dollars.

Many of us have used alternative inductance-measuring methods since becoming amateurs. This entailed using fairly crude techniques, such as placing a known-value capacitor in parallel with an unknown inductance, then using a dip meter to find the resonant frequency. The two known factors could then be used to learn the inductance value by using the appropriate equations. Approximations were possible with these methods. But, many of our projects call for fairly precise inductance values, especially in fixed-tuned RF filters. So, we really need an instrument that can be used for measuring inductance directly. This eliminates time-consuming follow-up calculations or monitoring the dip-meter operating frequency with a calibrated general-coverage receiver.

Circuit Commentary

Fig 1 contains a schematic diagram that shows the circuit for our project this month. Provisions are made for two popular inductance ranges—1-10 μH, and 10-100 μH. More ranges can be added. This is discussed later in the article.

Two oscillators are used in Fig 1. One operates on 2.5 MHz (10-100 μH range), and the other is on 7.9 MHz (1-10 μH range). C2 and C9 are critical values for establishing the proper amount of oscillator feedback. The X_C of these capacitors is 150 ohms. Tuned transformers are used at the collectors of Q1 and Q2. Each transformer is terminated by a 56-ohm resistor to provide a fixed oscillator load. Fundamental crystals are used at Y1 and Y2.

Operating voltage and the RF output for the oscillators is selected by range switch S1. RF voltage is routed to C6 (main tuning), J1 and J2 through a 6.8-pF coupling capacitor. This light coupling prevents the transformer secondary windings and load resistors from loading the coil under test, which could ruin the Q_u (unloaded Q) of the coil under test. This would cause low, broad-response meter readings. Light coupling (C8) is used between C6, J1 and J2 for routing the RF voltage to meter amplifier Q3. This helps to preserve the Q_u of the coil being tested.

A 2N4416 (Q3) serves as our meter amplifier. The word "amplifier" is a misnomer, since M1 indicates changes in FET current as the test coil is tuned to resonance by C6. As the tuning capacitor is adjusted for circuit resonance, the RF voltage at the gate of Q3 rises, and this increases the FET current. So perhaps a more descriptive name for the Q3 stage would be "current multiplier." By this I mean, we are *not* amplifying the RF-input signal.

A 10-megohm gate resistor is used at Q3 to help maintain the high gate impedance of the FET. For example, if we used a 0.1-megohm gate resistor, this would set the actual gate impedance at 0.1 megohm, and that would tend to load the test coil.

R1 sets the meter sensitivity, and R2 is adjusted to zero the meter when there is no coil connected to J1 and J2. It is likely that an MPF102 JFET could be used at Q3. I used a 2N4416 because I had some of them on hand, and did not wish to make a 60-mile round trip to buy an MPF102 at the nearest Radio Shack!

Harmonic Traps Are Needed

An interesting problem arose while I was testing the circuit of Fig 1: Two peak responses were observed on each range. One peak proved to be the desired one, and the spurious peak response took place when C6 was moved toward minimum capacitance. Investigation with my dip meter (wavemeter mode), when it was coupled to the test coil, showed a strong response at the second harmonic of each oscillator—5 and 15.8 MHz! The test coil was being tuned to the second harmonic, which enhanced the harmonic currents present in each oscillator. The simple cure is to install a series-tuned trap at the secondary winding of T1 and T2 (L1, L2, C3 and C5). Alternatively, a half-wave, low-pass filter can be connected between the transformer secondary and C7 of Fig 1.

Additional Inductance Ranges

We may add a tester range for 0.1 to 1.0 μH by including a third oscillator for 25-MHz operation. A suitable circuit is provided in Fig 2. An overtone type of oscillator is required, since fundamental crystals are not available for frequencies much above 20 MHz. Y1 of Fig 2 is a third-overtone crystal. A 50-MHz trap is used at the output side of T1. I tested the circuit of Fig 1 for use in this range by tuning the 7.9-MHz oscillator for third-overtone operation, and the results were good.

If you wish to cover the inductance range

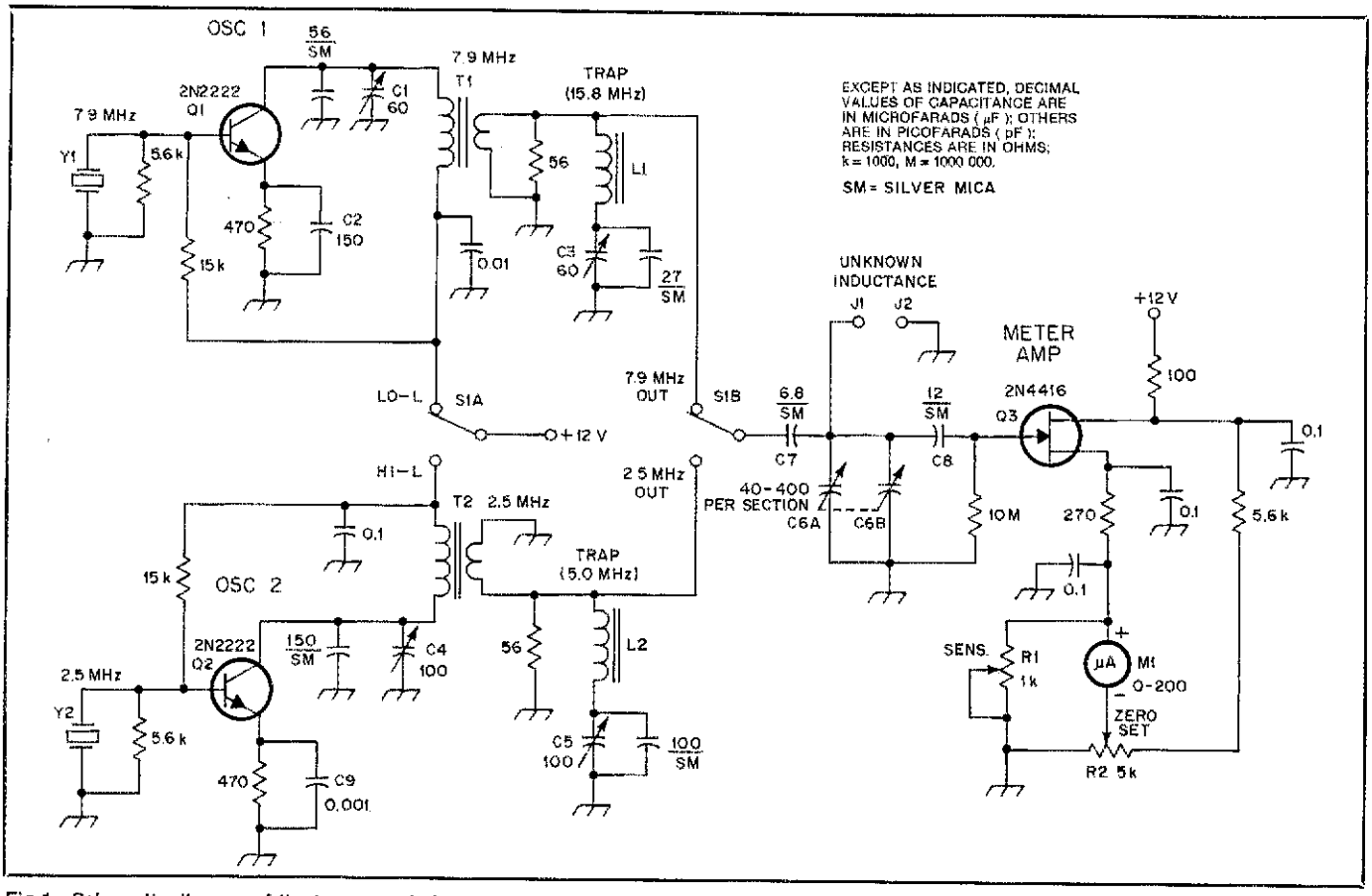


Fig 1—Schematic diagram of the two-range inductance checker. Fixed-value capacitors are disc ceramic or silver mica. Fixed-value resistors are ¼- or ½-W carbon composition.

C1, C3, C4, C5—Miniature ceramic, plastic or mica trimmer.
C2, C9—See text.
C6—40-400-pF variable (State Street Sales no. 68C96-5V or equiv).
J1, J2—Terminal post for banana plug.
L1—Toroidal inductor, 1.7 μH. 24 turns no. 26 enam wire on Amidon T37-6 toroid core.
L2—Toroidal inductor, 6.8 μH. 40 turns no. 30 enam wire on T37-2 toroid core.
M1—Miniature (or larger) 100- or 200-μA dc meter.
R1—PC-mount miniature 1-kΩ control (see text).
R2—Panel-mount 5-kΩ or 10-kΩ linear-taper, carbon composition control.
S1—DPDT toggle or wafer switch.
T1—Narrow-band transformer. 5-μH primary. 31 turns no. 26 enam wire on T50-2 toroid core. Sec has 7 turns of no. 26 wire.
T2—Narrow-band transformer. 20-μH primary. 19 turns of no 26 enam wire on Amidon FT37-61 (125 mu) toroid. Sec has 4 turns.
Y1, Y2—Fundamental crystal, 30-pF load capacitance. International Crystal Mfg Co, type GP.

from 100 μH to 1 mH, you may include a fourth oscillator. It operates on 790 kHz. The circuit is given in Fig 3. This is a fundamental oscillator. The selectivity of T1 may be high enough at this frequency to preclude the use of a harmonic trap. I did not perform a test to determine if a trap was needed.

Construction Notes

You may prefer to plan your own layout for the tester. The important matter is to keep the leads between the oscillator transformers (T1 and T2) and C7 as short as possible. Otherwise, use miniature RG-174 cable for the connecting leads. Similarly, the lead from C7 to C6 and J1 must be short. Again, keep the lead from C8 to Q3 short.

Fig 4 shows an interior view of my prototype unit. It reflects the "ugly construction" philosophy. Things were tacked together hurriedly in order to get the circuit operating. A finished model is planned.

The foundation for my tester is made from PC-board material. Double-sided PC stock was used for all but the front panel, which is made from single-sided board. The latter material was chosen to permit writing on the panel with an indelible marking pen. The copper around J1 of Fig 1 was ground away to a diameter of 3.8 inch to minimize stray capacitance to the copper foil. I used a Moto Tool® and abrasive bit for this job.

The arbitrary size of my tester is (HWD) 2½ × 8 × 3½ inches. The oscillators are built on an unused PC board that was designed for a different circuit. I used the available pads and traces for the circuits. Many unused elements remain.[1] Q3 is built on a terminal strip that has its ground lug soldered to the chassis.

R1 is a trimmer control that is soldered across the meter terminals. You may wish to use a panel-mounted control for R1.

M1 in my circuit is a 200-μA edgewise S-meter that I obtained from State Street Sales.[2] Any 100- or 200-μA meter may be used. You can use a 50-μA instrument, but adjustment of R1 and R2 may be more critical than when using a 200-μA movement.

I used tape labels for indentifying the front-panel controls. A fine-point marking pen is ideal for marking the μH calibration on the panel (C6).

Relative Q

The higher the M1 meter reading, when C6 is tuned for a peak indication, the higher the coil Q. This is a crude test at best, but it provides valuable insight into the coil quality. You can calibrate the instrument for more accurate Q readings by mounting R1 on the panel, then marking its range for various Q factors. The *ARRL Electronics Data Book* [out of print—Ed.] explains how to measure coil Q, and a test circuit is provided. You may use one high-Q coil for the high-range calibration, then place a variable resistor (100 kΩ control) across the coil to provide various Q_U values by adjusting the control for specific lower resistances.

It is possible to build a very elaborate in-

[1]Notes appear on page 22.

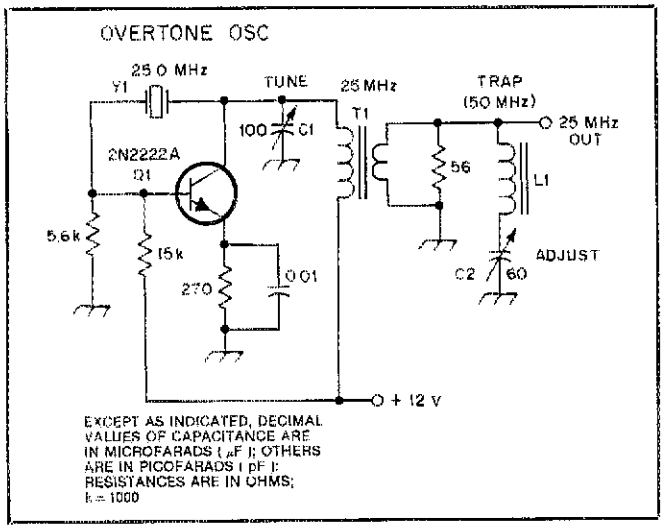


Fig 2—Schematic diagram of a 3rd-overtone oscillator for measuring inductances from 0.1 to 1.0 μH (see text). C1 and C2 are small mica, plastic or ceramic trimmers. L1 is 0.34 μH. Use 12 turns no. 26 enam wire on Amidon T37-10 toroid. T1 primary is 0.6 μH. Use 15 turns of no. 26 enam wire on T37-10 toroid core. Use 3 turns for sec. Y1 is a 3rd-overtone, 30-pF load capacitance crystal.

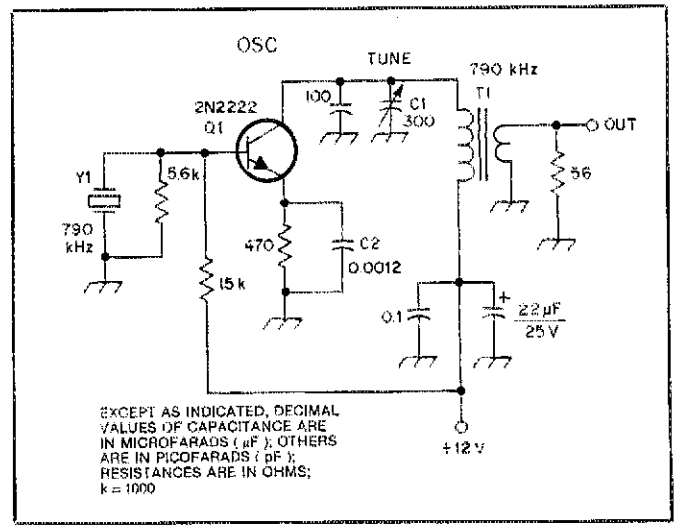


Fig 3—Circuit for a low-range oscillator (100 μH-1.0 mH). C1 is a mica trimmer. T1 primary is 135 μH. Use 45 turns of no. 26 enam wire on Amidon FT50-61 ferrite toroid. Sec has 10 turns. C2 is a feedback capacitor. The value may require adjustment to ensure reliable oscillator starting, depending upon the activity of the crystal used at Y1.

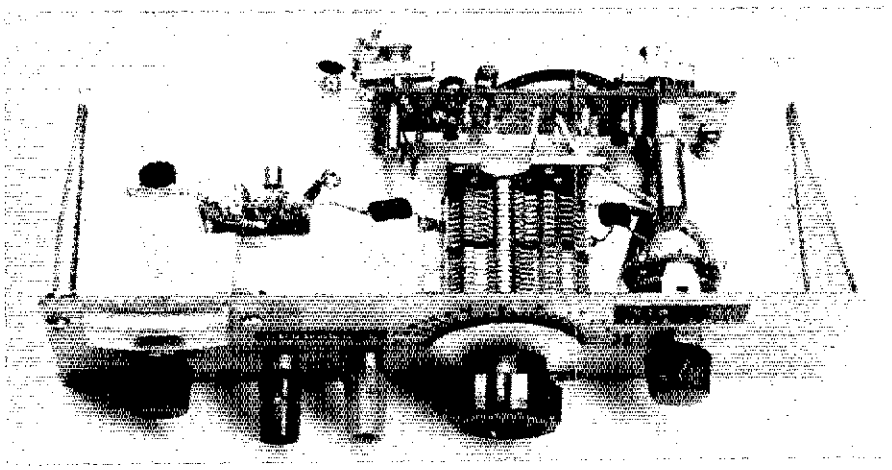


Fig 4—The "ugly construction" prototype tester built by W1FB. PC-board material is used for the chassis and panel (see text). The twin oscillators are mounted vertically near the tuning capacitor to keep the critical leads short. The meter amplifier is seen below the meter on a terminal strip.

strument by using the circuit in Fig 1 as a foundation. For example, a vernier drive and readout dial for C6 would represent an improvement. A shielded metal cabinet would represent a step forward, too. A larger meter at M1 would aid you in observing the meter action more easily.

Calibration and Use

Various capacitors may be used at C6, but whatever type you select should have a minimum capacitance of 40 pF or less, and the maximum capacitance needs to be 400 pF or greater. I used a surplus two-gang capacitor with both sections in parallel (see note 1). The tuning range is from 35 pF to 465 pF, hence the overrun at each end of the panel dial scale.

I used a digital capacitance meter to calibrate the dial for C6. Marks were selected at 10, 20 and 30-pF increments, with the 10-pF marks near the minimum-capacitance range of C6, and the 30-pF increments toward the maximum-capacitance end of C6. The 20-pF markers are in the middle of the C6 range. Once these points are established, you may take that data, plus the known oscillator frequency, and determine the inductance value for each capacitive increment.

C1 and C4 are adjusted for reliable oscillator starting when the HI-L, LO-L switch is cycled. I used a scope at the transformer secondary windings to set C3 and C4 for equal RF output from the oscillators. An RF probe and VTVM may be used for the same adjustment. With + 12 V applied to the tester, but with J1 and J2 open, set R2 for a zero reading on M1. R1 may be set for a midscale reading when a test coil is attached to J1 and J2, and with C6 tuned for a peak reading on M1.

The harmonic traps are adjusted for a null on M1 when the spurious meter indication (mentioned earlier) is present. The tuning of these traps is sharp, so adjust them slowly!

You will find it handy to solder an alligator clip to a banana plug (two needed) for use at J1 and J2. This makes it easier to clip in a test coil, as opposed to unscrewing and tightening the posts on the jacks.

Wrap-Up

The crystal frequencies are critical if you wish to have the dial scale track on the various inductance ranges. However, if you do not object to plotting a scale for each range, you may use crystals of various frequencies for your instrument. My early tests, for example, were made with 2.1- and 8.0-MHz crystals, since these were the only ones I had that were close to the desired frequency. You may buy on-frequency crystals from International Crystal Mfg Co or from JAN Crystals.

I am convinced that you will find this test instrument one of the most valuable of the Under Construction collection. It will be helpful for determining the values of surplus slug-tuned coils and many prewound toroidal and pot-core inductors.

I will gladly award four gold stars to anyone who comes up with a similar, low-cost design that contains digital readout for the inductance. In fact, I'll buy your dinner at the next hamfest we attend jointly! Good luck!

Notes

[1]Circuit boards for this project are available from A & A Engineering, 7970 Orchid Dr, Buena Park, CA 90620, tel 714-521-4160.

[2]State Street Sales, PO Box 249, Luther, MI 49656. Q1, Q2, C6, J1, J2, M1, S1, R1 and R2 are available for the circuit in Fig 1.

A Truly Broadband Antenna for 80/75 Meters

Have you been dreaming about an antenna that will do justice to your no-tune, solid-state transceiver by letting you operate across the entire band from 3.5 to 4.0 MHz? Then this may be the antenna for you!

By Brian L. Wermager, KØEOU
311 Andover Rd
Hoyt Lakes, MN 55750

With declining sunspots and poor conditions on the higher HF bands, 80 meters has suddenly become very popular. But, unfortunately, many hams are not able to use this band to its full potential. It offers every kind of ham activity from CW to phone, from nets and ragchewing to great DXing, but many hams are too limited by the frequency range of their antennas to enjoy this band completely.

Antenna-matching networks are one answer, but they spoil the advantage of the no-tune feature of modern transceivers. Matching networks also are often less effective than many hams think; they introduce losses. The losses can be significant at some settings which provide a match. With these things in mind, I decided to try some ideas that might give me a more broadbanded antenna. The prime requirement was that it be fed with common 50-ohm coaxial cable, with no traps, coils or capacitors.

First, I tried a quarter-wave sloper. This antenna worked very well, with a bandwidth of 300 kHz between the 2:1 SWR points. It still, however, limited me from operating CW DX at the bottom of the band and the phone nets at the top of the band. There had to be a better antenna.

Antennas can be broadbanded by using large-diameter elements. With this in mind, I began experimenting with two-wire slopers, attached to a common feed point, but with the wire ends fanned out from each other. (See Fig 1.) This seemed to help, but not as much as I had hoped. It did, however, shorten the length required for the sloper. For those with a short tower, this idea could make an 80- or 160-meter sloper possible when a single-wire sloper would be too long.

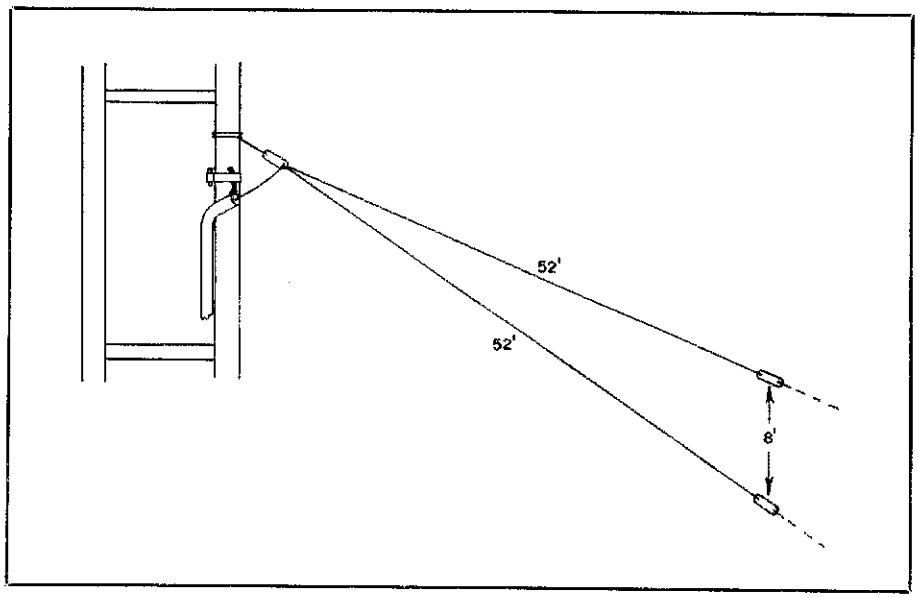


Fig 1—Arrangement of the original KØEOU experiment. The coaxial cable shield is connected to the tower, with both wires of the two-wire element connected to the center conductor. The wires are spread approximately 8 feet at the ends and are each approximately 52 feet long.

The Fickle Finger of Fate Strikes!

While I was trying one of these two-wire antennas at a low height on my tower, the SWR was less than 2:1 from 3.5 to 4.0 MHz! After several attempts to get it to work the same way at the top of the tower, I discovered that these results could be attained only when my old quarter-wave sloper was at the top of the tower *and grounded* to the tower. (See Fig 2.) The two antenna elements were obviously interacting with each other, broadening the bandwidth tremendously. Further pruning of the lengths of both the sloper and the two-wire element resulted in the amazing SWR curves shown in Fig 3.

What's Going On?

I will leave the question of *why* it works to the experts. (See the sidebar to this article.—Ed.) Like a true ham, I subscribe to the old saying, "If it works, leave it up and don't mess with it." My guess, however, is that it is something like one-half of a two-element log periodic seeking its mirror image in the grounded tower. The top element is tuned for the lower portion of the band and the two-wire element for the upper portion. In fact, there is a little SWR "bump" in the middle of the band that seems to give further evidence of this.

How Well Does It Work?

Although I have no way of scientifically plotting the antenna pattern, it does seem to be vertically polarized. Good DX performance from the antenna seems to verify this. Because many contacts have been

The MININEC Analysis of the KØEOU Three-element Half Sloper

The Mini-Numerical Electronics Code (MININEC) analyzes thin-wire antennas, solving an integral equation representation of the electric fields using a method-of-moments technique. MININEC solves for the currents, impedance and patterns for antennas composed of wires in arbitrary orientations in free space and over perfectly conducting ground.

The impedance at the feed point calculates to be 79.4 + j1859.8 ohms. This assumes a perfect ground beneath the structure and simply a 3-foot extension of the tower above the connection of the upper wire. In practice, the impedance will be affected by both the ground conductivity and the top-loading effect of a beam antenna atop the tower.

A fair amount of current flows in the top section above the upper wire connection point. Top loading will affect the phase of this current, which will be reflected as a change in impedance at the feed point. In other words, the calculated data is not absolute. Use it as an approximation only.

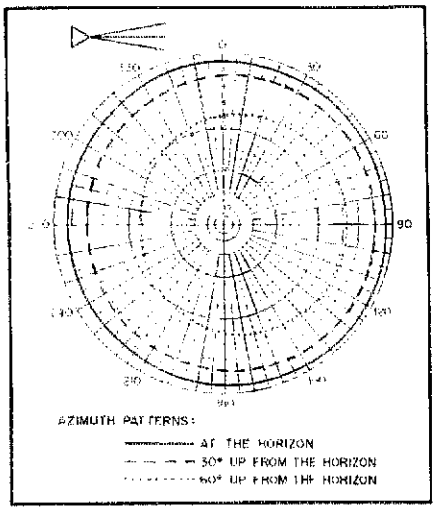


Fig A—Antenna azimuth radiation pattern for the KØEOU three-element half sloper antenna. Values are in dBi. Add 6.0 dB to the values shown.

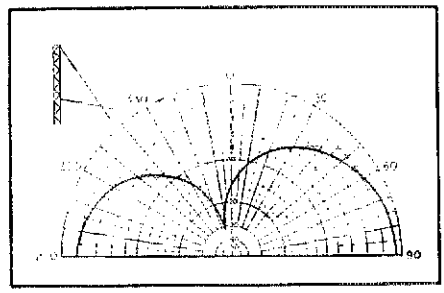


Fig B—Antenna elevation radiation pattern, in the direction of the wires, for the KØEOU antenna. Values are in dBi. Add 6.0 dB to the values shown.

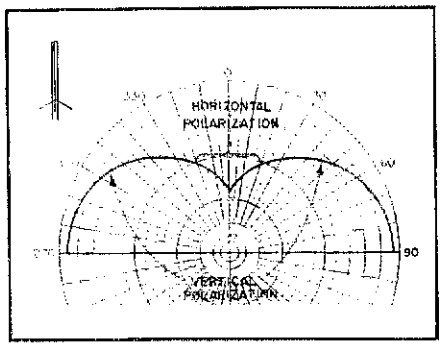


Fig C—Antenna elevation radiation pattern, in a direction broadside to the wires, for the KØEOU antenna. Values are in dBi. Add 6.0 dB to the values shown.

A relatively high current flows at the base of the tower to ground—more than in any other part of the system. This indicates that a good earth connection, and even a radial system, would offer highest efficiency.

The antenna patterns, Figs A, B and C, are also approximations. Polarization is predominantly vertical—at low angles it may be considered to be almost completely vertical. Broadside to the direction of the wires, the polarization becomes horizontal at high radiation angles, ie, above 75 degrees. At 60-degrees elevation, the vertical component is almost 16 dB greater than the horizontal. The vertical component increases significantly at lower elevation angles, being in excess of 30 dB above the horizontal component at a 5-degree elevation. These figures all apply in a direction broadside to the wires. In the direction of the wires, both "front" and "back," the radiation is entirely vertically polarized.—*Gerald L. Hall, K1TD, Associate Technical Editor,* QST

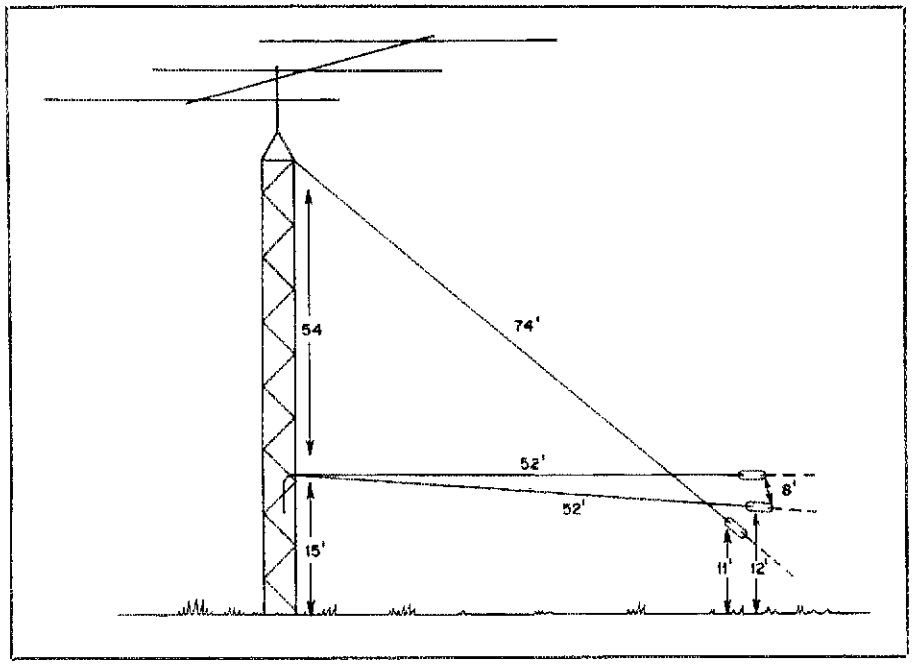


Fig 2—The antenna as constructed at KØEOU. The tower is 70 feet high. The feed point is as described in Fig 1 and is 15 feet above ground level on the tower. The sloper element is 74 feet long, is connected to the tower at the top end and slopes to a point 11 feet above ground level at the end.

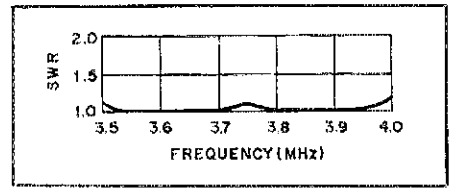


Fig 3—SWR measurements for the antenna at KØEOU. The highest SWR measurement between 3.5 and 4.0 MHz is 1.2:1.

made in all directions, the antenna probably has a fairly omnidirectional pattern. On-the-air comparisons with a quarter-wave sloper across town show that the antenna performs at least as well as the sloper. It also seems to have a little less noise on receive than the sloper.

Getting One Up for Yourself

If you have a tower over 40 feet high, you should be in business. The element dimensions will vary according to the height of your tower. My friend Kelly Davis, KD7XY, constructed one of these antennas on his 50-foot tower so we could see how the dimensions would change.

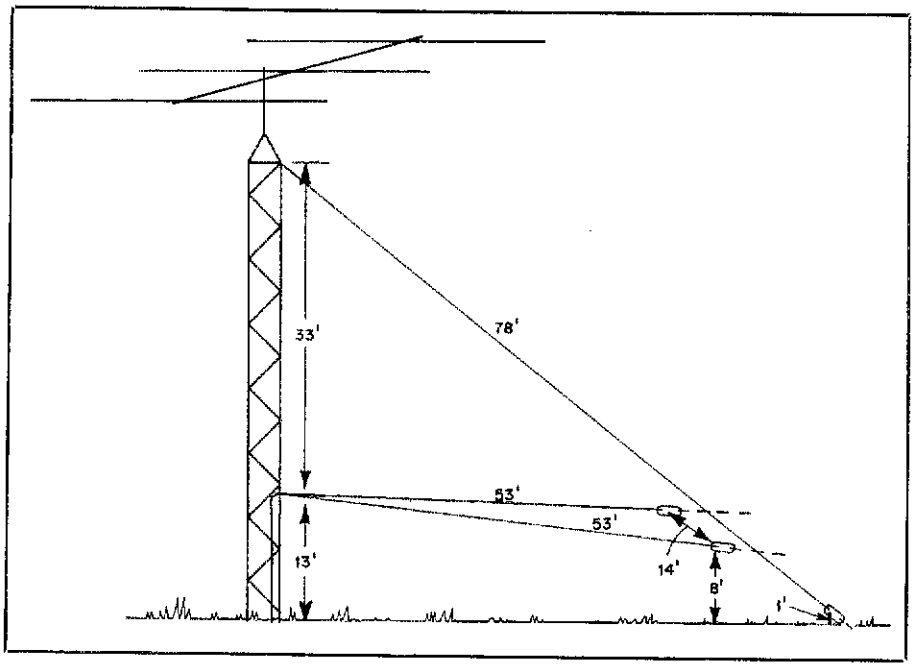


Fig 4—The antenna installation at KD7XY. The tower is 50 feet high. The sloper element is attached at 46 feet, is 78 feet long, and is only 1 foot above ground level at the end. The two-wire element is 53 feet long and is attached to the tower at 13 feet above ground level. Like KØEOU's antenna, it is virtually "flat" across the band; highest measured SWR is 1.4:1.

Measurements of his antenna are shown in Fig 4.

It is interesting to note that the height of the feed point on the tower does not appear to be critical at all. The angle of the wires in the two-wire element does not seem to be critical either. The sloper element, however, should come down *between* the two wires of the lower element. The sloper angle is about 45 degrees. As you attempt to get the lowest possible SWR from the antenna, remember that the angle of the sloper to the tower and its distance from the ground at the end will have an effect on the bandwidth. Because these antennas can be pruned from the ground, the trial-and-error method is easy. When pruning the antenna, remember that the two elements are cut for different frequencies. Changing the length of the top element changes the performance at the lower part of the band. Changing the lengths of the two-wire elements changes the performance at the top part of the band. Don't give up until your antenna SWR is, at the very most, 1.5:1 from band edge to band edge.

Use good insulators at the ends of each of the three wires. I used nylon fishing line at first, but one foggy, wet night the wire in the top element burned through in three places. It surprised me that there could be such high currents in a part of the antenna not even connected to the feed line, but I should have known better. Remember also that other objects around the antenna, such as other antennas or guy lines, could adversely affect antenna performance. Keep the antenna as much in the clear as possible.

Some Untried Ideas

I hope others will try some modifications to this antenna. For example, there should be no reason why a single wire for the bottom element won't work. My small city lot doesn't give me room to try a single wire, as it would surely need to be longer than the two-wire element. I would also like to see someone try cutting the top element for the high end of the band, and the bottom element for the low end. This could shorten the sloper element for someone with a shorter tower and may even give the antenna some gain in the direction of the two-wire element. It might also be possible to construct an antenna for another band inside of this one (40 meters, for example). The same feed point could be used, but with another sloper element for the second band. Another possibility is to construct the antenna with two dipoles. It is my guess, (and only a guess), that it is the merging of the ends of the elements that causes the 50-ohm impedance of the antenna.

Winter gives us the best conditions on the 80/75-meter band. You can be ready to use the whole band with this simple-to-construct and very broadband antenna.

[Editor's Note: Chuck Hutchinson, K8CH, erected one of these antennas at his Connecticut QTH and consistently works European and South American DX with 100 W and less.]

Strays

ROANOKE DIVISION LEAGUE PLANNING MEETING

☐ The Blue Ridge ARS will sponsor the annual Division League Planning meeting in Greenville, South Carolina, May 10-11, at the Ramada Inn. The meeting starts 1 PM Saturday, May 10, and concludes that day with an informal dinner. The meeting resumes at 9 AM Sunday and ends at noon after the presentation of the written recommendations to the Director. This year's theme is "Packet Radio—How Can We Use It?" with Paul Rinaldo, W4RI, ARRL Publications Manager, leading the discussion.

The fee is $14 in advance, $16 at the door, and covers facilities, food breaks, dinner, mailing and other administrative costs. Checks (payable to Blue Ridge ARS) should be sent to Sue Chism, PO Box 6751, Greenville, SC 29606. Hotel reservations must be made directly with Ramada Inn, tel 803-227-3734. For special rates, be sure to mention you're with the "radio group" when making reservations.

Next Month in *QST*

Here are just a few of the many items awaiting you in May *QST:*

- a new type of RF-measurement system that's a step above its predecessor, the dip meter
- a peek at HF propagation conditions—now and in the future
- one group's secrets to achieving top Field Day scores, and rules for this year's event
- November Sweepstakes and EME Contest results, and June VHF QSO rules

Please note: Although we try our best to include in the next issue all the items we've advertised, from time to time we have to postpone publication for a month or two. If the item you're particularly interested in doesn't appear "next month," it most likely will be in the following month's issue.

The KI6O 160-Meter Linear-Loaded Sloper

No room for a top-band antenna? Try this one on for size!

By Deane J. Yungling, KI6O
7972 Sunset Ave, Suite J
Fair Oaks, CA 95628

After having good success using my linear-loaded, inverted-L antenna over the winter 1984-85 160-meter season, I decided to try linear loading on a different type of 160-meter wire antenna.[1] I have had considerable success with a quarter-wave sloper on 80 meters, but my city-sized lot isn't deep enough to accommodate a full-sized sloper for the 160-meter band. About 120 feet would be required for the sloper to be 10 feet off the ground at the low end; I have about half that distance to work with. Linear loading solved the problem.

This antenna provides an effective bandwidth of about 70 kHz with an SWR of 2:1 or less. At the design frequency of 1.840 MHz, SWR is 1.1:1 with 50-ohm feed line and no matching network or tuner.

Although the individual dimensions are not critical, the sloping wire and the ladder line must resonate at the desired frequency. If the sloping wire is less than 65 feet long, the ladder must be longer, and vice versa. If you use a different length for the sloping wire, you will need to experiment a bit to see how much to add or remove from the ladder length.

Construction

My sloper is hooked onto the tower at about the 55-ft level using a strain insulator (see Fig 1). The coaxial-cable feed line is securely taped to one tower leg, and the shield is connected to the tower leg with a radiator hose clamp. The tower is grounded at the base with several ground rods. The center conductor of the coaxial cable is soldered to the sloper at the strain insulator and is taped for weather protection where the center conductor and shield separate.

The ladder portion of the antenna is made with the same type of wire as the sloping portion. The ladder spacers are made of 3/8-inch hardwood dowels that have small holes drilled 1 inch from each end to hold the wires. The dowels should be soaked or sprayed with a wood preservative, prior to assembly, for weather protection. Plastic spreaders could also be used, if desired. The wires are firmly tied to the dowels with waxed lacing twine or similar material where the wires pass through the holes. The dowel spacing can be adjusted, with some difficulty, after the dowels are tied.

One end of the ladder is tied to the tower with heavy monofilament fishing line, with the other end tied to a tree or whatever else is handy. The tie-off lines are fanned vertically to keep the ladder from twisting and should be tensioned enough to eliminate any sagging in the ladder. Monofilament fishing line provides some cushioning if the supporting tree sways or if the wind is strong.

Adjustment

Initially, the ladder should be a few feet longer than shown, to allow for adjustment. The resonant frequency should be checked, and a few inches removed at a time from the tower end of the ladder until the desired frequency is achieved. At this point, the wires should be soldered together and then taped to the end dowel. It appears that there must be an HF beam, or something similar, on the tower for any quarter-wave sloper to work properly. This sloper is no different in this respect. Finally, the antenna, particularly the sloping section, should be kept as far as possible from surrounding guy wires and other objects.

This antenna requires no ground system, balun or matching network over its operational bandwidth. The linear-loaded sloper is simple to construct and easy to adjust, and its performance is superior to my linear-loaded, inverted L.

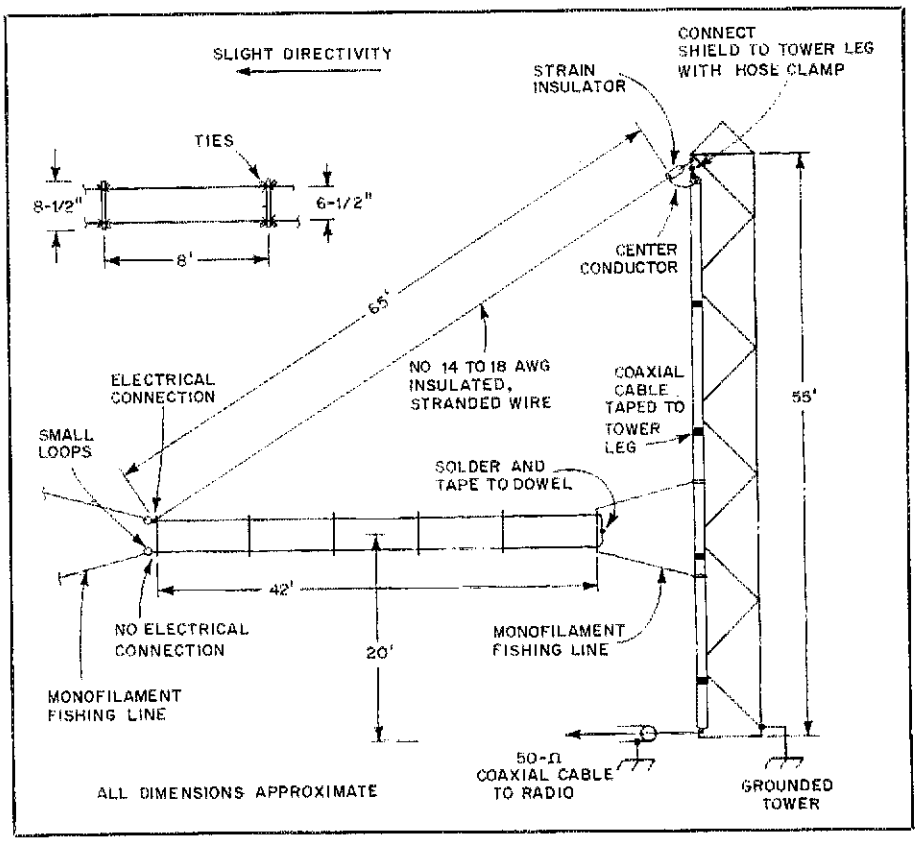
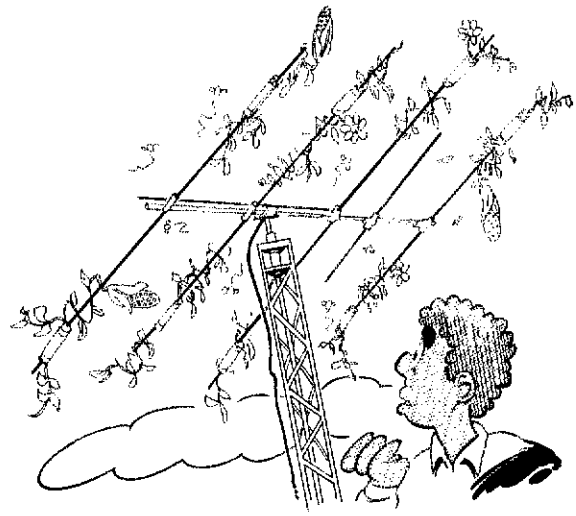


Fig. 1—Construction details for the KI6O 160-meter linear-loaded sloper.

[1]D. J. Yungling, "The KI6O Top-Linear-Loaded 160 Meter Inverted 'L' Antenna," *CQ*, Apr 1985, pp 38-39.

Tune Up Your Tribander



Is your trapped triband antenna giving you problems? Maybe it's time for some spring cleaning.

By Paul K. Pagel, N1FB
Senior Assistant Technical Editor, ARRL

"Uh-oh! What's the matter with the tribander? The SWR indicator needle is bouncing between zero and 3:1. Rats! Why do these things always happen in the middle of winter?" These were the thoughts that raced through my mind last winter. Some quick checks verified that the problem was one that would require lowering the antenna for inspection. A multitude of reasons prevented that from occurring until warmer weather and vacation time arrived. Meanwhile, I managed as best I could with my faithful 40-meter dipole.

Locating the Problem

My Cushcraft A3 tribander had been comfortably nestled at a relatively low height of 30 feet for almost four years. It performed well when called to serve—until that day in winter. As I later reconstructed the events that led to that fateful day, I recalled that the antenna had worked flawlessly at low power (100-W RF output from the transceiver) and for a short time while operating with 600-W RF output from an amplifier. But it was soon after higher-power operation had commenced that the problem arose.

When the SWR indicator needle first showed me an antenna system problem existed, I performed a couple of quick tests. Ohmmeter checks showed no shorts in the feed-line choke or between the feed-line center conductor and its shield. Swapping the feed lines between the 40-meter dipole and tribander further proved the tribander feed line was in good condition. Visual checks showed no loose connections at the tribander feed point, no antenna elements were missing or damaged externally, and moisture had not invaded the coaxial cable or feed-line choke. I suspected the problem was a "blown trap" and/or a loose connection somewhere on one or more of the antenna elements.

Lo! The Winter is Past ...

Once warmer weather arrived and I had some time to spare, I decided to emulate Quincy, TV's formidable forensic pathologist, and began an autopsy of the tribander. No trap was left unchecked, no screw unturned. The evidence I uncovered pointed the accusing finger at a small, white member of the arachnid family. Indeed, the poison introduced into my antenna system by that eight-legged creature (aka "Archy") was as deadly to the antenna as venom injected into the circulatory system of one of Quincy's objects of attention.

Of what did this poison consist, and where was it injected into the antenna system? Basically, it consisted of grass and dead insects—Archy had a "pack-rat syndrome"—stuffed into the element traps! How did Archy get it into the traps? He entered the traps through the trap drain holes. Archy did have some less-guilty henchmen, too. One antenna element end cap had fallen off, and some wasps had stuffed a few ounces of mud into the antenna element. But the added mud proved to be the lesser of the evils.

A glance at Fig 1 will give you an idea of the extent to which Archy went to provide himself with all the riches of his world. And this is only *one* of the traps! Out of 14 traps on the antenna (a 40-meter dipole adapter with 20-meter traps had been added to the driven element of the A3), half had been stuffed to some degree with insects, grass and webs. The 20-meter trap shown in Fig 1 displays evidence of high-voltage arc-over at one end. A circle of the matted material has been burnt away, and the insulation at the left-hand end of the trap-coil winding has been destroyed.

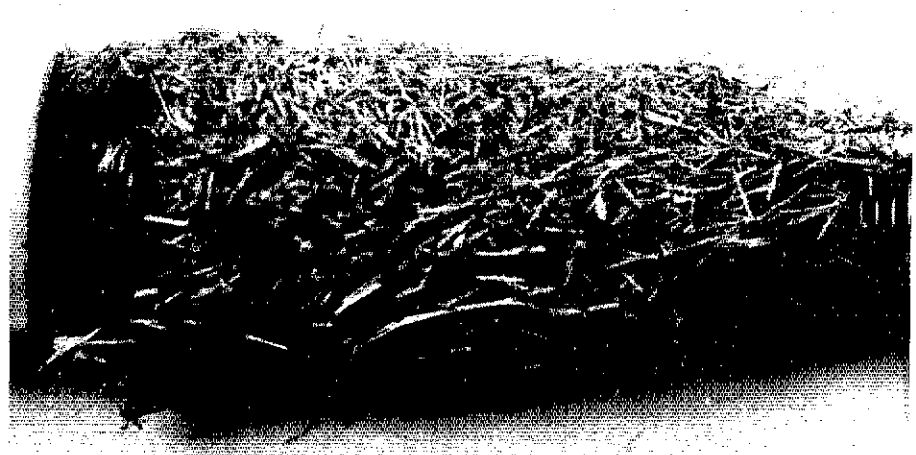


Fig 1—A trap packed with foreign material deposited by a spider. The left-hand end of the trap-coil winding is blackened, and the wire insulation and a portion of the dried material has been burnt.

If your trapped tribander is acting abnormally, perhaps you have similar unwanted components in your traps, or a damaged trap. Set aside a day or two to restore the antenna to its former working condition. You may need to purchase some hardware, too, so plan on that.

Traps

If you've never dissected an antenna trap before, it may seem to be a difficult, if not impossible, feat. I assure you, it is not. The accompanying photographs (Figs 2 and 3) show you what's inside a typical trap. In this discussion, I'm referring to traps such as those found on the Cushcraft A3 tribander. Basically, each trap consists of a portion of the radiating element (acting as one plate of the trap capacitor), some circular spacers and a coil of wire concealed within a cylindrical housing (the outside of the trap) that acts as the other plate of the trap capacitor. The ends of each trap are usually sealed with removable plastic covers. These covers can be slid away from the trap ends. Once the end caps are off, you may see evidence of unwanted material near the trap ends. But even if you don't, *never* assume the trap is clean. The only way you'll be able to definitely know that is to disassemble the trap *completely*.

At one end of the trap you'll find that a circular, insulating spacer is held in place by dimples in the outer shell of the trap. At the opposite end of the trap, you'll see a portion of the cylindrical housing has been cut, bent to make contact with the antenna element and secured to the element, usually by means of a sheet-metal screw. To inspect the interior of the trap, first remove the screw. Did that screw seem to be loose? That's one source of potential trouble.

Now pry the tab of metal upward (a large-bladed screwdriver is a good tool for this work) so that the circular spacer can be pulled past the open end of the trap. Proceed slowly and try not to fracture the metal tab at the bends. (If you do break the tab, all is not lost; I'll discuss that later.)

Pull the interior portion of the trap free of the housing. Clean out all foreign material, inspect the wire winding for signs of damage, and check to ensure that any securing screws are tight. When you're convinced the trap is okay, reassemble it in reverse order. Perform the same procedure for each antenna trap. While you're disassembling the antenna, visually inspect the inner portions of all the antenna tubing to ensure that they are free of foreign material. If there is access to the inside of the tubing, wasps and other insects will often pack it with mud. Replace all missing element and boom end caps.

Hardware

If you should break one of the trap-securing tabs during disassembly, don't fret. Measure the width of the tab and length of the tab cut in the housing. Rotate the trap housing 180 degrees and use a hacksaw to cut another tab on that side. Drill a pilot hole in the tab to pass the securing screw, then place the cleaned and inspected inner portion of the trap within the housing. Push the tab down to make contact with the antenna element (I again used a large-bladed screwdriver to do that) and secure the assembly with the screw.

You should replace all rusted hardware with aluminum, stainless-steel or brass materials. Some "stainless steel" hardware is often partially, or completely, anything

(continued on page 31)

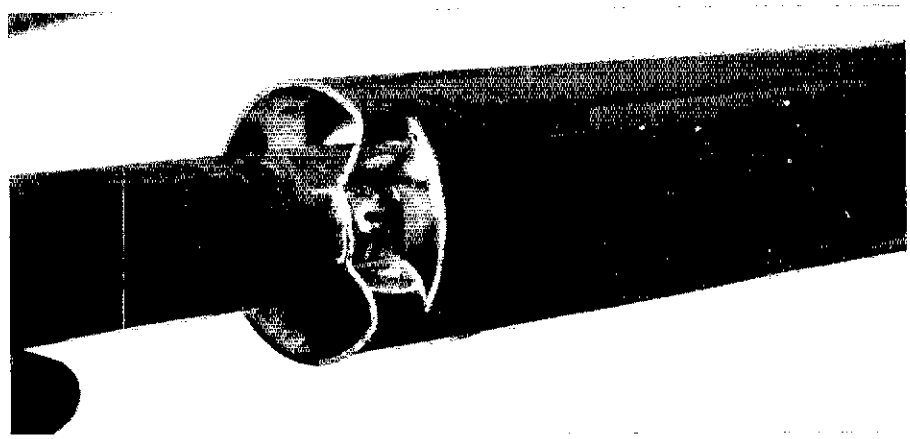


Fig 2—An inside view of one end of a typical trap from the antenna. The plastic end caps have been removed, revealing the method of securing the trap housing to the antenna element and providing electrical contact.

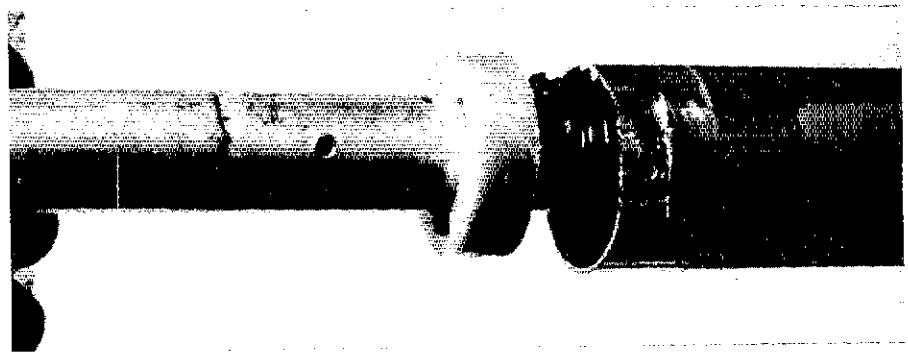


Fig 3—Once the retaining screw has been removed and the trap tab bent away, the inner portion of the trap may be removed from the shell.

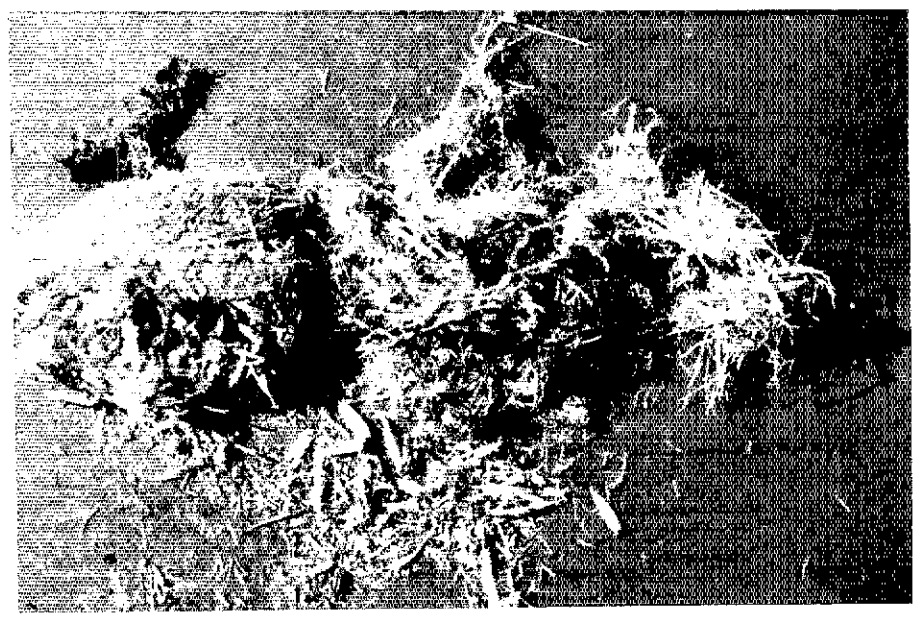


Fig 4—This pile of debris was removed from another trap. As poured from the trap, the pile measures 2 × 5 × 7½ in (HWD)!

Gaining on the Decibel

Part 3: Antennas—Bigger *is* better! Taller, wider and deeper, that's about the size of it.†

By H. Paul Shuch, N6TX
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Previous chapters of this opus have not only succeeded in keeping your humble servant occupied for the better part of a bel, but have generated significant spurious comment within the amateur community. Public response to these articles has indeed been underwhelming, and I am amplified to find myself firmly established as the belwether of a powerful group of gainsayers. However, in reviewing your homework papers from last class session (see Part 2, Case 5), I find myself still about 1 dB shy of achieving my goal of total double-talk. Hence, I am compelled to chime in with this third and final installment.

All seriousness aside, this concluding part of the series explores the numeric gain limitations of practical antennas, documents noise-parameter conversions and presents an actual system-analysis example for your consideration.

One need merely attend the antenna-measuring competition at one of the various regional VHF/UHF conferences to realize how little agreement exists between our fellow experimenters as to what physical antenna attributes produce high gain. The variety of antenna designs on display is staggering, but the successful antennas all have one feature very much in common: They are *large*!

Especially with respect to parasitic arrays (such as the Yagi) and driven arrays (like the log-periodic or collinear antennas), the common wisdom seems to suggest that more elements will produce more gain. In fact, the antenna designs presented in the pages of *QST* do little to dispel this myth. However, consider that the parabolic reflector antenna, which was first developed by Heinrich Rudolph Hertz[10] some 97 years ago, really has only two elements—one driven (the feed), the other parasitic (the reflector or mirror). Or consider waveguide horn antennas. Two physicists at Bell Labs in Holmdel, New Jersey, used one to detect the background radiation left over from the Big Bang some 18 billion years ago. Their horn, with but a single element, had enough gain to "hear" all the way to the edge of the universe, earning Arno Penzias and Robert Wilson (*real* DXers!) a Nobel prize.

A well-known VHFer brought to a recent antenna competition a monstrosity of a 1296-MHz Yagi, 80 elements on a 10-meter boom. The antenna proved every bit as ungainly as it looked, for every time its builder removed a director, the needle on the dB meter went up! Like a taxpayer on April 16, he had passed the point of diminishing returns. Clearly, something besides number of elements determines antenna performance.

It has been shown that for Yagi-type antennas, the primary determinant of antenna gain is boom length.[11] Certainly the number, placement and dimensions of the elements on the boom do contribute somewhat to antenna performance, but given two properly designed antennas, the one with the longer boom will produce the higher gain, even though it may sport fewer elements. What the actual number of elements seems to influence most strongly is factors such as impedance matching and bandwidth.

Yet if longer booms provide higher gain than shorter, why do deep parabolic dishes (with their corresponding short focal lengths) often outperform their shallow, high-focal-length counterparts? The fact is, the primary determinant of antenna gain is not necessarily a physical dimension, but rather an electrical one: effective aperture, often called capture area.

The effective aperture of an antenna determines how much of an electromagnetic wave it will capture in receiving service, or the degree to which it will focus electromagnetic waves in a desired direction in transmitting service. Consequently, effective aperture is closely correlated to antenna gain. It is important here to note that the effective aperture of an antenna is related to both its physical frontal area and its length (or depth). Additionally, antenna gain is influenced by such factors as radiation resistance, impedance matching, efficiency, and the surface conductivity of the driven and parasitic elements. However, with all these factors properly considered, the generalization still holds: Big antennas have the highest gain.

Gain of Parabolic Reflectors

Of the various antennas which the microwave experimenter is likely to encounter, one for which the effective aperture closely correlates to its physical frontal area is Hertz's well-known parabolic reflector, or dish antenna. Thus its gain can be estimated with fairly high accuracy, from its physical dimensions alone.

For a perfect (lossless) parabolic reflector illuminated by an electromagnetic wave of wavelength λ at far-field,[12] the EMF incident upon the reflector's surface varies directly with the diameter D of the reflector, and inversely with λ. The equality is:

$$Av = \frac{\pi D}{\lambda} \qquad \text{(Eq 1)}$$

where Av represents voltage ratio (or gain) relative to an isotropic radiator, and diameter and wavelength are both measured in the same units.

Since we are measuring across a constant impedance (that of free space), the power incident upon the surface of the parabolic reflector varies with the square of the incident EMF. The power ratio is:

$$Ap = \left[\frac{\pi D}{\lambda}\right]^2 \qquad \text{(Eq 2)}$$

To collect this power we place some sort of feed antenna at the focal point of the curved reflector, and the feed illumination in the real world is going to be less than 100% efficient. Power gain for the fed reflector thus becomes:

$$Ap = \eta \left[\frac{\pi D}{\lambda}\right]^2 \qquad \text{(Eq 3)}$$

where η (the Greek letter eta) represents the illumination efficiency factor, a number between 0 and 1. Typical illumination efficiency for commercial parabolic reflector antennas is on the order of 55%, or $\eta = 0.55$.

The last step is to convert to dB, by taking 10 times the common logarithm of power ratio. Parabolic antenna

†Parts 1 and 2 of this article appeared in QST for February and March 1986. This is the concluding part.

[10]Notes and references appear on page 31.

performance is thus:

$$dB = 10 \log_{10} \left[\frac{\eta \pi^2 D^2}{\lambda^2} \right] \quad \text{(Eq 4)}$$

which, with the exception of efficiency factor (which we can approximate), predicts gain purely as a factor of physical reflector diameter.

Converting Noise Units

Frequently we have a need to convert between the various noise units introduced in Part 2 of this series. Although computer programs are readily available to perform the conversions between noise figure, noise factor and noise temperature, the algebra required is relatively trivial and lends itself well to solution with a handheld calculator.

If noise factor F (as a power ratio) is known, convert to noise figure NF (in dB) and equivalent noise temperature T_{eq} (in kelvins) as follows:

$$NF\ (dB) = 10 \log_{10} F \quad \text{(Eq 5)}$$

$$T_{eq}\ (K) = 290(F - 1) \quad \text{(Eq 6)}$$

If you know the noise figure NF (in dB), calculate noise factor F as follows:

$$F = 10^{\frac{NF}{10}} \quad \text{(Eq 7)}$$

and determine equivalent noise temperature T_{eq} from Eq 6.

Given the equivalent noise temperature T_{eq} (in kelvins, or degrees on the absolute scale), the conversion to noise factor F is:

$$F = \frac{T_{eq}}{290} + 1 \quad \text{(Eq 8)}$$

and noise figure NF is found from Eq 5.

It should be pointed out that in all of these conversions, it is assumed that the receiving equipment in question is operating at the standard earth temperature of 290 K. This may not be the case, especially for receivers operating aboard orbiting satellites or other spacecraft. There the operating temperature may be considerably lower, reducing the thermal noise with which the signal must compete. When the actual operating temperature (in kelvins) is known, it should be substituted for the numeric constant 290 in the foregoing conversion equations.

Signal-To-Noise Ratio

Through link analysis, we have seen that the signal amplitude available to the receiver, and the thermal noise power with which it must compete, can be readily determined. The difference between these two quantities, in dB, is variously referred to as RF signal-to-noise ratio (RF SNR) or carrier-to-noise ratio (CNR). Obviously, the decibel value can be either positive or negative, depending upon whether the received signal is above or below the noise level. And remember that we have thus far been considering only the effects of thermal noise at the receiver input circuitry. Any ham who has ever operated in a noisy mobile environment, or in the presence of strong local QRM, is well aware that other external factors can easily impair copiability.

Neglecting the external factors, do these numbers accurately predict the actual signal-to-noise ratio (and corresponding copiability) of the demodulated signal that forms sounds in the headphones or pictures on the CRT? Not exactly! It is well known that, for a given CNR, the readability of AM, FM and SSB signals may differ widely.

One factor influencing recovered (or demodulated) signal-to-noise ratio (SNR) is the bandwidth of the emission. Bandwidth effects, however, can be confusing. For example, the noise improvement which frequency modulation boasts over equivalent amplitude-modulation modes is no illusion—you can observe it any day on the local VHF repeater—and is attributed to the wider bandwidth employed. That is, for signals above the detector threshold, an FM signal that is 12 kHz wide will provide twice the demodulated SNR as an equivalent AM signal of half the bandwidth. That's a 3-dB improvement for using twice the spectrum. But on the other hand, a single-sideband AM signal with suppressed carrier, which uses only 3 kHz of spectrum, will *also* provide a 3-dB improvement in audio SNR as compared to double-sideband AM. And that's a 3-dB improvement for using *half* the spectrum. Confused? Me too!

The full explanation of this paradox is, as we say in the university environment, beyond the scope of this course. But it relates to the distribution of energy in the modulation sidebands, those portions of the signal that actually carry the intelligence. To further complicate matters, various signal-conditioning techniques exist to boost the recovered SNR for a given CNR, for any type of modulation. Examples range from the simple compression of audio employed in speech processors commonly used in HF SSB transceivers[13] to frequency-tailoring circuits (preemphasis and deemphasis) commonly used with FM, to digital signal enhancement and amplitude compandoring techniques currently being explored by a number of experimenters.

The bottom line is that, although an improvement in CNR will result in improved demodulated SNR, the precise relationship between the two depends on the modulation mode, bandwidth and signal-conditioning techniques employed. For a given modulation and demodulation scheme, on-the-air experience will indicate the input CNR required to produce intelligible signals.

System Analysis Example

As this installment is being written, a small group of dedicated microwave amateurs in Colorado is hard at work developing the circuitry to provide an upcoming OSCAR satellite with an S-band downlink. Their projected link analysis is indicative of the very calculations we have been discussing in the preceding sections.[14]

The proposed downlink will operate at a frequency of 2401.33 MHz. You may recall that the operating wavelength, in centimeters, is found by dividing the numeric constant 30 (derived from the speed of light) by the frequency in GHz. Thus, an operating wavelength of 12.49 cm will apply. This information is needed to calculate both free-space path loss and antenna gain.

Unlike the linear translators employed in earlier OSCARs, it is expected that the S-band transponder will operate as a "soft-limiting" FM repeater. Given adequate uplink power, the 2.4-GHz transmitter output power will be relatively constant, at a planned 2 W. Converting to dBm, we have:

$$P_{out} = 10 \log_{10} (2000 \text{ mW}) = +33 \text{ dBm}$$

Plans call for a virtually lossless transmission line connecting the transmitter output to an 8-turn helix antenna, which will radiate a circularly polarized signal while providing an estimated gain of 14 dBi. We can now calculate expected *E*ffective *I*sotropic *R*adiated *P*ower:

$$\begin{aligned} EIRP &= P_{out}\ (dBm) + Ant\ Gain\ (dBi) \\ &= (+33 \text{ dBm}) + (+14 \text{ dBi}) \\ &= +47 \text{ dBm}. \end{aligned}$$

Next we must determine the path attenuation which the downlink signal will experience when propagated between the spacecraft and an earth-bound user. We are interested in free-space propagation (that is, operation when the satellite is above the user's horizon), and we find by analyzing the mechanics of the planned orbit[15] that the maximum communications range (satellite at apogee, user at the edge of the circle of illumination) is on the order of 40,000 km. We now apply the free-space path loss equation discussed in Part 2 of this series:

$$\begin{aligned} \alpha &= 10 \log_{10} \left(\frac{4\pi D}{\lambda} \right)^2 \\ &= 10 \log_{10} \left(\frac{4\pi \times 40{,}000 \text{ km}}{12.49 \text{ cm}} \right)^2 \\ &= 10 \log_{10} \left[\frac{4\pi \times (40{,}000 \times 1000) \text{ m}}{0.1249 \text{ m}} \right]^2 \\ &= 192 \text{ dB} \end{aligned}$$

so the power reaching an isotropic antenna on the earth, when it is directly in the beam of the spacecraft transmitting antenna, will be:

$$\begin{aligned} \text{Received power} &= EIRP - \text{Path Loss} \\ &= +47 \text{ dBm} - 192 \text{ dB} \\ &= -145 \text{ dBm}. \end{aligned}$$

This is a pretty weak signal (on the order of a millionth of a billionth of a milliwatt), so if we hope to receive it, we're going to need a combination of high receiving-antenna gain and low receiver noise. A little luck wouldn't hurt, either.

We can improve the odds quite a bit by employing a parabolic receiving antenna of moderate diameter. If you recall our discussion about factors affecting parabolic antenna gain, you may wonder why I say "moderate," rather than "huge." The answer involves two considerations. First, for a satellite with an orbit not synchronized to the earth's rotation (that is, not "geostationary"), it will be necessary to rotate the antenna in at least two planes to track the satellite as it moves across the sky. The larger the physical antenna size, the greater the mechanical challenge this task presents. Less obvious, but an equally critical factor, is that the beamwidth of an antenna diminishes as its gain increases, making accurate aiming of the antenna all the more difficult. As a first-order approximation,

$$\phi = \frac{\lambda}{D} \qquad \text{(Eq 9)}$$

where ϕ represents the 3-dB beamwidth in radians (not degrees),[16] and wavelength and diameter, as usual, must be expressed in like units.

Let's consider the beamwidth of a parabolic antenna that is 1 meter in diameter, at our intended operating wavelength. From this relationship, beamwidth is found to equal 0.1249 radians, or about 7 degrees. Since a much narrower beamwidth will likely make aiming too critical for the average user, this is the antenna size we will assume.

From Eq 4, we can now calculate the gain of our receiving antenna. Assuming an illumination efficiency of 50% (and this can be readily obtained with a cylindrical-waveguide feed horn fashioned from a 1-pound coffee can), the antenna gain is found to be +25 dBi. The power available to our receiver is thus equal to the sum of incident power plus antenna gain, or −120 dBm. We're now up to a millionth of a millionth of a milliwatt. Unlikely as it may seem, such signal levels are within the sensitivity limits of high-performance receivers.

The current state of the art in S-band GaAs field-effect transistors suggests that a 75 K receiver noise temperature is not unfeasible. Since the proposed transponder will employ narrow-band frequency modulation, a practical receiver bandwidth on the order of 20 kHz is indicated. The resulting thermal noise power, which the desired signal must override at the input of the receiver, is found thus:

$$\begin{aligned} Pn &= kTB \\ &= (1.38 \times 10^{-23})\,(290\text{ K} + 75\text{ K}) \times (20 \times 10^{3}\text{ Hz}) \\ &= 1.0 \times 10^{-16}\text{ watts} \\ &= 1.0 \times 10^{-13}\text{ milliwatts} \\ &= -130\text{ dBm} \end{aligned}$$

Finally, comparing the signal incident to the receiver (−120 dBm) to the receiver's input noise (−130 dBm), we find that the receiver input signal-to-noise ratio is their algebraic difference, or +10 dB. Does this represent enough signal to make bels flash and lights ring? A 10-dB CNR is well above the threshold level for "QSO quality" copy of modern FM detector circuits, and in fact, with proper signal conditioning (preemphasis and deemphasis), can result in an audio signal-to-noise ratio approaching 30 dB. That is, the audio signal power available from the speaker or headphones will exceed the accompanying audio noise power by a factor of a thousand. Clearly, the system performance criteria outlined here will result in usable signals.

Such computations as this example illustrates, although cumbersome, can be utilized to quantify the performance of any electronic communications path. With the proliferation of personal computers in the ham shack, along with the availability of suitable software, system analysis may in time become a routine part of Amateur Radio.

I hope you've found this series of articles destructional, and not overly punderous. If you have mastered the concepts I have presented, you are now in a position to gain considerable notoriety at local ham club meetings. In fact, you should be the bel of the ball!

Notes

[10]Hertz was probably the world's first DXer. He wrote, "As soon as I had succeeded in proving that the action of an electric oscillation spreads out as a wave in space, I planned experiments with the object of concentrating this action and making it perceptible at greater distances by putting the primary conductor (ie, dipole) in the focal line of a large concave parabolic mirror."

[11]Gunter Hoch, DL6WU, "Extremely Long Yagi Antennas," *VHF Communications*, March 1982, p 130.

[12]Far-field considerations were touched upon in Part 2 of this series. For meaningful measurements, the minimum distance between transmitting and receiving antennas is determined by $D >> A / \lambda$, where A represents the effective aperture of the antenna under test, and λ is the operating wavelength (all dimensions in like units).

[13]One well-known contest operator defines the RF speech processor as "a device cleverly designed to disguise your voice so that your own mother won't recognize it."

[14]The specifications used in this example were provided by William D. McCaa, Jr, K0RZ, AMSAT's Coordinator of S-Band Transponder Development.

[15]See Martin R. Davidoff, *The Satellite Experimenter's Handbook* (Newington: ARRL, 1985, Chap 8).

[16]To convert radians to degrees, multiply by 180 and divide by π.

Tribander

(continued from page 28)

but stainless steel. You usually discover that at some inconvenient time! One item I am wary of purchasing is compression (hose) clamps. These clamps are ideal for securing telescoping pieces of antenna tubing, but some compression clamps have screws that are not stainless steel; only the circular band is of stainless steel. I will not purchase any compression clamps unless they are stamped "all stainless steel" on the screw housing.

It's a good idea to clean all metal joints and give them a coating of No-Alox®, Oxiban® or a similar compound before reassembly.[1] This will ensure good metal-to-metal contact at these points.

No Bugs Allowed

How do you keep invaders from entering your newly cleaned traps? Good question. I know of no guaranteed way to do that, but perhaps some aluminum screening taped over the trap drain holes would discourage them. Not having any screening on hand, I decided to try a different approach. I first applied some aluminum duct tape to the supporting mast and at a couple of places on the antenna boom. Over this tape I applied a material known as Tree Tanglefoot; it's a sticky substance used to keep insects from making successful journeys up and down tree trunks and plant stems. (Tanglefoot is available at most garden-material suppliers.) Of course, this measure may not be entirely successful with airborne invaders. The tape was first applied to aid in removal of the Tanglefoot by simply peeling off the tape and Tanglefoot together, should I need to handle the antenna again.

In an effort to reduce the drain-hole size, I covered each hole with electrical tape and scored it with an "X" to allow water to drain. Only time will tell how successful these measures are.[2]

Summary

Armed with this information, you should be better able to handle any difficulties you may have with your trapped Yagi antenna. A bit of time and a few parts may be all you need to get it back into shape again. Oh ... what happened to the desperado who "killed" my antenna? He was observed hastily leaving the scene of the crime during the opening of one of the traps. I, the jury, found him guilty.

Notes

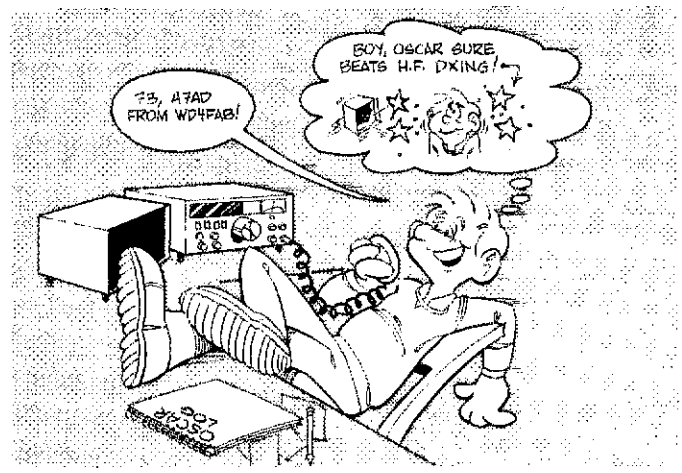
[1]Available from electrical supply houses.

[2]During a later conversation I had with Bob Schetgen, KU7G, ARRL's *TIS specialist*, he suggested surrounding each trap drain hole with a circle of RTV® sealant. The sealant would be used to secure some fiberglass screening over the holes.

Adventures In Satellite DXing

Part 1: Crowded HF bands and marginal propagation got you down? Use the high-flying DX machine to give your spirits a lift.

By Dick Jansson, WD4FAB
1130 Willowbrook Trail
Maitland, FL 32751



Is there such a thing as an impossible dream? Imagine relaxed ragchewing with exotic DX stations on SSB without the congestion found on 20 or 75 meters, all with only 15 watts of RF power. Not possible? Sure it is—just try your hand at OSCAR 10.

Oh sure, here we go again, another lecture on amateur satellites! Hold on there—don't turn the page yet! We are not going to talk strictly about satellites, but about how you can enjoy the fun of operating a super DX machine at a casual pace that won't push your stamina or heart! For example, one recent morning I talked with hams in Texas, Colorado, Antarctica, England, Massachusetts, Grenada and South Africa. All of this occurred when some operators were bemoaning that the satellite wasn't too active. Interested?

This is the first of a four-part series of articles that will show you what satellite operating is all about. This installment will explain what OSCAR 10 is and what it can do for you. In the coming months, we'll take a look at the equipment and antennas for satellite work and show how to assemble them into a station that really plays. Then we'll examine some of the finer points of communicating through OSCAR 10.

Not for Beginners Only

If you think that this discussion is aimed at beginners, you are very right. All of us, even old-timers, are "beginners" at the satellite game at one time or another. Part of the beauty of satellite operation is that there's always something new to learn. Just this year I've picked up some new tricks even though I've been operating amateur satellites regularly since 1977. This form of communication is very different from the HF bands.

As we proceed, I'll try to avoid some of the involved jargon of satellite talk. Where appropriate I'll explain what the terms mean so you'll be able to hold an intelligent conversation with others interested in OSCAR operation. I do highly recommend that every satellite user obtain and read a copy of *The Satellite Experimenter's Handbook* by Martin Davidoff, K2UBC.[1] This fine publication is packed with useful information that ranges far beyond the scope of this *QST* series.

One special term that needs to be explained up front is AMSAT.[2] This is the name given to the Radio Amateur Satellite Corporation, a nonprofit, scientific corporation founded for the creation and operation of satellites for Amateur Radio communications. Over the years, AMSAT has continued to make reliable communications satellites available to the amateur community. AMSAT's paid staff is very small. Hundreds of volunteers support the organization's efforts through donations of time, expertise and money, making possible the superb communications available from OSCAR 10 and other spacecraft.

Every amateur-satellite user should join AMSAT to show their support for the organization and to help with the construction of the satellites we use. AMSAT members receive *Satellite Journal*, a publication filled with useful information for everyone. New members also receive a copy of *A Beginner's Guide to OSCAR 10*, which is full of information helpful to the newcomers and old hands alike.[3]

[1]Notes appear on page 72.

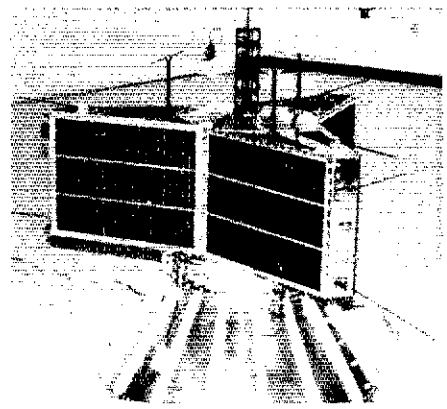


Fig 1—OSCAR 10 is small enough that it can be carried by two or three people. Much of the outer surface is covered with solar panels that will power the satellite for years.

What Is OSCAR 10?

At the risk of boring the more knowledgeable readers, I'll give a short history of OSCAR 10. Some of you may want to skip to the next section.

OSCAR 10 (also called AO-10 for AMSAT-OSCAR 10) is the tenth in a series of amateur satellites. The name OSCAR, for *O*rbiting *S*atellite *C*arrying *A*mateur *R*adio pretty much tells the story. It is a communications satellite designed and built by radio amateurs for the sole purpose of supporting Amateur Radio communications and experimentation. It's very much like the satellites that allow you instant telephone access to relatives overseas and allow you to watch televised events occurring on the other side of the world as they happen. OSCAR 10 receives transmissions from earth stations and relays them back, allowing hams to communicate over great distances without worrying about the whims of ionospheric propagation.

Fig 1 shows OSCAR 10 pretty much as it looks today. Weighing about 200 pounds, this satellite was launched by a European Space Agency rocket in June 1983. Although it is an "amateur" satellite, there is nothing amateur about OSCAR 10's design and construction. It is built to the same high standards as other communications satellites and was subjected to strenuous testing before launch. Historically, amateur satellites have provided reliable service well beyond their design lifespans.

About Orbits

Some of you may have operated through OSCARs 6, 7 and 8. They were in circular orbits less than 1200 miles above the earth.

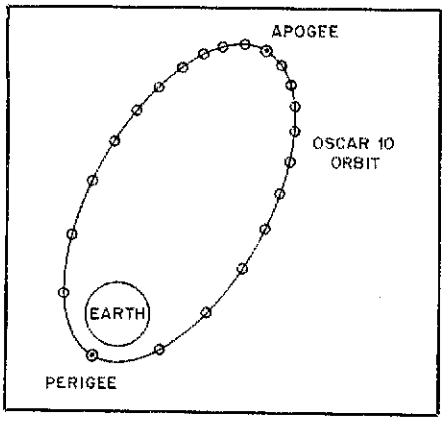


Fig 2—OSCAR 10 was designed for an elliptical orbit to allow it to be in view of much of the Northern Hemisphere for hours at a time. The circles on the ellipse represent the approximate position of OSCAR 10 during each half hour of its orbit. Note that the satellite "slows down" as it nears apogee. It passes through perigee (where it is out of sight of stations in the Northern Hemisphere) rather quickly.

Glossary

AMSAT—the Radio Amateur Satellite Corporation, a nonprofit organization located in Washington, DC has overseen the OSCAR program since the launch of OSCAR 5.
AO-10—AMSAT-OSCAR 10, the 10th amateur satellite in the OSCAR series.
apogee—the point in a satellite's orbit at which it is farthest from the earth.
downlink—the frequency on which signals are transmitted from the satellite to earth.
elliptical orbit—those orbits in which the satellite path traces an ellipse with the earth at one focus.
Mode A—transponders with a 2-meter uplink and a 10-meter downlink.
Mode B—transponders with a 70-cm uplink and a 2-meter downlink.
Mode L—transponders with a 24-cm uplink and a 70-cm downlink.
OSCAR—Orbiting Satellite Carrying Amateur Radio.
pass—that segment of a satellite orbit that brings it in range of your station.
passband—the range of frequencies handled by a transponder.
perigee—that point in a satellite's orbit at which it is closest to the earth.
Phase II—the name given to low-altitude-orbit (less than 1200 miles) OSCARs. Equipped with solar cells, these satellites have lasted for up to five years.
Phase III—the name given to extended-range, high-altitude OSCARs in elliptical orbit.
transponder—a device that receives radio signals in one segment of the spectrum, amplifies them, translates (shifts) their frequency to another segment of the spectrum and retransmits them.
uplink—the frequency on which signals are transmitted to the satellite from earth.

Known as Phase II satellites, these OSCARs provided communications over distances up to about 4500 miles. They were in range of a given point on earth for at most 20 minutes or so during each orbit. Phase II satellites moved quickly, so operators had to work hard to keep their antennas pointed at the "birds." One consequence of these 20-minute passes was that contacts tended to be short, contest-like exchanges of signal report, name and QTH.

Looking for something that would support communications for longer periods over longer distances, AMSAT designers developed a new generation of satellites, Phase III. As shown in Fig 2, these satellites have an elliptical orbit, rather than a circular one. At the apogee, the point in its orbit where it is farthest from earth, OSCAR 10 is about 22,000 miles away. At perigee, when it is closest, OSCAR 10 is about 2500 miles from earth.

In practice, this means that maximum communications distance via OSCAR 10 is more than 10,000 miles when the satellite is at apogee. It is accessible to nearly half the earth! Because the orbit is elliptical, OSCAR 10 is in view of stations in the northern hemisphere for up to eight hours at a time. Being able to work stations half a world away for up to eight hours at a time is my idea of relaxed DXing!

Links: Up and Down

OSCAR 10 carries two linear translators, or transponders. A transponder acts like a typical VHF FM repeater. The basic idea is the same: You transmit to it on one frequency, and it retransmits your transmission on another. There are some major differences, however. Unlike FM repeaters that are designed for nonlinear modes only, OSCAR 10's transponders are linear. They faithfully reproduce all modes, including SSB. The other big difference is that OSCAR 10's transponders cover not just a single frequency, but a whole range of frequencies. This range of frequencies is called a passband; the passband may cover 100 kHz or more. Amateur satellites retransmit every signal heard in the receiver passband, so many stations can use the transponder simultaneously.

The frequency on which you transmit to the satellite is called the uplink, while the frequency on which the satellite retransmits your signal to earth is called the downlink. Uplink and downlink frequencies are on different bands. Various band combina-

(continued on page 72)

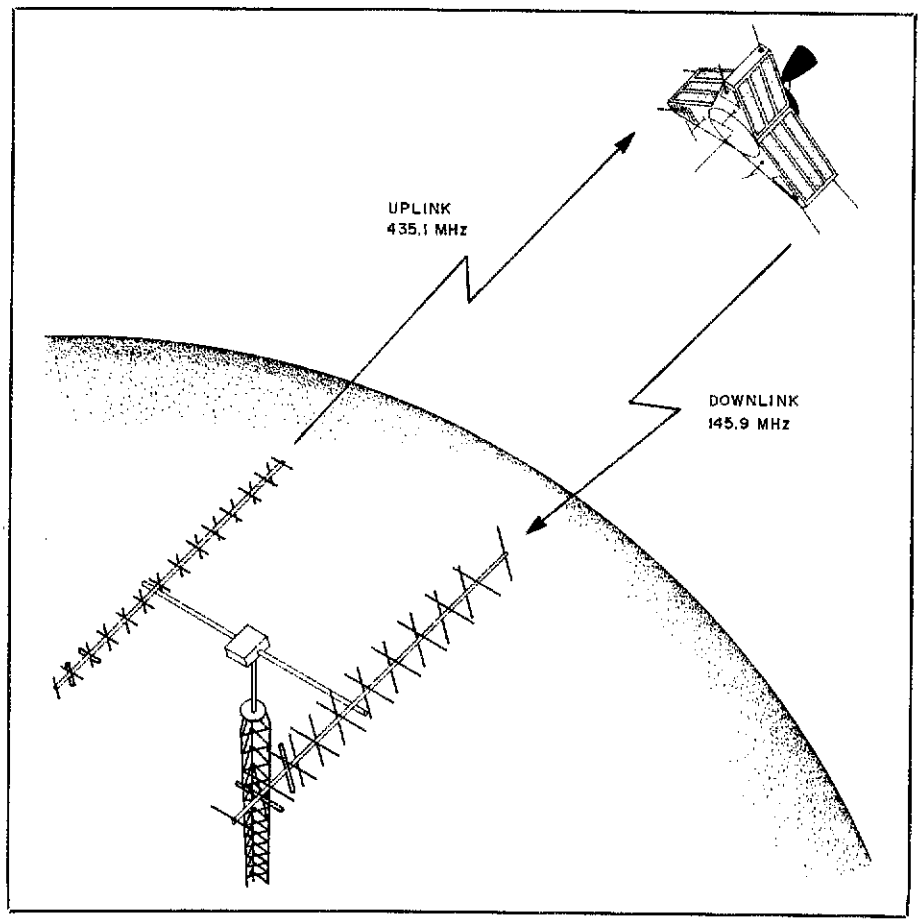


Fig 3—This series of articles will concentrate on Mode-B operation, whereby stations on earth transmit to the satellite on 435 MHz and listen on 145 MHz.

Gravity Gradient Modulation: The Newest Frontier in Amateur Radio

Some radio amateurs are already making inroads into what may well become *the* communications mode of the future.

By David L. Morris, NS5D
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Garland, TX 75042

Communication techniques have changed quite radically over the past few decades. The state of the art has seen mega-spark generators, oscillators turned on and off (CW), full-carrier double sideband amplitude modulation, pulse modulation, frequency shift keying, slow-scan TV and spread-spectrum transmission, and the list keeps on growing. Look at the list, and you can see that radio amateurs have always been at the forefront of the development of new techniques of communicating voice, data and images across vast distances. These techniques almost always find their way into commercial and military communications circuits after a while, but it is important to note that *we* are primary contributors to the state of the art.

When developing a new communications methodology, inventors look at many different problems and attempt to come up with a compromise that will satisfy the main objectives of the new techniques. Here are some of the problems inherent in current single-sideband (SSB) communications: atmospheric and man-made noise, limited bandwidth (2 kHz), variable propagation and distances, and the effects of solar radiation.

Often, when working on new philosophies and designs, it is helpful to expand one's horizons and consider some rather exotic and seemingly impossible options for the new design. With this in mind, some objectives for a new communications medium were set forth:

- fast transmission medium (speed of light)
- good long-distance capability (measured in thousands or millions of kilometers)
- low susceptibility to QRM and QRN
- immense bandwidth (several hundred megahertz)
- low susceptibility to EMP
- constant propagation characteristics and immunity to sunlight variations
- low power consumption consistent with long-distance communications capability.

It can be recognized that these objectives would make for a spectacular communications medium for amateur and commercial as well as military users.

Enter GGM

Can these objectives be attained? Not only can they be reached, but they have been! Amateur Radio station NS5D has for some time now been conducting experiments with a new medium that promises to revolutionize the communications world. The theory and construction of this new communications medium is being published here for the first time, and it is hoped that other amateurs will join in the research necessary to make this new frontier a reality for many others.

Communications have formerly been conducted on various media: smoke, string (and cans), electrical (over wire), sonic (from subaudible to superaudible), electromagnetic and light. Now, finally, an untapped medium can be used: gravity. The new communications technology is called Gravity Gradient Modulation, or GGM. This medium offers all the objectives outlined above. Its effects can be detected across entire galaxies, are relatively constant, regardless of solar illumination or time of day, and are not impeded by electromagnetic noise, such as found on the nighttime 80-meter band.

In order to communicate over gravity, we must be able to generate disturbances (or gradients) in the Earth's gravitational field, and to detect those generated by others. This is similar to the way communications are done on RF media: We turn on and off an oscillator, and we detect the oscillations and turn them into an audible or visual signal. In GGM, the gradients are not in the electromagnetic field, but rather in the Earth's gravitational field. Since these fields encircle the earth and the universe around it, their effects can be detected many light years from the Earth itself, so GGM lends itself supremely to interplanetary communications. This is a benefit that is quite important if amateurs are to continue to be on the forefront of space exploration.

Transmitting

To disturb the gravity field, we simply construct a "transmitter" as shown in Figure 1. This device consists of a microphone, which feeds an amplifier, which is designed to cause changes in a magnetic field. Simply put, the magnetic field suspends a small sampling of antimatter in the vacuum chamber of the MFC (magnetic field containment) chamber. When the magnetic field is changed by modulation of the amplifier, the antimatter shifts its position, thereby causing slight changes in the Earth's gravitational field. By adding a variable frequency oscillator (VFO)—in the range of 100 kHz to several gigahertz—to the circuit and mixing this output frequency with the audio from the microphone, a tunable system that allows

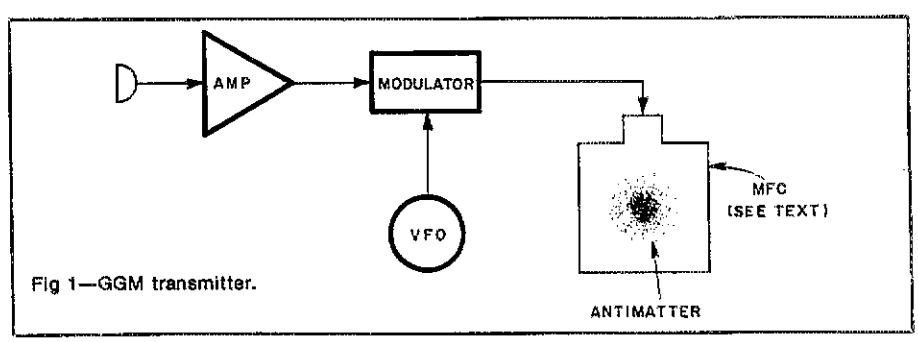


Fig 1—GGM transmitter.

for many communications channels can be designed.

Transmitter power is not measured in watts or kilowatts, as is common practice, but rather in Richter units. A good transmitter—that is, one capable of communicating around the world—should be able to put out about 0.3 Richter. No doubt a number of amateurs will experiment with various QRP levels, just as in RF technology. As in our current SSB world, overmodulation and excessive power can be detrimental to others; thus, a station that continually runs at power levels over 1 and 2 Richter could become a real nuisance to the surrounding neighborhood, not just to other communicators.

Regulation of this new communications medium will probably *not* fall under the jurisdiction of the Federal Communications Commission (FCC), which is really only in charge of RF-based communications technology. Rather, the government agency that is more likely to be concerned is the Department of the Interior. This is because of the amount of physical damage that can be done by improperly tuned transmitters, abusive power and unlicensed antimatter usage. That department has already been contacted and given information on this new communications technique, but no reply has been received from them yet. A national association such as the ARRL would most likely be useful in getting the necessary cooperation from the government and to assist in setting up licensing procedures and operating regulations.

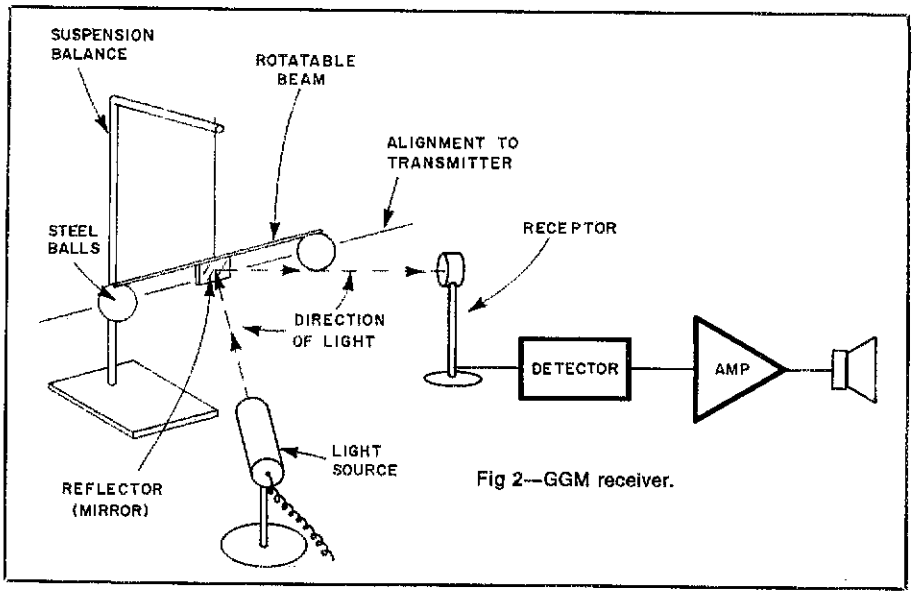


Fig 2—GGM receiver.

Receiving

Receiver technology is also quite different from that employed in RF techniques. The simplest way (as with RF) to get some experience with GGM, and to see if it might be useful to you, is to construct a receiver and listen to some of the stations currently "on the field." (The term "on the field" is somewhat analogous to the RF term "on the air," but since we are not communicating over air waves but rather over gravity fields, the term is different for GGM.)

A GGM receiver is shown in Figure 2. It consists of a suspension balance supporting a rotatable beam with two mass balls of steel or other heavy material. At the center of the beam, where a thread connects the beam to the balance arm, is a small mirror. From several inches away, a light source directs a beam of light onto the mirror, which reflects it onto a detector. The detector measures the deviation of the light beam from a calibrated center position and translates the change into an electrical signal variation, which can be audible or visual, or otherwise decoded. Depending on complexity and sensitivity desired, this light source and detector could be a helium-neon (HeNe) laser light source and liquid-nitrogen-cooled detector, or it could just be a simple high-power LED and phototransistor arrangement.

The actual communication happens something like this: A person speaks into the microphone of the transmitter, causing a change in the magnetic field of the antimatter MFC chamber, thus changing the grativational fields around the chamber. These gravitational disturbances are detected by the receiver, located many miles away, as a small difference in the attraction of the two mass balls to the Earth, since the two balls are a finitely different distance both from the Earth's surface and from the transmitting device. As the gravitational field affects the balls differently, the angle of incidence of the light beam onto the mirror is changed a very small amount, but enough to be detected by the light detector and converted into a change in the output signal, which is coupled to an amplifier and fed to a speaker or headphones.

As with current RF-communications antenna technology, the GGM "Beam" antenna can be rotated to provide some directional characteristics. For example, an antenna that is aligned broadside to the transmitting station will not have the sensitivity (gain) that an antenna would have where the two mass balls were aligned in a direct line with the source of the transmission. The transmitter device does not have a real antenna in the classical sense, and its transmissions are omnidirectional anyway.

A Word of Caution

The only major drawback to the system that has been noted at NS5D is a great need for care in assembling the transmitter device. The receiver is quite uncritical, which makes it an excellent starting point for experimentation. Several complaints from neighbors and the mayor of San Francisco and even a call from the Departimiento Agriculturale y Geologico de Uruguay were received in the early stages of experimentation before a suitable device for measuring Richter units in the transmitter was devised.

Another, smaller problem is that some hams are having trouble locating antimatter. Unconfirmed reports have been circulating that several Air Force bases will be selling antimatter surplus material once it is no longer needed in missile-propulsion research. We can only wait to see if the prices there will be more in line with amateur budgets. For a limited time, however, NS5D will be able to supply 0.025 antigrams of antimatter to experimenters for a nominal fee. Persons interested in this offer should send a suitably constructed magnetic-field containment chamber (as shown in Figure 1) with enough batteries to maintain the field during shipping (this is very important, as an entire UPS truck was destroyed once when the batteries died and the antimatter contacted the walls of the container!).

Conclusion

It is felt by all who have begun experimenting with this new communications medium that GGM is an exciting new frontier that radio amateurs should pursue further. It will undoubtedly have far-reaching effects—on not only the ham community, but the entire world—and the benefits of interplanetary communications far outweigh the possible dangers. Those who are interested should contact NS5D for information on joining TREMOR, an international society of gravity-gradient-modulation experimenters, and getting a subscription to the quarterly newsletter, *Field and Beam*. Please send an SASE if you expect a reply. Additional sources of information on this communications medium can be found under "Einstein, Albert" in any local library.

David Lee Morris, licensed since 1971, has held his Extra Class ticket since 1973. An aviation and space enthusiast since childhood, David is a licensed private pilot and a member of AMSAT, and has been active on many satellites since OSCAR 6. His professional background includes computer systems design and programming, but his first love has always been communications, whether it be voice or data.

Product Review

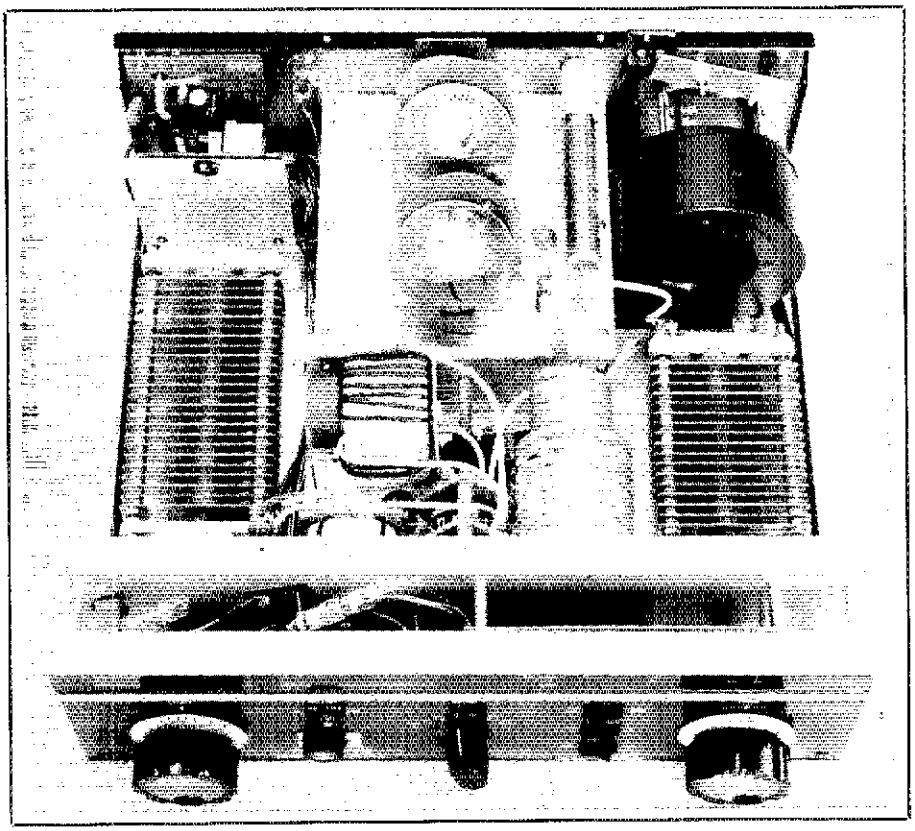
Conducted By Bruce O. Williams, WA6IVC
Assistant Technical Editor

Ten-Tec Model 425 Titan HF Linear Amplifier

Power amplifiers are one of the few products in Amateur Radio that you can "buy American" and still choose from almost every available model. Ten-Tec, operating from the heart of the "Tennessee Technology Corridor" offers up the Model 425, the Titan, for your consideration.

According to Greek mythology, a titan was one of a race of giant gods. Webster's says a titan is "one that is gigantic in size or power." Given this definition, the Ten-Tec Titan has a tall reputation to live up to.

The "gigantic power" part certainly applies. The Titan uses a pair of EIMAC 3CX800A7 high-mu triodes to deliver more than 1500-W output on the 160- through 10-meter amateur bands. It is rated at 1000-W output, continuous duty, for RTTY or SSTV operation. Features include a vacuum relay for QSK, a pi-L tank circuit for excellent harmonic suppression and a ducted forced-air cooling system using a centrifugal blower for quiet, cool operation. But, "gigantic size"? Not exactly. Thanks to a separate power supply, the Titan RF deck is a relative lightweight that takes up about as much bench space as a transceiver.



Inside the RF Deck

One of the first things you notice upon removing the RF deck lid is that the tubes are so small for the performance they deliver. Don't let the looks fool you; each 3CX800A7 offers 800 W of plate dissipation. The tubes are mounted on a 2-3/8-inch-high subchassis along the center of the rear wall of the amplifier. The blower draws air through slots in the sides of the cabinet and blows it directly into the subchassis that supports the tubes. The only way for the pressurized air to exit is through slots cut directly below the tubes. Neoprene chimneys direct the airflow through the 3CX800A7 anode coolers, and duct the warm air out screened holes in the cabinet top.

A tuned input circuit is used to provide best linearity and drive characteristics. The input circuitry is mounted on a PC board underneath the subchassis that holds the tubes. Input band switching is accomplished by a rotary switch that is mounted on the board and driven by an extension shaft from the main band switch. Another PC board for the ALC and bias circuitry is also located under the tube subchassis. Access to these PC boards and to the tube sockets is provided through a panel on the bottom cover.

The band switch, a heavy-duty three-section ceramic model, offers eight positions. There are two 160-m positions, separate 75- and 80-m positions, and one position each for 40, 20, 15 and 10 meters. The low bands rate two positions each to switch in different amounts of fixed loading capacitance for best operation over the entire band.

The tank circuit, a pi-L network on all bands, features a 300-pF air-variable capacitor for tuning and a 500-pF air variable for loading. Various fixed-value, transmitting type doorknob capacitors are switched in parallel with the loading capacitor for operation on the different bands. An additional 400 pF is switched in parallel with the tuning capacitor for 160-m operation.

A somewhat unusual feature of the Titan is that low-capacitance doorknob capacitors are switched in *series* with the tuning capacitor on 20, 15 and 10 meters to *lower* the overall tuning capacitance. This is how Ten-Tec gets around the "touchy tuning" problems that many amplifiers suffer on the higher bands because the minimum capacitance of the tuning capacitor is too high (which raises the Q). The Titan's tuning is as broad and smooth on 10 meters as on the other bands.

The pi inductor for 40-10 meters is wound from silver-plated, ¼-inch copper tubing. A toroidal inductor is added for 160 and 75-80 meters. The L coil is a single, tapped toroidal inductor.

As supplied from the factory, the Titan will not operate on 10 meters. If you send a copy of your amateur license to Ten-Tec with the warranty registration card, however, they will send you a sheet showing how to make the simple 10-meter modification. Basically, this

Ten-Tec Titan Model 425 HF Linear Amplifier, Serial No. 00268

Manufacturer's Claimed Specifications	*Measured in ARRL Lab*
Frequency coverage: 1.8-2.0, 3.0-4.7, 5.0-8.0, 9.0-15.0, 18-22 MHz (24-30 MHz for export model).	As specified.
Power output: 1500 W SSB or CW, 1000 W continuous RTTY and SSTV.	See Table 1.
Drive power required: 80 W typical for 1500-W output.	See Table 1.
Efficiency: 50-65%, depending on frequency, drive level and load.	See Table 1.
Distortion: −35 dB from 1-kW output level.	Not measured.
Harmonics and spurious emissions: −50 dB, typical.	See Fig 1.
Primary power requirements: 220-250 V ac at 20 A maximum.	As specified.
Color: Gray.	
Dimensions (height, width, depth): Amplifier, 5.25 × 15.25 × 15 in. Power Supply, 8.25 × 13.4 × 10.25 in.	
Weight: amplifier, 17 lb; power supply, 45 lb.	

Table 1
ARRL Laboratory Measurements
Ten-Tec Titan Model 425 HF Linear Amplifier, Serial No. 00268

Band (MHz)	Plate Current (A)	Plate Voltage (V)	Power Output (W)	Drive Power (W)	Input SWR	Efficiency† (%)
1.8	1.2	2100	1500	59	1.3:1	57
3.5	1.05	2120	1500	60	1.9:1	64
7.0	1.0	2200	1500	49	1.3:1	66
14	1.1	2150	1500	52	1.6:1	61
21	1.07	2150	1500	50	1.5:1	63
28	1.15	2150	1500	70	1.2:1	58

†Efficiency = $\frac{\text{(Output Power} - \text{Drive Power)}}{\text{Input Power}}$

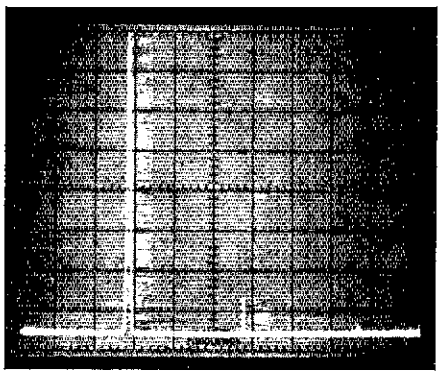


Fig 1—Worst-case spectral display of the Ten-Tec Titan Model 425 HF linear amplifier. Power output is 1500 W at 14 MHz. Horizontal divisions are each 5 MHz; vertical divisions are each 10 dB. All spurious and harmonic emissions are at least 66 dB below the fundamental output. The Titan meets all current FCC spectral purity requirements.

operation involves loosening collars on the band-switch and loading-capacitor shafts and shifting the position of mechanical stops that limit the movement of these two controls. Once the cover is removed, the whole operation can be completed in less time than it took you to read this paragraph.

The review Titan was produced early in 1985, well before 24-MHz (12-m) band operation was authorized for amateurs. Our review model sort of worked on 12 meters with the band switch in the 10-meter position. The performance was far inferior to that on the other bands, however. A call to Ten-Tec revealed that a modification for improved 12-meter operation is being built into all units currently in production and that the factory would retrofit our older unit without charge.

Control Circuitry

Ten-Tec has built some nice features into the Titan to help protect your investment. Most noticeable is the three-minute delay you must endure while the 3CX800A7 heaters warm up. During the warmup period, it's impossible to place the Titan in the transmit mode. You must stand by until the red WAIT light goes out and the green OPERATE light comes on. Although this delay might be annoying, it's absolutely necessary to prolong the life of those expensive tubes.

When the cover is removed, a microswitch cuts power to the coil of the control relay that energizes the power-transformer primary, and a shorting bar falls across the high-voltage connector. These two features make it difficult to hurt yourself if you remove the cover before making sure that the high voltage is removed.

The front panel features two analog meters, as well as two LED displays, to allow you to monitor several parameters at once. The meter on the left is a dedicated 1.5-A plate-current meter. The meter on the right is a multimeter that can be switched to display grid current, plate voltage, forward power and reflected power. In use, the forward- and reflected-power meter readings closely tracked those of a Bird Model 43 wattmeter.

Any analog meter movement is a bit slow for accurately tracking voice peaks, so Ten-Tec included a row of LEDs on the right side of the front panel to display peak output power. Calibration points are 100, 500, 1000 and 1500 W, and we found the readings to be 100 to 200 W higher than those recorded on a Bird digital peak-reading wattmeter. Nevertheless, this display is a useful feature, and the flashing LEDs are reassuring for those operators who like to see the meters fly on voice peaks.

The fourth indicator is the red OVERDRIVE LED. This one lights up if you exceed the 120-mA, safe grid-current rating specified in the manual. This feature is especially handy on SSB because the analog meter is too slow to track the peak grid current. The manual is clear on use of the OVERDRIVE light: "If this indicator is flashing under voice modulation, regardless of what the grid current meter reading indicates, *reduce drive immediately.*"

CW operators will like the Titan's QSK feature. You can use the Titan in a 1500-W full-break-in system if your exciter is up to it. A Kilovac vacuum relay handles the output RF switching chores, and a PC board full of components sequences the TR switching events in the proper order. To prevent damage to the relay contacts from hot switching, protective circuitry senses the presence of RF on the amplifier input and will not switch the TR relays if more than 100 mW is present.

Power Supply

A rather plain box houses the Titan power supply. This unit is intended to reside, unseen, under your operating bench. The front panel is blank. The rear panel sports two fuse holders, a ground lug, a short primary power cord, and a multipin connector and a high-voltage connector for interconnections to the RF deck.

The power-supply interior is just as businesslike. A 1.8-kVA CCS, tape-wound Hypersil® power transformer dominates the interior. Secondary windings include 13.5 V for the 3CX800A7 filaments, 28 V for the relays and control circuitry, and a high-voltage winding switchable between 1370 V and 1920 V for high- or low-voltage operation. The full-wave bridge rectifier for the high-voltage supply, consisting of strings of individual 1000-PIV devices, is contained on a PC board along with most of the control circuitry. Filtering is accomplished by eight 400-μF, 450-V computer-grade electrolytics connected in series for a total filter rating of about 50 μF at 3.6 kV. The filter capacitors and their bleeder resistors are mounted on the power-supply PC board.

Ten-Tec included several protective features of note. The power supply features a primary interlock switch and a high-voltage shorting bar, actuated by cover removal, identical to those in the RF deck. The primary circuitry incorporates resistors to limit the inrush surge current through the diodes at turn on, as well as a relay that automatically switches the protection out of the circuit after a short interval. Following EIMAC recommendations, Ten-Tec has included a 10-ohm, 25-W resistor in series with the B+ line to limit current to a safe value in case of a high-voltage short circuit.

According to the front-panel meter, the power supply delivers about 2450 V in the high-voltage mode and about 1700 V in the low-voltage mode under no-load conditions. These drop to about 2150 V at 1500-W output in the high-voltage position, and 1500 V at 1000-W output in the low-voltage position.

The Titan Arrives

Our Titan arrived in three cartons—one each for the RF deck, power supply and power transformer. The transformer is shipped separately to minimize the potential for damage during handling. During initial inspection, we found three problems with the RF deck. When we first opened the box, we noticed that the two plastic trim pieces that mount on either side of the front panel had broken off. In addition, neither of the vernier drives for the output tuning or loading capacitors worked properly. Both slipped and exhibited excessive backlash, making amplifier tuning impossible. More serious, a cover-off inspection revealed that L4, a toroidal inductor in the output tank circuit, was floating loose near the high-voltage points. The head of one of the nylon screws that secure L4 had broken, allowing the inductor to come free from its mount. We replaced the nylon screw with a brass screw; problem solved! This experience reaffirms that it's good practice to look inside any power amplifier or high-voltage power supply before using it for the first time after shipment. A problem such as we found could be dangerous.

We contacted the selling dealer for warranty repair information. We found out that Ten-Tec handles these repairs at the factory, so we called for authorization and returned the unit directly to them. They repaired the unit without charge, and it has performed perfectly since then.

We believe that the problems we experienced were caused by rough handling during shipment. Even so, the factory took care of everything for us promptly and without complaint. It's easy to see why Ten-Tec enjoys a reputation for exceptionally good customer service!

Hookup

Installation of the power transformer takes

less than half an hour. First, unpack the power supply and unbolt the transformer from its shipping container. Remove the 20 screws that secure the power-supply cover and lift the cover off (this move takes a little finesse to clear the lips on the bottom edge of the cover). Clear the cabling out of the way and lower the power transformer into the power-supply case. Bolt the transformer in place, join two sets of multipin connectors, replace the top cover, and you're in business.

Ten-Tec supplies a 234-V, 20-A power cable plug. An amplifier in this class draws 15-20 A from a 234-V line; at 117 V, the requirement is a whopping 30-40 A! Accordingly, the manual says that 117-V operation is *not* recommended, and gives no information on converting the power supply for 117-V use. Take the hint and run a 234-V, 20-A line to your station before purchasing an amplifier such as this.

Interconnecting the Titan with the rest of the station is easy. Ten-Tec supplies all the control cables. The manual offers several configurations, depending on whether you want to use conventional VOX or PTT operation, CW QSK or fast VOX, or set up to switch between these two keying options.

Operation

I enjoyed using the Titan during the 1985 fall operating season. In addition to routine operating, I used it during the CQ World Wide DX Contests, the ARRL November Sweepstakes and the ARRL 10-Meter Contest. It was perfectly content loafing along at 1500-W output on SSB or CW for hours at a time. Tuning is exceptionally smooth, even on 10 meters. As long as the procedure outlined in the manual is followed, tune-up is a snap.

The amplifier never complained under any operating conditions. In fact, the first time we tuned it up in the ARRL Lab for measurements, we increased the drive too quickly and accidentally drove the Titan to more than 2000-W output into the dummy load. It didn't even flinch.

According to the manual, the Titan is rated for 1000-W continuous duty on RTTY and SSTV. Ten-Tec recommends using the low-voltage power-supply setting for best efficiency. The hardest test I put the amplifier through was the Worked All Europe RTTY Contest. During this event, I operated the amplifier at between 700 and 1000 W for the better part of a weekend. The Titan took on this task without complaint, and kept on working perfectly and efficiently long past the point where lesser amplifiers would have given up. Best of all, at this output power level the drive required is only 40 to 50 W, so the exciter can run cool at half power.

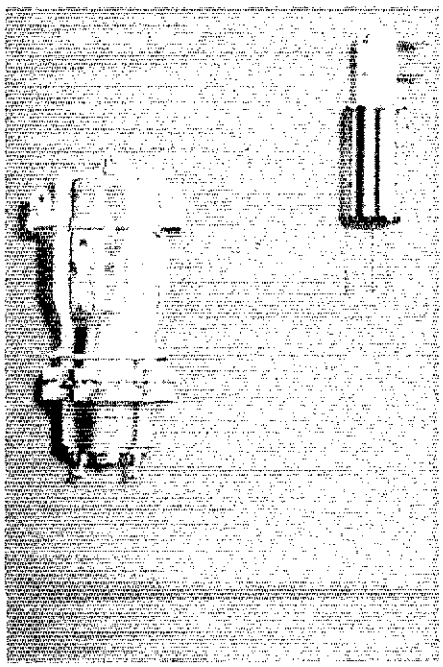
Those CW operators who use QSK will enjoy the Titan's break-in capability. The review amplifier proved to be a good match for a Kenwood TS-940S transceiver; I had no problem making the two units QSK together.

There's one caveat: It's necessary to keep an eye on the grid-current and the OVERDRIVE indicator. As the manual explains, "It is imperative that the RF drive power always be adjusted to a level appropriate for the way the amplifier has been tuned up. Grid current falls off rapidly when drive is too low, and soars abruptly when drive power is too high." This behavior is characteristic of the 3CX800A7 and other high-mu triodes. They offer legal-limit output for relatively low drive levels, but the grid is capable of dissipating only a few watts. It's highly unlikely that you'll hurt the tubes with excessive plate current, but the grids are another story. If you have a typical transceiver capable of delivering 100 W (almost twice the power required to drive the Titan), you must follow the manufacturer's tune-up instructions carefully and keep a watchful eye on the grid-current meter. Properly treated, these tubes could well last you for your entire amateur career. Mistreat them, and in short order you'll be writing out a check for more than $500 to your favorite tube supplier.

The Titan is a fine amplifier in every respect. It is rugged and reliable, yet operation is smooth and easy—like a finely tuned sports car. There is still plenty of reserve horsepower, even when it's operating at the legal limit. Coupled with Ten-Tec's outstanding after-sale customer support, these features make the Titan a serious contender for your dollars if you're in the market for a linear amplifier.

Price class: $2685. Manufacturer: Ten-Tec, Inc., Highway 411 East, Sevierville, TN 37882, tel 615-453-7172.—*Mark Wilson, AA2Z*

New Products



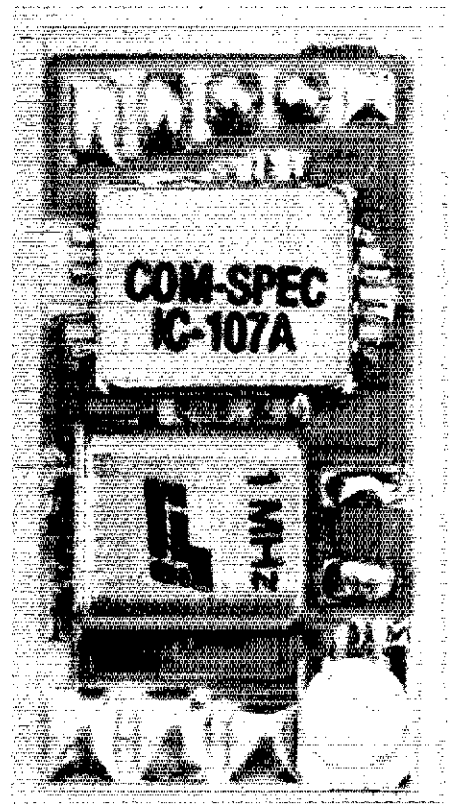
KILOVAC CORPORATION RELAY CATALOG

☐ Kilovac Corporation has published an eight-page, condensed catalog on their expanded line of high-voltage relays. A primary feature of the catalog is the introduction of a family of miniature ceramic vacuum relays. Available in a variety of fail-safe and latching configurations, the relays offer voltage isolation to 10-kV dc and carry currents of 15-A dc or 60-Hz ac.

The catalog contains applications notes, specifications, product photographs and a simple product-selection table. For your copy, contact Kilovac Corporation, PO Box 4422, Santa Barbara, CA 93103, tel 805-684-4560. —*Paul K. Pagel, N1FB*

COMMUNICATIONS SPECIALISTS SS-32 HB CTCSS ENCODER

☐ This small encoder (claimed to be the smallest in the industry) measures only 0.15 × 0.5 × 1 in (HWD). The unit may be programmed for any of the 32 standard subaudible tone frequencies by bridging solder pads on the PC board. Price class: $30. For more information, contact Communications Specialists, Inc., 426 West Taft Ave, Orange, CA 92665, tel 1-800-854-0547, or 714-998-3021 from California. A free catalog is available on request.—*Paul K. Pagel, N1FB*



Hints and Kinks

Conducted By Bob Schetgen, KU7G
Assistant Technical Editor

KEYS AND KEYERS

Here are a few items especially for the CW operator. Most of us normally refer to the entire mechanism of a paddle key with the term "paddle." This makes reference to the various components of the key difficult. Therefore, I have adopted some restricted definitions for these particular contributions. The terms "key" and "paddle key" refer to the entire keying mechanism. "Paddle" however, denotes the actual finger grips and the arms to which they are attached. The "armature" is a semicircular piece of metal to which the paddles, contacts and spring are attached. There are two armatures (one for dot and one for dash) on a key.

Inexpensive Paddle-Key Covers

☐ I find that the thin plastic covers (about 4½ inches square) used on plastic strawberry and cherry-tomato baskets make excellent covers for Bencher paddle keys. If you cut a slot in one side to fit over the paddles, you need not remove the cover to operate.—*Dick Randall, K6ARE, Livermore, California*

☐ Dust—the enemy of all precision electronic equipment. For those operators who use paddle keys, a small plastic bag is a fine way to keep dust off the key. Slip the complete key into the bag. For added convenience, leave the paddles exposed; this keeps the key covered, and the cover need not be removed to operate. Plastic bags are made in various sizes. I prefer soft-textured plastic bags for use as key covers.—*Paul Smolarz, WA2HYY, Rego Park, New York*

A Modification for HAL "FYO" and Some Bencher Keys that Prevents Accidental Paddle Dislocation

☐ Both the HAL "FYO" and Bencher BY-1 and BY-2 keys are variations of the same basic paddle-key design. They are excellent keys but have one major shortcoming: They tend to fly apart if bumped the wrong way. That is, if a paddle is moved in a direction contrary to normal keying, the armature of that paddle can swing free of two of its three point-contact bearings. The operator must then carefully reposition the armature on the bearings.

Bencher solved this problem in later units by drilling a hole in each moving armature. Through each of these holes they pass a small screw that threads into holes in the armature support (the piece resembling a very thick circular washer). The holes in the moving armatures are large enough to permit the screw body to pass through without contacting the armatures. When the paddles are bumped, however, the armatures dislodge only slightly before they come into contact with the screw heads, which limit further travel and keep things from flying apart.

Once I saw this clever solution, I looked for some way to apply this concept to my old HAL key. I was very reluctant to drill even small holes in the armatures of my HAL key, however, as this might weaken them. Hole alignment might also be a problem, so I looked for another method to accomplish my goal. It occurred to me that a screw mounted vertically, directly opposite the needle-bearing points and tapped into the key base, would accomplish this by restricting the armature movement. This proved true, and the modification is a complete success.

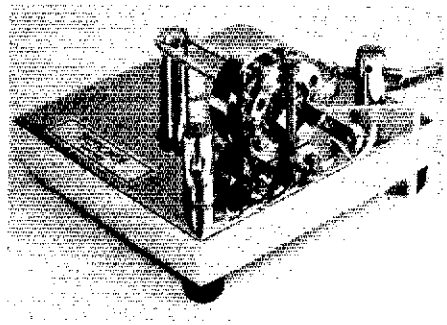


Fig 1—A Bencher paddle keyer with a no. 6-32 screw placed per W5XW's modification. (This key is shown for reference only. It is from the ARRL lab and already has armature-retaining screws—the lowest screw on the face of each armature. One paddle has been removed so that the new screw can be more easily seen.)

To begin the modification, hold a no. 6-32 × 1½-inch screw tightly against the paddle side of both armatures at the center (near the bearing points; see Fig 1). With the screw contacting the base plate, give the screw a very light tap with a hammer to mark the baseplate surface for drilling. Remove the spring and armatures from the key. *Do not drill exactly in the center of the screw mark,* as the screw would then bind against the armatures, but rather offset the drill to the outer radius of the mark to provide clearance between the armatures and screw. Drill a no. 35 (0.110-inch) hole in the key base and tap (no. 6-32) it to a depth of 3/8 inch. After remounting the spring and armatures, thread the screw into the hole. On my key, the armatures still had a slight tendency to dislodge at the tops by displacing the screw, laterally. This was resolved by threading a small spacer up under the screw head, where the larger diameter of the spacer blocks forward movement of the armatures completely. A single no. 6-32 hex nut under the screw head would also be adequate. After mounting the screw, it may be necessary to bend it slightly for exact alignment at the armature top.

I do not have an early Bencher key for inspection. The Bencher and HAL are so similar, however, that this modification, or a slight variation, should be applicable to Bencher as well as HAL keys.—*Robert G. Wheaton, W5XW, San Antonio, Texas*

Reed-Relay Keying for the Accu-Keyer

☐ Several years ago, I built the Accu-Keyer.[1] As it has served me well, there is no way that I would part with it. So, when I replaced my Kenwood Twins with one of the new solid-state transceivers that uses a positive keying voltage, some keyer changes were needed.

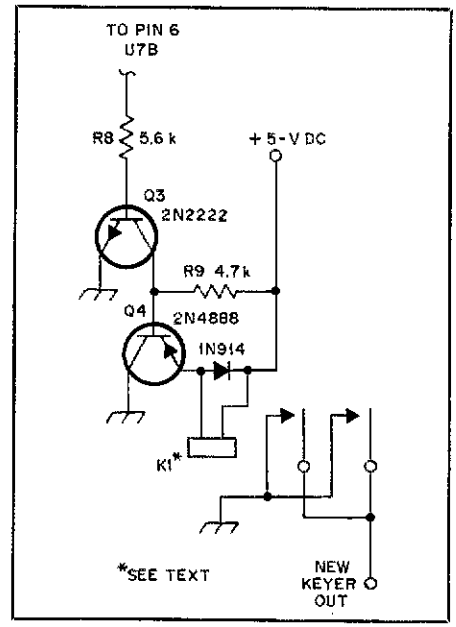


Fig 2—The output stage of the Accu-Keyer with a reed relay added for keying transmitters with either negative or positive keying logic. For complete details of the Accu-Keyer, see the reference in note 1.

The Accu-Keyer is designed to key negative voltage only. The options available included changing the final keying stage, adding an inverter, or adding a complete separate stage. None of these suited me as possible Field Day use of the keyer meant that it should be capable of keying both negative and positive voltages. It would be undesirable to provide separate outputs for each keying logic as Murphy has a way of crossing things up. Fig 2 shows my solution. Total cost of the modification is less than $2, and the time required is less than one-half hour.

I merely replaced the 470-Ω resistor in the emitter lead of the output transistor with the winding of a reed relay. The collector of the transistor is then grounded. Coil resistance of the Radio Shack no. 275-228 relay is 180 Ω.[2] This allows a current of 28 mA to flow (the transistor can handle more than half an ampere). Drain on the power supply is minimal. The relay contacts are wired in parallel to minimize the effects of contact bounce. The relay contact rating is 10 volt-amperes at 200 V, maximum. This circuit modification works fine for me, however, I am not capable of testing it at more than

[1] J. M. Garrett, "The WB4VVF Accu-Keyer," Aug 1973 *QST*, pp 19-23.

[2] The current Radio Shack catalog does not list this relay. It does list no. 275-232, which is a 5-V dc, "low current" relay with 1-A, 125-V ac contacts. No. 275-232 should be suitable for most transmitters. Digi-Key Corporation, PO Box 677, Thief River Falls, MN 56701, carries several reed relays that should be suitable. In particular, no. Z627-ND is a 5-V dc relay that can switch up to 300-V dc or 2 A (50 W maximum).

about 25 WPM.—*David E. Warnick, WA3MKB, Spring Grove, Pennsylvania*

An Accu-Keyer Using "LS" Series ICs

☐ I just finished assembling the WB4VVF Accu-Keyer. This is by far the best keyer in my experience. I did not know how bad my sending was until I tried the automatic-character-space feature.

My version of the keyer uses low-power Schottky (LS) ICs. The required changes are minor, while the current consumption is about 20% of that with standard TTL parts. A simple plug-mounted dc supply from Jameco is adequate to power the LS version. The circuit changes are as follows:

1) The SET lines (pins 4) of U4A and U5A must be connected to +5-V dc, which is available at pin 14 of each IC.

2) 22-kΩ pull-up (to +5-V dc) resistors are needed at U1A, pin 1; U2C, pin 9; U7B, pin 5 and U5B, pin 13.

These changes are needed as unused LS inputs float in the linear region.

It should be possible to make similar changes in the memory circuits. The LS123 will require component changes to preserve the timing relationships. The LS90 may be hard to find as it wasn't often used in industry (because of the odd supply pinouts).—*Steve Lund, WA8LLY, Santa Rosa, California*

A POOR HAM'S COR AND TIMER CIRCUIT

☐ While trying to put a 10-m remote-base station on the air using some less-than-state-of-the-art, middle-1950s, vacuum-tube base stations, I needed a COR (carrier-operated relay) and timer circuit. During a search through old Motorola and General Electric manuals of that thoriated-tungsten era, I found a circuit that used vacuum tubes, but it called for a relay costing nearly $60! I am basically cheap and thought that there *had* to be a better (not to mention cheaper) way. After some experimental work, I arrived at a design that incorporates the following features:

- Easy construction—with available parts
- Compatibility with either vacuum-tube or solid-state gear
- Built-in variable-length timer
- Automatic timer reset
- No timer reset until carrier drops
- Low current drain
- Adjustable threshold level
- Wide supply-voltage range
- Costs less than $10

The circuit uses only two ICs and one transistor to accomplish all of this. The heart of the unit is a LM339 Quad Comparator. Only two of the four comparators are actually used. Fig 3 is a schematic of the COR circuit.

Circuit Operation

A very small portion of the voltage from my 10-m-receiver squelch circuit is sampled across R1 and R2. The sample is fed (via the wiper on R2), to pins 4 and 10 of the LM339. Those pins are the inverting inputs of two different comparators. R3 and R4, which are connected to pins 5 and 11 set the reference level at which the comparators toggle. The values given are correct for my 1959 Motorola "Compa Base Station." You may need to juggle the values to get reliable operation with another radio. When a carrier appears and drives the squelch switch into conduction, both comparators toggle, driving pins 2 and 13 low. When this occurs, two things happen: (1) U1B turns Q1 off, allowing the voltage at pin 4 (RESET) of the NE555 to approach the supply voltage and (2) U1A triggers the '555 (pin 2) via the differential network (C1 and R7). Once triggered, the timer instantly discharges C3 and drives the output (pin 3) high, pulling in the relay. The relay remains on until either: the voltage at pins 6 and 7 of the '555 reaches approximately ⅔ of the value of the voltage on pin 8 (time out) or pin 4 (RESET) is driven low. The NE555 is reset only when the signal from the receiver disappears, causing the comparators to again toggle and turn Q1 on. This feature is important so that, once time out has occurred, the timer cannot be retriggered until the signal disappears and then returns. The diode (D1) across the relay serves to protect the NE555 while the relay is in transit from on to off.

Construction

I highly recommend use of a regulated power supply so there will be no voltage variations on either the comparators or the timer. Use a low current relay, as the '555 output is limited to around 200 mA. Also, use a quality tantalum capacitor for C3: An electrolytic of that value would have too much leakage current for this circuit. The values shown give a time constant of about 2¼ minutes. If you desire a different time constant use the formula:

$$T = R9 \times C3 \times 1.1 \qquad \text{(Eq 2)}$$

where
R is in megohms
C is in microfarads
T is in seconds

Construction details are left to the individual builder. I built my circuit on one of the experimenter's boards sold by Radio Shack®. The LM339, NE555, 2N2222 and most of the other parts are also available at Radio Shack. No particular caution is needed during construction. Simply observe the polarity of C3 and the power supply.

After the circuit is assembled, check for solder bridges, and apply dc power (5 to 15 V). If you want to check the timer, observe a clock or watch and momentarily short pin 1 to pin 2 of the '555. The relay should pull in and remain that way until the '555 times out. Attach the unit to your receiver and adjust R2 until the relay just drops out. If you have access to a calibrated signal generator, you may juggle R1, R2, R3 and/or R4 to achieve the toggle point you desire. In my particular unit, however, the COR toggles just as the squelch opens (when the receiver squelch is set to just barely past the threshold). The COR is adjustable from about 0.15 μV input to about 0.35 μV input. (20-dB quieting is about 0.22 μV in my receiver.)

The complete circuit has been in daily operation on the WA6MBP remote base for nearly a year now with not one failure. After installing it, I did make one small change. The spike created when the relay released sometimes toggled the comparators. This was corrected by using a well-regulated supply and generously by-passing both ICs.

It is always fun to build something from "scratch" and make it work, especially if you get *exactly* what you want and save money to boot! If you're like me, you can find nearly all the necessary items for this project in your junk box. Even if you purchase everything new, the cost shouldn't exceed $10.—*Jerry D. Arnold, WA6MBP/9, Terre Haute, Indiana*

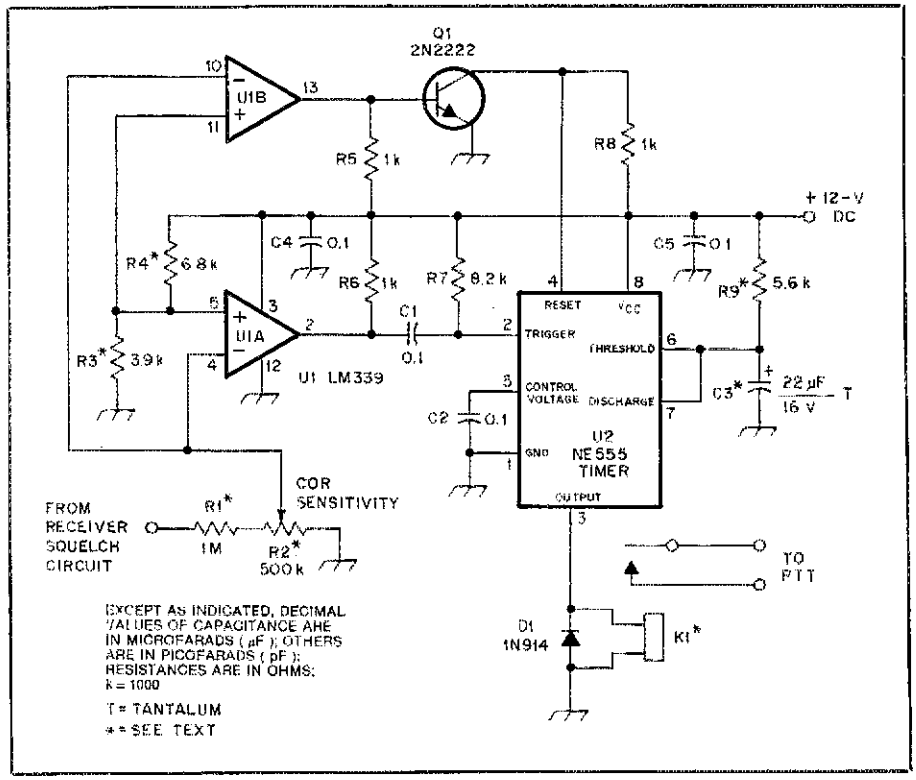


Fig 3—A schematic of WA6MBP/9's simple COR circuit.

Technical Correspondence

Conducted By Paul K. Pagel, N1FB
Senior Assistant Technical Editor

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

TVI MYSTERY SOLVED

☐ Recently, I purchased a new HF linear amplifier. When operating the amplifier on 14 MHz, my signal caused TVI of the "screen is blank" type on Channel 2. To eliminate the TVI, I installed a high-pass TVI filter on the TV tuner. It had no effect. Using a second low-pass filter on the rig produced similar results. I then placed a 75-ohm termination on the TV antenna input. This resulted in a snowy, no-picture screen with little indication of interference. That indicated that whatever the source of the interference, it was coming in through the antenna connection of the TV set.

For several weeks, I looked for some nonlinear device external to the TV and HF equipment that might be the source of the problem. Finally, I took a close look at my other radio equipment. I noticed that the S meter on one of my 2-meter rigs would move upscale when the HF amplifier was being used. The squelch did not open, but the S meter would indicate from S2 to S9 + 10 dB depending on the orientation of the HF beam versus that of the 2-meter beam. Disconnecting the antenna cable from the 2-meter rig immediately eliminated the TVI on all the TV sets in the house, including those not equipped with a TVI filter.

The 2-meter rig causing the problem is an ICOM 25A. Another rig connected to a vertical antenna on the same tower as the Yagi serving the IC-25A showed no S-meter indication and caused no TVI. Installation of a standard "TV type" high-pass filter (I use a Drake TV-75HP that is no longer sold) in the coaxial lead to the IC-25A eliminated all traces of TVI and permitted normal operation of the transceiver. Loss at 144 MHz through the TVI filter was measured at 0.6 dB. Perhaps this information will save someone else a lot of work.—*Joe Mehaffey, K4IHP, 6950 Hunter's Knoll, Atlanta, GA 30328*

CAT AND THE IBM PC Jr

☐ When I read "A CAT Control System" in *QST*, I knew I had to try to link my Yaesu FT-757 to my PC Jr.[1] There were some modifications that had to be made. Since I am a novice programmer, I contacted two friends, Bob Pierlott, WE4J, and George Fryer, KI4KK, who put their heads together. The resulting program works great![2] I have not tried using this program with any other computer, but I understand it will work with any IBM PC and the Yaesu FT-757 transceiver.

The PC Jr does not use a standard DB-25 connector for the RS-232-C port, and the Yaesu FT-757 does not use a commonly available miniature Molex-type plug for the EXT CTNL jack. I sifted through computer parts at a local hamfest and was able to find connectors similar to those I needed, although I had to shave the plugs to make them fit properly. Modifying an existing IDC (insulation-displacement connection) plug may be a less-expensive alternative to purchasing the IBM plug (P/N 860026); it costs $25. I have learned that the proper Molex-type connectors can be purchased from Yaesu for less than $1.

I constructed and use the interface shown in Fig 5B of the original article. This is a fun project! It doesn't cost much, and it works well.—*C. Roy Morris, Jr, W4WFB, 2214 Beverly Dr, Charlotte, NC 28207*

☐ The article, "A CAT Control System" by Kjell W. Strom [see Feedback—Ed.] was helpful when I connected my Yaesu FT-757GX transceiver to my Atari computer—with but one exception. The documentation I received from Yaesu specifies the use of *one* stop bit, whereas the article specifies the use of *two* stop bits. After hours of frustrated programming, I noticed the discrepancy. The verdict: My program works every time with one stop bit, but only intermittently with two stop bits.—*Richard Myers, 31 6th St, Box 274, Dacono, CO 80514*

MORE ON TELEPHONE RFI

☐ Telephone RFI occurs when RF is picked up by the telephone line and rectified by the transmitter (microphone). Some of the RFI cures I've seen given are adequate, but they are not economical.

The best way to eliminate telephone RFI is to prevent the RF from reaching the telephone transmitter. AT&T's Z100A filter does the job, but two ferrite beads will do just as well. The ferrite beads should be placed inside the telephone where the line enters the instrument. Occasionally, when the RF field is strong, it is necessary to put two ferrite beads on each side of the line. The beauty of this solution is that ferrite beads are readily available at hamfests for as little as ten cents each.—*Robert F. Imhof, AG2K, 203 Isle Dr, Port Richey, FL 33568*

MIXERS WITH MUSCLE

☐ When I read Doug DeMaw's article on receiver mixers, I was taken aback by the third-order intercept figures for the power FET mixer circuit.[3] However, I could not help but take notice of the component cost and power requirements of such a circuit. I began to think of ways to improve the performance of the more common and economical singly-balanced dual-gate FET mixer. Before long, I found myself pondering the sterling article written by W. K. Squires in 1963.[4]

In his article, Squires described a high-performance mixer that used a single 7360 beam-deflection tube. This circuit was used as the heart of the Squires-Sanders SS-1R receiver. The "desense" and cross-modulation characteristics of this mixer were superlative; I doubt any commercially made amateur receiver on the market today could match the SS-1R. To be sure, no amateur receiver could do so in 1963.

I am not about to advocate a return to the 7360. Instead, I present an idea that arose from one of the seminal points made in the Squires article. It will be up to others to put the idea to the test; I have neither the time nor the equipment for such an undertaking. I can assure you, however, that the task in question is quite simple.

One of the key points made in the Squires article pertained to how the LO energy and RF signals are fed into a 7360 mixer. The trick was to use *balanced* LO injection for the deflection electrodes while applying an *unbalanced* RF signal to the signal grid. Thus, the circuit becomes a highly linear push-pull device. Linearity, of course, is the key to mixer performance.

A singly balanced mixer is shown in Fig 28 on page 8-17 of the *1980 ARRL Handbook*. The LO signal is applied *unbalanced* to the control gate, and the signal is applied to the signal gate *balanced*. My idea is this: Flip-flop that arrangement to see how the third-order performance is affected. Substitution of 3N211s for the 40673s might be considered. Protection diodes just might compromise linearity.

I am of the opinion that we need to get away from multiple IFs and RF "front ends" in our receivers. An economical high-performance mixer with low power requirements would allow us to do just that. I shall be grateful to anyone for calling to my attention any flaws that are found with this idea.—*Matt George Erickson, WA4WAX, 1482 Oxford Rd, Atlanta, GA 30307*

SUPER DUPER PRINTER

☐ Mr. Allison is to be congratulated for his fine job in producing "The Super Duper" and sharing it with the Amateur Radio community. I did, however, experience some difficulty getting the print option to work correctly. The published code printed only one entry per page followed by a form feed, a boon for paper merchants! I offer the code of Fig 1 as an alternative. The revised code: (1) Prints all items in the present list and prints a space each time a different band is encountered, and (2) prints page numbers at the bottom of each page, issues a form feed and reprints the page headers.

I compiled the program using the IBM/Microsoft BASIC Compiler and while the program executes faster, the additional memory required by the compiler run-time package severely limits the amount of free memory. After only 30 entries, free memory is only about 43%. It seems the amount of free memory after program compilation is

[1] K. W. Strom, "A CAT Control System," *QST*, Oct 1985, p 38.

[2] A program listing is available for $1 and a large SASE. Address your inquiry to the Technical Department Secretary and specify the IBM PC Jr/CAT Control Program.

[3] D. DeMaw and G. Collins, "Modern Receiver Mixers for High Dynamic Range," *QST*, Jan 1981, p 19.

[4] W. K. Squires, "A New Approach to Receiver Front-End Design," *QST*, Sep 1963, p 31.

```
286Ø H = 44: K = 44                          'LINES ON FIRST PAGE
2865 PA = Ø
287Ø FOR I = Ø TO C - 1
2875    IF I = Ø THEN GOTO 293Ø
288Ø    IF (H / K - INT (H / K)) > .ØØØØØ1 THEN GOTO 295Ø
          'HEADER/FEED CONTROL
289Ø    REM *** PAGE HEADER SUBROUTINE ***
291Ø    H = 55: K = 55                       'INITIALIZE NUMBER OF
          LINES PER PAGE
292Ø    LPRINT: LPRINT: LPRINT " "," ","    PAGE  ";PA:LPRINT
        CHR$(12)
293Ø    GOSUB 3Ø1Ø
294Ø    PA = PA + 1
295Ø    GOSUB 3Ø9Ø
296Ø    IF Q$(I,7) < > Q$(I + 1, 7) THEN LPRINT: H = H - 1
          'BAND SEPARATION
2965    H = H - 1
297Ø NEXT_I
```

Fig 1—Super Duper print formatter.

only about 13 kbytes. I suggest that users with compilers such as BetterBASIC®, which are not limited to using 64 kbytes of memory, give compilation a try.—*John A. Scott, KA8FSM, 2300 Clawson Ave, Royal Oak, MI 48073*

CHOKING RF

☐ Antenna construction and experimentation can sometimes be very confusing, with measurements yielding results that change and do not seem to make sense. Most amateurs use an SWR indicator or perhaps a noise bridge, both of which generally provide useful data for HF-antenna measurements. There is one situation, however, that will result in meaningless readings from either device, that being when the outer shield of the coaxial transmission line becomes part of the antenna system. *The ARRL Antenna Book*[5] addresses the problem of parallel currents, but it is useful to look at a specific problem and its solution.

My antenna is a 20-meter vertical ground plane, consisting of a quarter-wave vertical radiator mounted at the peak of the roof. Four radials, each a quarter wavelength long, run out from the base of the antenna along the roof. A short length of coax connects the antenna to the radio equipment on the top floor, immediately beneath the ground-plane system.

Two major problems I encountered were constantly changing SWR-meter (or noise-bridge) readings and lots of RF in the shack, creating a hot chassis, microphone and so on. Several attempts to detune the transmission line by using different line lengths had no effect on the problem of RF in the shack. Changing the transmission-line length did, however, have an effect on the SWR readings. The clincher occurred when I observed that the SWR readings changed when the headphones were plugged into the rig! Finally, I realized that the outer shield of the transmission line was contributing to the composite load, made up of the shield and the antenna itself. Further, all of my radio equipment—SWR meter, linear amplifier, coaxial cable jumpers, even the headphones and microphones—would add to the total length when connected.

One might think that a good ground connection would solve the problems, but a good earth ground is hard to obtain from the third floor of a house. Turning to *The Antenna Book*, the solution became obvious. A portion of the coaxial transmission line was wound into an RF choke, 5 turns, approximately 6 inches in diameter—right at the base of the antenna. The addition of the choke cured both problems completely.

Not every ham is fortunate enough to have a classic antenna system, be it a beam high up on a tower or a dipole in the clear. As more of us are forced into situations that require unusual antennas, unique problems will arise. A review of the basics of antenna theory, and how it fits into your specific installation, will usually provide the solution. I hope sharing my experience will help someone else.—*Scott M. Hower, K7KQ, 506 Sugarland Run Dr, Sterling, VA 22170*

[5]*The ARRL Antenna Book*, G. Hall, ed. (Newington: ARRL, 1982) p 5-6.

HELICAL ANTENNA BEAMWIDTH

☐ I noticed an error in the otherwise excellent article, "The Basic Helical Beam."[6] On page 25, the beamwidth is given as

$$\text{Beamwidth} = \frac{115}{C_\lambda \sqrt{n S_\lambda}} \text{ degrees} \qquad \text{(Eq 1)}$$

where

C_λ = circumference in free-space wavelengths
S_λ = spacing between turns in free-space wavelengths
n = number of turns of helix

Referring to Kraus, you will find that this is the expression for the beamwidth to the first nulls (in the radiation pattern).[7] The "normal" definition of beamwidth for both commercial and amateur purposes is beamwidth to the half-power points of the radiation pattern. This is given by Kraus as

$$\text{Beamwidth} = \frac{52}{C_\lambda \sqrt{n S_\lambda}} \text{ degrees} \qquad \text{(Eq 2)}$$

This definition is more consistent with that found in other technical literature and should lead to less confusion on the part of those using Mr. DeMaw's article.—*Domenic M. Mallozzi, N1DM, 26 Carey Ave, Apt 8, Watertown, MA 02172*

[6]D. DeMaw, "The Basic Helical Beam" *QST*, Nov 1965, p 20.
[7]J. Kraus, *Antennas* (New York: McGraw-Hill, 1950), p 213.

MORE VOLTS—NO CHIRP

☐ Chirping signals take first place in the number of OO (Official Observer) notices sent to Amateur Radio operators. A large number of these hams are operating modern commercial equipment. Why, then, are these notices necessary?

My own experience has shown that the 117-V power line at my location was the cause of a badly chirping CW signal; the line-voltage regulation is poor. Taking a hint from *The ARRL Handbook*, I switched to the use of the 234-V line. This change fixed the problem.—*William J. Christman, W9TT, 624 Prospect Ave, Barrington, IL 60010*

EASY DOES IT

☐ To understand the problem presented in "Simple Conversion of Complex Networks, it is certainly worthwhile to go through a complete derivation of the series-to-parallel conversion of RX circuits.[8] But for everyday use, three easily remembered expressions do the same job.

Since both series and parallel forms have the same Q

$$Q = \frac{X_s}{R_s} \qquad \text{(Eq 3)}$$

$$R_p = R_s (Q^2 + 1) \qquad \text{(Eq 4)}$$

$$X_p = \frac{R_p}{Q} \qquad \text{(Eq 5)}$$

—*Harry R. Hyder, W7IV, 1638 W Inverness Dr, Tempe, AZ 85282*

[8]B. Schetgen, "Simple Conversion of Complex Networks," *QST*, Nov 1985, p 41.

Feedback

CATTY LITTER

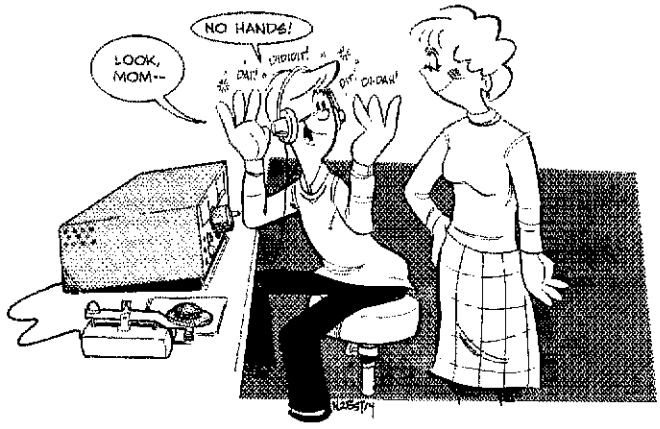
☐ Several program lines are missing from Fig 6 of "A CAT Control System," Oct 1985 *QST*. There are also two program lines that require alteration. These corrections are:

```
1Ø4Ø  GOSUB 17ØØ

1Ø55  REM * ALT.: 1Ø5Ø CLS: PRINT A;" MHz"

131Ø  GOSUB 17ØØ

17ØØ  REM HEX/DEC & OUTPUT
171Ø  A$ = MID$ (STR$ (A), 2)
172Ø  IF A = INT (A) THEN A$ = A$ + "."
173Ø  A$ = "ØØØ" + A$ + "ØØØØØ"
174Ø  FOR I = 1 TO LEN (A$)
175Ø  DP$ = MID$ (A$, I, 1)
176Ø  IF DP$ = "." THEN DP = I: GOTO 18ØØ
177Ø  NEXT
```

☐ In "Build a Homemade Signal Generator" (Jan 1986 *QST*, p 40) the oscillator circuit of Fig 2 is a Hartley, not a "tapped-coil Colpitts oscillator" as described in the text. Thanks to Mason A. Logan, K4MT, for bringing this to our attention.

☐ In "Untangling Upgrade Math" (Feb 1986 *QST*, p 40) the correct answer in the third line of Eq 2, column two, is 0.0356×10^8.

Throw Away Your Pencil!



Whether it be to build operating confidence, to prepare for an exam or just for personal satisfaction, most amateurs want to increase their code speed. Here's one ham's method.

By Melvin Broaddus, K6LJE
573 East Fremont
Fresno, CA 93710

Do you stumblebum through the code bands at 14 or 15 words per minute? Does 18 WPM push you? Would you upgrade to Extra if you could crack 20 WPM? Well, you can do it if you are willing to try breaking out of the slow-code strait jacket.

Until recently, I was hard pressed to copy 18 WPM. Today I'm copying 35 WPM, cold turkey. A veteran ham showed me the way.

I'll never forget the QSO that turned me around. The earphones were tight against my ears. I grabbed another pencil. The lead smoked across the last sheet of the tablet. 18 WPM was crowding me.

"By the way, Mel . . ." Pete went on as I came to the end of the sheet.

The break-in was working, so I leaned on the key for a short string of dits.

"Wait one, Pete, while I get more paper."

As I rose from the chair to look for another tablet, I heard Pete's signal coming from the earphones. He was laughing.

I jerked open the cabinet, grabbed two tablets and returned to the desk. Wiping the sweat from my fingers, I touched the paddle.

"Okay now, Pete. Have paper."

"Mel," he replied. I copied my name easily. "Would you like to be able to copy faster?" I could feel the blood rush. At 18 WPM I thought I was *already* blistering the frequency. Yet after 28 years of Amateur Radio—I was ashamed to admit—I had failed to break 20 WPM, though I had often tried.

I put down the pencil and swallowed hard. Touching the paddle gently, I sent one word: "Yes." His message came back like a shot.

"Throw away your pencil."

"What does he mean?" I wondered. "How can I copy without the pencil?"

"Mel," Pete's signal filled my earphones, "do you copy?"

"Yes," I answered, "but I don't understand."

Again the code filled the phones: *"Throw away your pencil. Now!"*

My pulse quickened. He was serious! Hand shaking, heartbeat in the paddle, I tapped out, "Okay, Pete, you're asking a lot of me. But I'll try it."

I closed my eyes, put down the pencil and held my hands against the phones.

When it was all over, I walked out of the shack feeling nine feet tall.

Walking into the kitchen, I stammered to my wife and kids that their old man had chewed the rag for an hour without touching a pencil, an accomplishment I had thought impossible. My 12-year-old son was impressed.

"Gee, Dad, you can do everything!" he said. I don't know if he understood just what I had accomplished.

Twelve weeks later, hog-wild and crazy for CW, I copied 35 WPM, hands down. I'm only embarrassed that I had not done this long ago.

Your Turn

If you are still pencil-bound and wondering how you can get started, I can give you this answer: Throw away the pencil and start listening to the signals as if it were just another way of speaking.

First, seek out strong, well-fisted signals—preferably from a keyboard—being sent at two or three words below your ceiling. (I recommend copying the keyboard signals whenever you can. When starting out, you need their precision spacing, character formation and timing.) Once you have located a signal, fasten onto it like a leech. If it helps, put your elbows on the desk and close your eyes while the dits and dahs dance in your head.

The trick is to *concentrate intently.* If you are doing it right, it'll nearly suck you dry after the first two or three hours. In four or five weeks, however, after you've developed the technique, you won't have to concentrate so hard. Believe me, it gets easier and eventually becomes second nature—just like listening to a voice.

It's hard to describe, but with constant practice you can soon learn to flash the words onto the mind's screen, so to speak. Try visualizing each letter (eyes closed) as if they were printing on your inner eyelids. Rather than slavishly writing out each character, as though engraving it in stone,

let your mind focus on each character. With practice, your mind will print it out for you.

What you'll hear in the beginning, as the really good CW ops have told us for years, are short words like *the, an, for, rig, name, watts.* You'll also begin to pick out prefixes and suffixes on longer words: con-, pro-, -ine, -ing. They will jump out at you.

What you're doing is training yourself to comprehend words and parts of words rather than single characters. That's the secret. The best CW operators have used this technique for years. However, this freehand method won't work on ciphers, random groups, or the like. Nor is it recommended for Novice class licensees who are still struggling with basic character recognition at very slow speeds. [A note of caution: No matter what your proficiency while copying in your head, there are times when copying on paper is the preferable method, such as when handling emergency traffic.—Ed.]

Four Steps to Increasing Code Speed

1) Put down that pencil
2) Concentrate intently (your brain can take it)
3) Copy the best signals, especially keyboards
4) Ragchew, hands-free (remember to increase WPM)

Working Up the Speed

If things are going right, by the second week your eyes may look like two burnt holes, but you'll have a new skill and be on your way to mastery of 20-WPM code. Now you are ready for some bold transmissions. I mean you must get into some ragchews. Simply copying someone else's QSO, helpful as that is, will not generate the pressure you need for fast speed gains.

On the other hand, the white-knuckle pressure of hands-free ragchewing will drive up your speed like a rocket, as it did in my case. (If you get in over your head, you can always resort to the pencil.) But try not to use anything more than you absolutely have to—just brief notes from which to prepare replies.

When you're ready to take the plunge, pick out a keyboard "musician" sending at a speed that you estimate as three or four words below your best. Call him. As he responds, *concentrate intently* on his CW; you should be able to comprehend 60 to 70 percent of the message without writing it down. After about 20 minutes, if you haven't fainted, request a speed increase of 2 WPM; the keyboard ops will generally be happy to oblige.

If 20 WPM is close to your limit, the veins may be standing out on your neck, but keep the pressure on. The idea is to advance to a speed higher by five words or more than your best. What I'm suggesting is, of course, strenuous; but if you work at it, in a few weeks you will exceed 20 WPM.

Be sure to explain to your contact that you are trying to increase your copy speed, or he may be annoyed if he discovers that you're not copying solidly at the speeds you requested.

I'd like to pass along a sequence that netted me a speed increase of 5 WPM in one week:

1) For the first 20 minutes of ragchew, copy at 3 WPM below your ceiling (you'll probably copy 60 percent).

2) Copy at 3 WPM *above* your ceiling for 10 minutes (you'll copy about 30 percent).

3) Copy at 5 WPM above your ceiling for 5 minutes (you'll copy about 20 percent).

4) Go back to starting speed for 10 minutes, then conclude chat.

5) Repeat steps 1-4 three times daily (or more) for one week, for 21 hands-free ragchews in one week.

If that works for you as well as it worked for me, in seven days your copy speed will increase by 5 WPM or more.

Personal Satisfaction

Those who learn to copy in their heads are likely to get a lot of satisfaction from it, just as I did. Racing along at 30 WPM or more while taking the Morse in the brain is exhilarating. I found it—pardon the expression—to be a heady experience. QST

Strays

CALL FOR *QST* TECHNICAL ARTICLES

☐ Is your station prepared to run on emergency power sources? What source or sources of natural power are you using? Why not share your experiences with other readers of *QST*? Put your thoughts on paper and send your manuscript to Paul K. Pagel, N1FB, Senior Assistant Technical Editor, ARRL, 225 Main St, Newington, CT 06111.

QST congratulates...

☐ Steve Affens, K3SA, of Olney, Maryland, on being chosen Cameraman of the Year in the 43rd annual White House News Photographers Association competition.

☐ Robert Smithwick, W6JZU, former Vice Director of the Pacific Division, on being elected President of the Board of Trustees of the Foothill-De Anza Community College District for 1986.

☐ the following radio amateurs on 60 years as ARRL members:

- Edmond A. Lar Rieu, W6BEM, of Sacramento, California
- Francis Walton, W9ACU, of Browning, Illinois

I would like to get in touch with...

☐ anyone in the Minneapolis-St Paul or five-state area with a Time Domain Reflectometer that an amateur audio project group could borrow for wire research. Douglas Wright, 425 13th Ave N, Hopkins, MN 55343.

☐ any hams who collect automobile license plates. Charles Fregeau, N5HSR, 1222-A Perry, Helena, AR 72342.

☐ any former WW II seagoing radio operators who attended or graduated from the USMS radio training school in Boston, including former instructors and merchant marine brasspounders. Send SASE to Ralph Albers, W4ER, 5597 Seminary Rd, Apt 2013 South, Falls Church, VA 22041.

☐ any former 574th-565th SAW BNS radio, radar, maintenance and other members. Angel Zaragoza, W6ZPR, 1571 Ninth St, San Bernardino, CA 92411.

☐ any radiomen who served on the *USS Appalachian*. Contact B. C. Blodgett, Rte 1, Box 216, Mt Vernon, OR 97865.

☐ any hams who are good, traditional New Orleans jazz musicians. Richard Weimer, W9JVE, 3632 Holly Cir, Indianapolis, IN 46227.

☐ anyone with information to help troubleshoot a Swan TB-500 tribander beam. Daniel Armstrong, W9ZVE/5, 1830 Carlyle Dr, Las Cruces, NM 88005.

☐ anyone with operating information for an RSO low-pass filter manufactured by Taylor Communications of Ontario. Charles Marriott, N5ESL, PO Box 919, Space 540, Apache Junction, AZ 85217.

☐ anyone with information on connecting a Macrotronics RM-1000 TU to an Atari 800. Jim Barnard, WA4GNW, 5513 Swiftbrook Cir, Raleigh, NC 27606.

Happenings

Conducted By David Newkirk, AK7M

- *Rules for Digital Automatic Control*
- *League Says "No" to 6-meter Eater*
- *Exam Credit for Written Exam Elements?*

Our New Spread-Spectrum Rules

When we go on the air with conventional AM and FM emissions, the energy in each resultant signal is concentrated narrowly around a center frequency. Signal bandwidth usually increases with information rate. The hassle with such compact signals is that they're quite vulnerable to other similar signals at or near the same center frequency. (We bet you've already experienced somebody else calling CQ, or the bleatings of a "test pest," right atop the station you're working, for example.)

Spread-spectrum signals don't follow this rule of concentrating signal energy around a center frequency. Their bandwidth is not necessarily tied to data rate. The idea behind spread-spectrum work is the *intentional spreading* of signal energy over such a wide bandwidth that the signal's energy isn't very great at any one frequency for very long. What's the point? Great immunity to non-spread signals—like CW, SSB, RTTY—for one thing, and little likelihood of "collision" with other spread-spectrum signals spread according to differing binary sequences. And these techniques really work: Spectrum-spreading is a popular antijamming technique used by the military, for instance, because it's hard for anyone to interfere with a spread-spectrum signal who doesn't have its binary-sequence "key."

Radio amateurs are going to have their shot at spread-spectrum work as of June 1, 1986. That's when the rule amendments specified in FCC's *Report and Order* in GEN Docket 81-414, "Amendment of Parts 2 and 97 of the Commission's Rules and Regulations to authorize spread-spectrum techniques in the Amateur Radio Service," go into effect.

FCC had some ticklish questions to address in allowing us spread-spectrum operating privileges. For instance, since one of the main uses of spread-spectrum techniques has so far been the *hiding* of signals (implicit in the antijamming use of spread-spectrum techniques by the military), we couldn't just bring up our spread-spectrum rigs under present rules without transgressing prohibitions against use of codes and ciphers. FCC has specified the methods to be used in amateur spread-spectrum work closely enough so that the Commission is assured of being able to perform its monitoring and enforcement duties even when an amateur spread-spectrum station might be inaudible to those of us listening with "conventional" receivers. We will have to reaquaint ourselves with our old friend the logbook; FCC wants complete documentation of how and what we'll be doing.

There was also the concern that since authorized spread-spectrum signals might appear as broadband noise, spread-spectrum work should be limited to amateur bands offering plenty of "wide-open spaces" to keep intraservice interference possibilities to a minimum—especially while we're getting our feet wet with the new techniques. FCC concurred, and limited spread-spectrum work to bands 420 MHz and above.

We'll still have to *identify* our spread-spectrum transmissions with *narrowband* emissions, as FCC puts it, "so that CW, SSB and/or narrow-band FM receivers, which might be victims of interference, can receive the station identification." Frequencies used for such IDs will have been chosen to minimize interference to, while facilitating identification by, other operators.

Right off, spread-spectrum work will be limited to domestic communication (not international work), as other national administrations will have had to satisfy themselves of the achievement of proper safeguards against encryption and intraservice interference before *their* amateurs jump into the spread-spectrum swim.

This is really new ground for Amateur Radio—so new, in fact, that we have a number of decisions to make about exactly how to go about spread-spectrum work in ways guaranteeing station-to-station compatibility (see League Lines, December 1985 and January 1986 *QST*). FCC has not limited our choice of spread-spectrum options so narrowly that we can just press the button and go, although the final rules limit spreading methods to frequency hopping and direct sequence only.

The new Fifth Edition of *The FCC Rule Book* includes the following Part 97 changes. As of June 1, 1986, Section 97.3 will include a new paragraph (cc) as follows:

> (cc) *Spread spectrum transmission.* An information bearing transmission in which information is conveyed by a modulated RF carrier and where the bandwidth is significantly widened, by means of a spreading function, over that needed to transmit the information alone.

Add a new Section 97.71 as follows:

Section 97.71 Spread spectrum communications

(a) Subject to special conditions in paragraphs (b) through (i) of this section, amateur stations may employ spread spectrum transmissions to convey information containing voice, teleprinter, facsimile, television, signals for remote control of objects, computer programs, data, and other communications including communication protocol elements. Spread spectrum transmissions must not be used for the purpose of obscuring the meaning of, but only to facilitate transmission.

(b) Spread spectrum transmissions are authorized on amateur frequencies above 420 MHz.

(c) Stations employing spread-spectrum transmissions shall not cause harmful interference to stations of good engineering design employing other authorized emissions specified in the table. Stations employing spread spectrum must also accept all interference caused by stations of good engineering design employing other authorized emissions specified in the table. (For the purposes of this subparagraph, unintended triggering of carrier operated repeaters is not considered to be harmful interference. Nevertheless, spread spectrum users should take reasonable steps to avoid this situation from occurring.)

(d) Spread spectrum transmissions are authorized for domestic radio communication only (communication between points within areas where radio services are regulated by the U.S. Federal Communications Commission), except where special arrangements have been made between the United States and the administration of any other country concerned.

(e) Only frequency hopping and direct sequence transmissions are authorized. Hybrid spread-spectrum transmissions (transmissions involving both spreading techniques) are prohibited.

(1) Frequency hopping. The carrier is modulated with unciphered information and changes at fixed intervals under the direction of a high speed code sequence.

(2) Direct sequence. The information is modulo-2 added to a high-speed code sequence. The combined information and code are then used to modulate a RF carrier. The high speed code sequence dominates the modulating function, and is the direct cause of the wide spreading of the transmitted signal.

(f) The only spreading sequences which are authorized must be from the output of one binary linear feedback shift register (which may be implemented in hardware or software).

(1) Only the following sets of connections may be used:

Number of stages in shift register	Taps used in feedback
7	[7,1]
13	[13,4,3,1]
19	[19,5,2,1]

(The numbers in brackets indicate which binary stages are combined with modulo-2 addition to form the input to the shift register in stage 1. The output is taken from

the highest numbered stage.)

(2) The shift register must not be reset other than by its feedback during an individual transmission. The shift register must be used as follows.

(i) For frequency hopping transmissions using x frequencies, n consecutive bits from the shift register must be used to select the next frequency from a list of frequencies sorted in ascending order. Each consecutive frequency must be selected by a consecutive block of n bits. (Where n is the smallest integer greater than $log_2 x$.)

(ii) For a direct sequence transmissions using m-ary modulation, consecutive blocks of $\log_2 m$ bits from the shift register must be used to select the transmitted signal during each interval.

(g) The station records shall document all spread spectrum transmissions and shall be retained for a period of one year following the last entry. The station records must include sufficient information to enable the Commission, using the information contained therein, to demodulate all transmissions. The station records must contain at least the following:

(1) A technical description of the transmitted signal.

(2) Pertinent parameters describing the transmitted signal including the frequency or frequencies of operation, and, where applicable, the chip rate, the code, the code rate, the spreading function, the transmission protocol(s) including the method of achieving synchronization, and the modulation type;

(3) A general description of the type of information being conveyed, for example, voice, text, memory dump, facsimile, television, etc.;

(4) The method and, if applicable, the frequency or frequencies used for station identification.

(5) The date of beginning and the date of ending use of each type of transmitted signal.

(h) When deemed necessary by an Engineer-in-Charge of a Commission field facility to assure compliance with the rules of this part, a station licensee shall:

(1) Cease spread spectrum transmissions authorized under this paragraph;

(2) Restrict spread spectrum transmissions authorized under this paragraph to the extent instructed;

(3) Maintain a record, convertible to the original information (voice, text, image, etc.) of all spread spectrum communications transmitted under the authority of this paragraph.

(i) The peak envelope power at the transmitter output shall not exceed 100 watts.

In **Section 97.84(g), Station identification,** add new subparagraph (5) as follows:

(5) When transmitting spread spectrum, by narrow band emission using the method described in (1) or (2) above; narrow band identification transmissions must be on only one frequency in each band being used. Alternatively, the station identification may be transmitted while in spread spectrum operation by changing one or more parameters of the emission in a fashion such that CW or SSB or narrow band FM receivers can be used to identify the sending station.

AUTOMATIC CONTROL FOR DIGITAL COMMUNICATION AT 50 MHz AND ABOVE—THE PART 97 CHANGES

March League Lines carried the news that FCC had acted in PR Docket 85-105 to allow automatic control for digital operation at frequencies of 50 MHz and above. Yes, we have been allowed automatic control for digital operation above the 10-meter band, but the wording of the ruling is such that it's a kick in the teeth for amateur packet radio. ARRL is in the process of seeking reconsideration, as promised. For now, here are the actual Part 97 updates resulting from 85-105. They are to be effective March 14, 1986. To update your copy of *The FCC Rule Book*, make these changes to Part 97. Section 97.3(m)(3) is amended to read:

(3) *Automatic control* means the use of devices and procedures for control without the control operator being present at the control point when the station is transmitting.

Section 97.79(b) is amended to read:

(b) Every amateur radio station, when transmitting, must have a control operator. The control operator must be present at the control point of the station, except when the station is transmitting under automatic control. The control operator must be a licensed amateur radio operator or permittee designated by the station licensee. The control operator and the station licensee are both responsible for the proper operation of the station. For purposes of the enforcement of the rules of this part, the FCC will presume that the station licensee is the control operator of the station, unless documentation to the contrary exists.

Section 97.69 is amended by adding a new paragraph (d), as follows:

(d) An amateur station may be under automatic control when transmitting digital communications on frequencies 50 MHz and above.

A new Section 97.80 is added, as follows:

Section 97.80 Operation under automatic control

(a) When under automatic control, devices must be installed and procedures must be implemented which will ensure compliance with the rules when the control operator is not present at the control point of the amateur station.

(b) No amateur station may be operated under automatic control while transmitting third-party traffic.

(c) Automatic control of an amateur station must cease upon notification by the Engineer-in-Charge of a Commission field office that the station is transmitting improperly or causing harmful interference to other stations. Automatic operation must not be resumed without prior approval of the Engineer-in-Charge.

Section 97.114 is amended by adding a new subparagraph (4) to paragraph (b) as follows:

(4) Third-party traffic from an amateur radio station under automatic control.

PUBLIC DIGITAL RADIO SERVICE WOULD GOBBLE HALF OF 6-METER BAND

What has one watt, four letters and wants to eat two megahertz? Answer: the PDRS (Public Digital Radio Service) sought for in a Petition for Rule Making (RM-5241), brought before FCC by Donald L. Stoner, W6TNS. Citing the rising popularity and falling prices of computers, and juxtaposing these with increasing costs for telephone service, Stoner proposes that the PDRS would permit the owners of personal computers to communicate by radio, first through Local Area Networks (LAN) and, beyond LANs, through a national packet-radio network. Transmitter power would be limited to a maximum of 1 watt in a given user's "radio modem," with output power being adjusted automatically to the minimum needed for communication. There's one immediate hitch, from Amateur Radio's point of view. Writes the petitioner:

"A wideband digital channel can only be accommodated with the VHF band or higher frequencies. To keep the cost of equipment low, a band between 30 and 300 MHz is ideal. Some readers may feel that a service as described should be placed in the UHF or SHF range. This might be true if a suitable allocation within the 30-300 MHz band did not exist.

"However, within this frequency range there is a band, 2 MHz in width, which is virtually unoccupied and therefore unused. I refer to the spectrum between 52 and 54 MHz.

"Radio amateurs are permitted to operate on frequencies between 50 and 54 MHz (the six meter band). For a number of reasons, this band is 'underoccupied.' It is estimated that out of 400,000 radio amateurs in the United States, less than 1000 are active on the six meter band ... "

The opinion of the petitioner is that most amateur operation is confined to the bottom 2 MHz of "Six" because of television interference; the proposed low power used by "radio modems" in the PDRS would obviate *their* causing TVI. Check an *ARRL Repeater Directory* lately? 52-54 MHz is where *repeaters* reside on 6, and they're doing quite well, thanks.

LEAGUE BLASTS PETITION FOR PUBLIC DIGITAL RADIO SERVICE

It would eat the top 2 MHz of our 6-meter band, the PDRS would—it would allow owners of home computers to link their machines with low-power radio and packet-switching networks. Here are ARRL's comments in this controversial *Request for Rule Making* (RM-5241).

The League is opposed to the creation of a new personal radio service for computer hobbyists on the grounds that:

a) the Amateur Radio Service already provides for communications between computers using packet radio, thus another radio service is unnecessary;

b) the Amateur Radio Service has the technical capability necessary for the orderly development of a data-communications network capable of handling the types and volumes of traffic which may be presented by the computer hobbyists; and

c) the Amateur Radio Service has the infrastructure and discipline needed for long-term viability of personal computer communications.

What the League most strongly objects to, however, is the proposed reallocation of half the 6-meter band to the proposed new service without any quantified need established therefore. The petitioner's premise that the band is under utilized by amateurs is erroneous. The claim that "less than 1,000 amateur stations are active on the band" is utterly unsupported and demonstrably untrue; attached to the League's comments as "Exhibit A" is a list of 250 active repeaters in the 52-54 MHz segment. Hmmm. In 1971, 58 repeaters were listed in ARRL's *Repeater Directory* on 6; 1978, 169; 1986, 250. Sounds like occupancy and growth to *us*. ARRL points out that in one weekend in June 1985, a single station participating in the ARRL June VHF QSO Party contacted 523 other stations, even with propagation limited to less than one-fourth the country.

Amateur packet radio already provides a forum for the type of communication proposed by the petitioner, and is rapidly developing. At 1200 bauds, an amateur packet signal is roughly 16 kHz wide; 9600 bauds would operate within 20 kHz. It appears that under no circumstance would the PDRS require more than 30 kHz of spectrum. Yet the proposal for the PDRS seems to assume that shared spectrum is unacceptable, that channelization is undesirable and that wideband digital communications are necessary.

ARRL is unsatisfied that the petitioner has established a *prima facie* need for a new radio service for computer hobbyists. The alleged need for such a service is presently satisfied by both the Amateur Radio Service and telephone modem computer services. The only possible disincentive in computer hobbyists using the already available Amateur Radio bands for their data communications is the Morse code requirement—but only a 5-WPM requirement exists. Why create another radio service on unsubstantiated conjecture and take frequencies away from Amateur Radio, which is already doing the job?

HOW ABOUT CREDIT FOR WRITTEN EXAMS, TOO?

Right now, if you pass a code test on your way to qualifying for a higher class of license, but you don't pass the "written," you're given credit for that code "pass" for up to a year—so next time you sit for the upgrade, you need only pass the written exam and you're in. FCC rules allow for this, but they don't allow credit for having passed a written exam unless it results in a new license or an upgrade. Robert Scupp, WB5YYX, petitioned FCC to authorize that credit be given for written exam elements, just as it is for code. FCC has responded with a *Notice of Proposed Rule Making* in PR Docket 86-63, proposing to do just that.

FCC explains that it had tested code aptitude first for reasons of administrative convenience. However, under the volunteer examination system, there are instances where volunteer examiners may not wish to do so—especially if an unlicensed applicant is shooting for a license class higher than Novice, or where a licensed applicant wishing to upgrade seeks to move up more than one notch at a time. The petitioner expressed particular concern about applicants seeking to further upgrade while awaiting FCC processing of a previously upgraded license.

"We see no reason to continue the procedures of the former examination structure in the existing volunteer examination system," writes FCC. "If examiners and volunteer-examiner coordinators (VECs) find it useful and convenient to offer examination elements in a different order, our rules should not hinder them. We therefore propose rules to offer examination credit for all written and telegraphy elements administered under the volunteer examination system above the Novice class ...

"We do not propose to extend temporary operating authority in the Amateur Service to person who have successfully completed the examinations for but not yet received their first amateur license. Written and telegraphy examinations are only part of the qualifications procedure. We must make many determinations based upon FCC Form 610 before we may issue an amateur operator license, including that the applicant is not a representative of a foreign government, that the applicant has a mailing address in the United States ...

"Nor do we propose to require that the most recent certificate of successful completion of examination include all previous successfully completed elements, for that information may not be readily available or verifiable by the examiners or the VECs with which they are associated. We do, however, seek comment on whether expansion of the use of certificates of successful completion of examination to written examination elements is workable." FCC also seeks comment on this: Should VECs hold pending applications, or should applicants collect certificates of successful completion until they "collect the whole set"?

Comments in this proceeding may be filed on or before April 30, 1986; reply comments are to be in FCC hands on or before May 31, 1986. A copy of the *Notice of Proposed Rule Making* in PR Docket 86-63 may be had from ARRL HQ for an SASE bearing 39 cents postage.

RICHARD A. WHITING, WØTN, APPOINTED DAKOTA DIVISION VICE DIRECTOR

A radio amateur and ARRL member for 31 years, Rick Whiting is perhaps best known for developing the North American Teleconference Radio Net. His ham radio activities include CW (CP25), SSB, VHF/UHF, packet radio, frequency coordination and repeaters, and equipment design, construction and experimentation. Now an Extra Class licensee and Life Member of the League, Rick has been serving as an OO and Assistant Director for packet radio in the Dakota Division.

Rick has served in many other leadership positions in Amateur Radio: in the Minnesota Radio Club (President, Secretary), Minnesota Repeater Council (Chairman, Vice-Chairman, Secretary), Honeywell Radio Club (Vice-President, Secretary, Director) and the TwinsLAN packet-radio club (Director). He is also a member of QCWA, AMSAT, AMRAD, TAPR and FADCA.

Professionally, Rick is an engineering manager in Honeywell's Corporate Network Engineering Department, Minneapolis. In addition to ham radio, Rick's avocations include nature photography and wilderness canoeing. He is a private pilot and holds an FCC First Class Radiotelephone (now General Radiotelephone), Radar Endorsement, Second Class Radiotelegraph licenses. He enjoys international travel and has been chosen by Volunteers in Technical Assistance (VITA) as one of two radio amateurs to take a packet-radio demonstration project to Ethopia.

AN ERA PASSES: W5NW, SK

With great sadness we report the death of ARRL Honorary Vice President Wayland Martel "Soupy" Groves, W5NW, on February 5 at the age of 81. Soupy has been closely connected with the ARRL for decades, having joined as a member in May 1923. Before we go any further, we had better explain that the nickname "Soupbone," quickly shortened to "Soupy" was publicly hung on W5NW right here in the pages of *QST*, back in January 1930, in a story called, "Hams are Born, Not Made." The author, Felix, W5LS, thought that his friend, who remained long, lean and lanky throughout life, with "scrawny legs," resembled nothing more than a soupbone, with no meat on it. The name stuck, and it has been Soupy ever since. Wayland M. was fond of the story; whenever anyone asked how he got to be "Soupy," W5NW would steer him to the W5LS yarn. He served as Director from the West Gulf Division from 1935 to 1939 and again from 1942 to 1950. The forties were exciting and difficult years for the League and its Board. For instance, how do you sustain membership interest when your whole purpose for being has been put on hold? When ham radio has been closed down for the duration? When newcomers are permitted to obtain operator licenses only, and there is nothing to operate? (Well, virtually nothing—the War Emergency Radio Service did perk along on 112-116 Mc/s.) By the middle of the decade, a new set of problems and opportunities appeared. The ceiling for practical radio operation had jumped dramatically upward, so a new multiplier prefix, Giga-, appeared on the scene. Top Band had been sacrificed to the war effort, for Loran. Television, barely introduced before the war, was back and growing like a weed. All the new technology developed during the war needed a home. Preparations for a World Administrative Radio Conference, already started behind closed doors while the war went on, went public and accelerated. The Conference was held, at Atlantic City, NJ, in 1947. Amateurs emerged with the promise of a new HF band, 21-21.45 Mc/s, and many chunks of new space in the super-high-frequency ranges.

And within Amateur Radio, the division between phone and CW operators had become hard and sharp. Some said the new interest in amateur phone was fueled by GIs having had their fill of CW, wanting to walk away from the key, never to come back. Some

said it was the new operators, exposed to "command voice" operations during their military service, impatient with dits and dahs. It may merely have been that voice equipment had come of age, with good equipment available at good prices.

Whatever, Soupy Groves was in the middle of it. Though CW was to continue as the main mode at W5NW, Soupy perceived that his West Gulf members leaned toward phone. They wanted their fair share in the allocations, in the decision-making process, in attention from the ARRL Board. He became a champion of the phone man on the Board, making for instance the motions for a new phone band on 40 meters and expanded phone on 80 at the 1946 meeting. For the next four years, phone vs CW issues crowded the Board calendar, climaxing in officer elections in 1950. After 12 deadlocked ballots in the race for President (9 votes for the incumbent George Bailey, W2KH; 9 for Goodwin L. Dosland, WØTSN), action shifted to the vice presidential arena. On the third ballot, Soupy Groves squeaked by J. Lincoln McCargar, W6EY, 10 to 8. (To drop the other shoe, there was a 13th 9-9 ballot in the presidential race, after which WØTSN withdrew, and moved the election of George Bailey. Two years later, Dos won, 11 votes to 7 for George; Soupy was reelected, 11 votes to 7 for Percy Noble, W1BVR.) Soupy served as First Vice President of the League and, under the terms of the IARU Constitution then in force, as Vice President of the International Amateur Radio Union until 1970, when he assumed his present title.

Soupy's life work was in the oil business, with Humble. At times it took him to the far ends of the earth; more recently it was centered on Odessa, Texas. After retirement from Humble in the '60s, Soupy went to sea as a shipboard radio operator a few times, giving him a chance to visit the DX he'd worked, especially "Down Under" in Australia and New Zealand. W5NW stayed busy in Amateur Radio right up until January this year, when his final illness overtook him. For instance, NG5R reports Soupy was active in the West Texas Amateur Radio Club. He was historian of the Old Coyote Chapter, Quarter Century Wireless Association. He had regular schedules on HF phone with friends in South Africa, and chased DX on CW. But he also had a 2-meter box for local QSOs. Was Soupy's enthusiasm for ham radio contagious? We think so: His wife Beth is W5DUR; his sons Grantland and Bertron are W5QMZ and W5QNA, respectively, each eligible for QCWA! Soupy was awarded an ARRL Plaque for 60 years of continuous membership in ARRL; Beth has a 50 Year Plaque. And Soupy had the Amateur Extra and Amateur Extra First Class licenses all three times the Government made them available: in 1924; during the revival of that class late that same decade; and again before Incentive Licensing was restored to Amateur Radio in the sixties. Hail and farewell to Wayland Martel Groves, W5NW, 1904-1986—our friend Soupy, a world-class amateur by any measure.—*Perry Williams, W1UED*

SECTION MANAGER ELECTION NOTICE

To all ARRL members in the Southern Florida, North Dakota, West Indies, Oklahoma, Minnesota, Connecticut, Idaho, Western New York and Ohio Sections: You are hereby solicited for nominating petitions pursuant to an election for Section Manager. Incumbents are listed on page 8 of this issue.

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.* It is advisable to have a few more than five signatures on each petition.

Petition forms (FSD-129) are available on request from ARRL Headquarters but are not required. The following is suggested:

(Place and date)
Field Services 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 Manager for this Section for the next two-year term of office.

(Signature ... Call ... City ... ZIP)

Any candidate for the office of Section Manager must be a resident of the Section, a licensed amateur of Technician class or higher and a Full member of the League for a continuous term of at least two years immediately preceding receipt of a petition for nomination.

Petitions must be received at Headquarters on or before 4 PM Eastern Local Time June 6, 1986.

Whenever more than one member is nominated in a single Section, ballots will be mailed from Headquarters on or before July 1, 1986. Returns will be counted August 19, 1986. SMs elected as a result of the above procedure will take office October 1, 1986.

If only one valid petition is received for a Section, that nominee shall be declared elected without opposition for a two-year term beginning October 1, 1986.

If no petitions are received for a Section by the specified closing date, such Section will be resolicted in October *QST.* An SM elected through the resolicitation will serve a term of 18 months.

Vacancies in any SM office between elections are filled by the Field Services Manager.

You are urged to take the initiative and file a nominating petition immediately.

Richard K. Palm, K1CE
Field Services Manager

REPEAT NOMINATING SOLICITATION

Since no petitions were received for the Eastern Pennsylvania Section by the petition deadline of December 6, 1985, as a result of notices in October and November *QST,* nominating petitions are herewith resolicited. See the above notice for details on how to nominate.—*Arline Bender, WA1VMC*

SECTION MANAGER ELECTION RESULTS

Balloting Results: In the Eastern New York Section, Paul S. Vydareny, WB2VUK, received 520 votes, and Joseph Humet, WA2UKP, received 201 votes. Mr. Vydareny was declared elected. In the South Dakota Section, Roland L. Cory. WØYMB, received 123 votes, and Robert J. Olson, WAØFPR, received 82 votes. Mr. Cory was declared elected. Their new term of office begins April 1, 1986.—*Arline Bender, WA1VMC*

GOLDWATER SCHOLARSHIP CONTRIBUTIONS

Through your generosity, the $50,000 fundraising goal for the Goldwater Scholarship Endowment has been achieved. Nonetheless, contributions continue to flow in to the ARRL Foundation to honor a great amateur, a great statesman, and a great human being. *We welcome all* contributions, regardless of size. Make your check payable to the ARRL Foundation Goldwater Scholarship Fund and send it to ARRL Foundation, 225 Main St, Newington, CT 06111.

Recent contributors of $25 or more include Omer B. Pea, N9DMG; Ed Munn, W6OYJ; Roy T. Shelso, W6RBV; in memory of Phillip K. Turner, K4BHO, from Harry L. Turner, KB4MPQ; Martin J. Carlucci, N6IFS; Bill J. Sturm, WA7LPY; and Edward E. Glanert Sr, KA1KUG.

Conducted By Ellen White, W1YL/4
19620 SW 234 St, Homestead, FL 33031

Clipperton Revisited

Last July's How's DX? admittedly furnished little "hot info" on the dazzling April 1985 FOØXX foray to Clipperton. Writing almost immediately on the April return of that crew's hectic engagement, your writer had to make do with what was available at copy deadline, the bare bones of bands and statistics. Correspondent K3NA promised to fill in the "human interest" story gaps when his business schedule permitted. Happily, Eric's recent schedule allowed him to reveal the following interesting points to your author, tidbits that "flesh out" the original factual story of this truly unique international DX operating event, information sure to expand your ecological view on this isolated bit of terra firma.

When we got to Clipperton a full day ahead of schedule, we found surf conditions too difficult to attempt a safe landing. Several unsuccessful attempts were made by the crew of the *Royal Polaris*. One of these attempts nearly ended in tragedy, as the skiff was flipped in the surf and dashed against the outer coral barrier reef (about 300 yards off shore, in waters frequented by the infamous Clipperton sharks). Fortunately, the crew members suffered only minor cuts and abrasions, and the skiff was rescued. The motor had been shut off in a timely fashion, and thus there was not too much sand and junk inside. The crew was able to restart the engine and return to the ship safely.

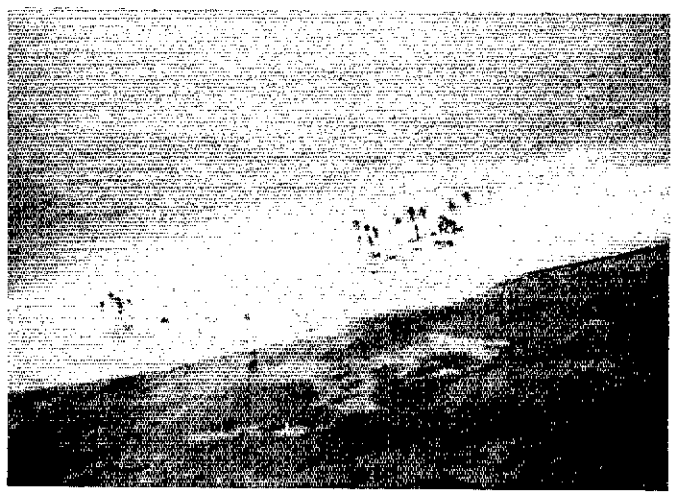
The second day circling the island was worse, as an incipient tropical storm (what meteorologists call an "easterly wave") passed over the island. Heavy squalls and high winds lashed us and generally obscured the island most of the day. The ship itself bounced around a good deal, much to the discomfort of some of the operators.

The third day circling the island was much like the first. And so there were 16 mighty anxious people at dawn on the fourth day. When I woke in my bunk below decks, I remembered thinking that the sea didn't seem much quieter that it had before. Anyhow, a landing was attempted on the northeast coast, near the old LST wreck and ammunition dump, and everything actually went quite smoothly.

But the first night on the island held some additional surprises. Several tropical rain squalls zoomed up out of the darkness, and it just poured rain and blew 30+ knot winds on the camp. Tent anchors popped up out of the ground as if they were nonexistent, and many tents started to roll across the thin island towards the lagoon. Fortunately, a few of the tents had heavy gear stowed inside, and they did not roll very far—although the wind pretty much flattened the walls and roof. The other tents were recaptured and filled with heavier equipment. Then, we secured them with 4-foot reinforcement bars driven into the sand. The waterproofing did not stand up to the constant abuse that occurred almost nightly (either because the tents weren't waterproofed very well to start with or because of the neutralization effects of the chemical action of bird droppings). So, in combination with the high winds, the tents filled with several inches of water. The tent floors, it seems, were very waterproof. (We wound up poking holes in the floors with pencils in order to get the water to drain out! This worked well.) In all the chaos, everyone became drenched, and no one survived with a dry sleeping bag or change of clothes. It was indeed an uncomfortable first night.

The second night was worse—more rain and higher winds. At least we had mastered the art of capturing tents and tying down gear. During the day, most of the crew had been working hard setting up additional stations, and everyone was tired. When a second, and then third, series of thunderstorms struck that night (with tarps collapsing around the operators and rain falling into the equipment), people just wore out. Most everyone went to bed, and the stations were not manned as extensively through the night as we had hoped.

The third day arrived. As tired people struggled out of bed, much to our surprise we heard what sounded like a helicopter approaching the island. Sure enough, a small helicopter appeared out of the morning sun and circled the camp. After hovering over the camp, it dropped a couple of small bombs and landed. (Later, we found out these were just smoke and noise to scare off the nesting birds from the landing areas.) A Mexican aircraft identification number was painted on the tail. XE1ZZA held a conversation with the pilot, and we discovered that the chopper was from a commercial tuna fishing boat still over the horizon. The choppers are used to spot fish schools, and while searching for fish the pilot noticed sunlight flashing from the island. He came over to investigate, and discovered stations and antennas (the sun was reflecting off the aluminum). An even bigger surprise was that the chopper pilot was OA4CRJ! There was a 2-meter Kenwood radio in the 'copter. The first FOØXX QSL, for the *only* 2-meter QSO, was handed out on the spot. The people couldn't have been nicer. XE1ZZA and W6RGG got a guided tour of the tuna fishing ship, escorted over by helicopter, and enjoyed a fine Mexican lunch and some ice cream (a real treat in that hot climate!). The ship's crew brought over cold beer, soda, fresh fruits, other foods and some fine brandy. Thanks to the helicopter, I was able to take several trips around the island for the aerial photo coverage.



An unexpected view of FOØXX, Clipperton 1985.

We were able to operate phone and CW on each band simultaneously because the antennas were spaced well apart and because of the W3LPL receiving filters used to eliminate cross-band interference. Nevertheless, conditions were not what we had hoped for, especially to Asia and extreme eastern parts of Europe. [DXpedition statistics were reported in the July 1985 issue.—Ed]

Recently, I had the good fortune to visit WØVDQ in Westminister, Colorado. Gene was on the 1954 Clipperton expedition with WØDX (who now is VP2VI). WØVDQ, W8TN (another FOØXX operator) and I had a wonderful evening comparing slides and stories about our respective Clipperton visits. We were really amazed at the changes that have occurred on the island in the past 31 years. Both expeditions camped at almost the same spot (but you wouldn't know that from the photos!). The big LST that was wrecked on the island during the '40s has broken up and is now gone except for bits and pieces here and there and some abandoned equipment on the island itself. In 1954, the island was covered with a vine-like type of ground vegetation. This has disappeared from almost everywhere, except for a small patch about 8 feet across near the north point. Coconut trees on the peninsula to Clipperton Rock have long since fallen over and disappeared. I believe the famous red land crabs are responsible for this destruction of vegetation. The 1954 group found that some wild pigs were still living on the island, remnants from the Mexican occupation through World War I. According to National Geographic archives, these pigs were reported as still present in 1962 and were used for food by some shipwrecked fishermen. But about a year earlier, a scientific expedition determined that the pigs were preying on nesting birds and slaughtered most of them. The pig population was apparently reduced to an unsupportable number and died off. As a result, without controls on its numbers, the land crab population mushroomed and has been destroying the vegetation, insect and bird life ever since. Today, Clipperton has almost no insects, but does have plenty of birds and land crabs. Few new coconut trees are sprouting. The only green spots are some islets located in the inner lagoon (called the Egg Islands), which are covered with grass. Apparently, the crabs can't swim across the lagoon! There is still quite a bit of vegetation in "Bougainville" on the southwest shore, where a grove of coconuts was established at the turn of

the century when the island was occupied. The 1978 expedition camped in Bougainville, as did the Jacques Cousteau group.

The inner lagoon is entirely cut off from the ocean. Historically, this was not always true. When the island was first discovered, there were three openings to the sea. Over the centuries these have apparently filled in with crushed coral sand. Today the lagoon is brackish, but much lower in salt than the sea. The water level of the lagoon, when we visited, was several feet below sea level. The island itself is like the rim of a bowl, with the lagoon filling in an old volcanic crater. As the rain falls, it drains into the lagoon, dissolving some of the ancient coral. Bird excrement (rich in phosphates and nutrients from fish that the birds eat) is also washed into the lagoon, making the lagoon rich in algae. There are some schools of small fish in the lagoon—fish which must be quite different from other sea fish in the world because of the different and varying salinity levels and their isolation. The outer edge of the island continues to build outwards by coral washed up from the reefs as the inner edge dissolves into the lagoon. If left undisturbed, perhaps the vegetation will disappear entirely, leaving the crabs and birds to fight over the remains.

[Editor's Note: Do *you* have additional information about Clipperton? K3NA finds recorded history sketchy, with lots of unconfirmed stories repeated over the years. He has not yet been able to dig up much information about the pirate John Clipperton, who made the island his secret hideout. If enough information surfaces, perhaps there will be enough some day for a small book about his island of Clipperton: hot, remote, desolate, uncomfortable, but strangely beautiful with the raw forces of nature acting on it. Clearly it deserves its reputation as the Classic DX location.]

Last year, KH6IJ (left) thrilled Fresno/Dayton DXers with his ever-present wit and style. At that April California DX Convention was KH6IJ, your column conductor and Nose's supportive XYL, Matsuyo. *(W6RVS photo)*

THE CIRCUIT

☐ **HBØ:** The Wiesbaden ARC will be on the air May 22 through June 6. The club will be operating HBØ/DA1WA on all bands. US and Canadians QSL with an SASE (with 1 unit of postage) to Steve Hutchins, Box 4205, APO New York 09633-5374. All others via Hugo Jakobljevich, Im Weinberg 10-, D-6200, Wiesbaden-Auringen, Fed Rep of Germany.

☐ **Montserrat:** Planning for May VP2MM activity during CQ WPX are VP2MM, VP2MIU, W1CDC/4 and AB1U. (CW operation is planned pre- and post-contest.) VP2MM/MIU contacts go via AB1U.

☐ **K4UVT/KH6:** Bob notes that anyone still needing a card for his September operation should go via D. R. Dorsey, Jr, PO Box 61733, Sunnyvale, CA 94088. Likewise cards for his November 8P9AJ Barbados operation.

☐ **ZK1:** Last fall, K5BDX made 2500 contacts on Rarotonga, and indicates that cards for both ZK1XT operations go via K5BDX.

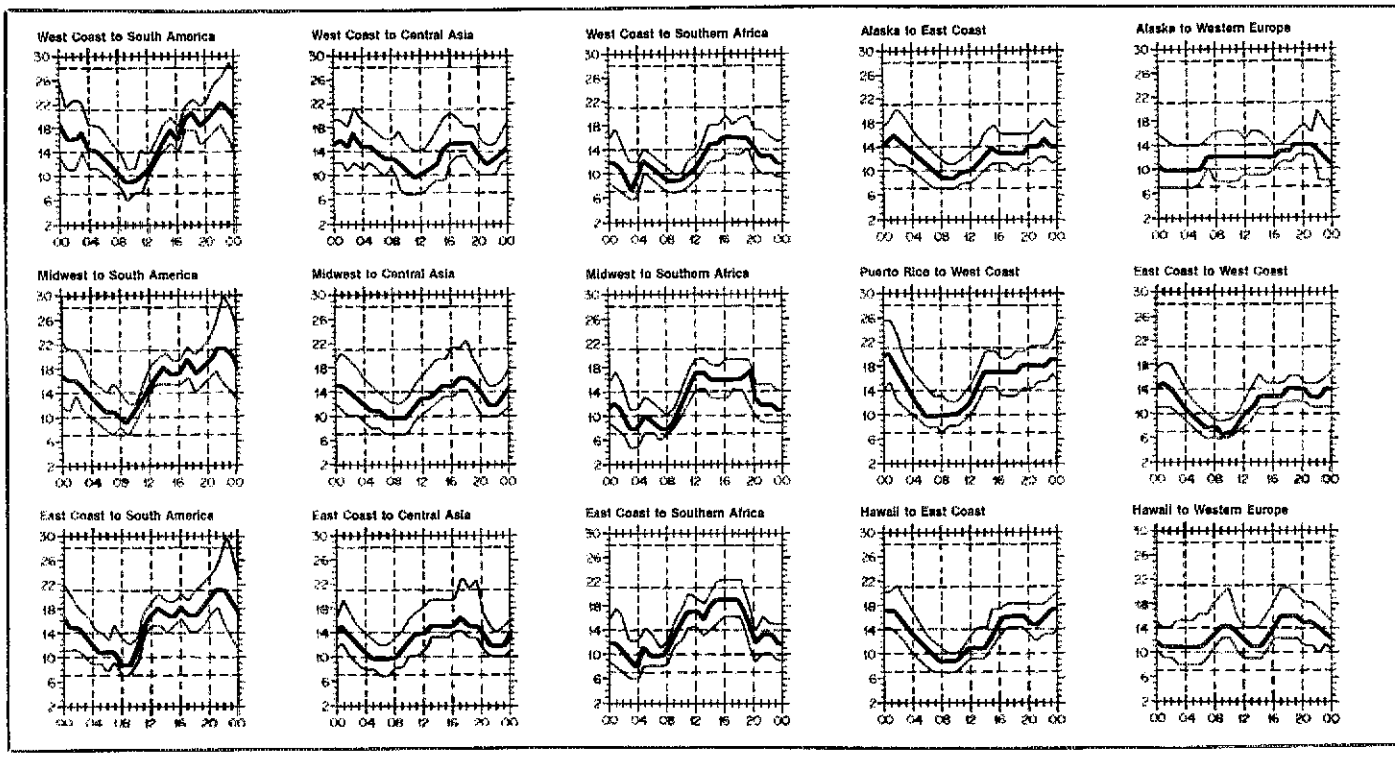
☐ **VK9LH:** The news from Rudi (on Lord Howe) isn't good. Since September of last year he and his family have sustained a number of severe disasters: health problems for Rudi and members of his family, and the uninsured loss of his new home bungalow in Germany. The Southern California DX Club, Inc and others in the DX community are rallying to aid Rudi in his time of need. Mail for Rudi goes c/o DJ5CQ, Alter Main 23, D-8601 Ebing-Bamberg, Fed Rep of Germany.

☐ **DX Nets:** OE2DYL's *DX Nets Around the World* list is in its fifth edition, detailing 100 nets. Further details from Dieter Konrad, Bessarabierstr 39, A-5020 Salzburg, Austria.

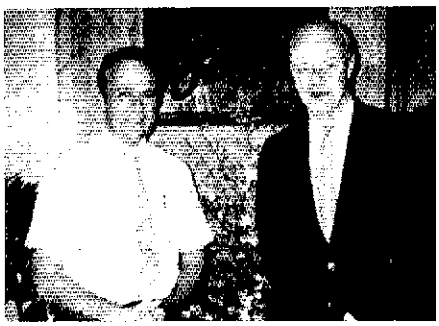
☐ **Long Skip:** The February issue carried details on this interesting monthly. Updating that item, however, is news of the new editor, VE3IPR. John notes that the Canadian DX Association is planning on a hospitality suite at Dayton.

☐ **Dayton:** The Kansas City DX Club notes that Kirsti and Jim Smith of Heard Island fame will be at the Dayton HamVention®. The club's hospitality suite will again be room 525 at Stouffers.

☐ **Heard Island Odyssey:** Kirsti Jenkins Smith, VK9NL, has produced a 140-page book geared toward nonhams, documenting the HIDXA expedition and promising to be a real plus to your library. The book is available by mail order for $14.45, which includes airmail postage, from HIDI-Y, Box 90, Norfolk Island, 2899, Australia.



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



VS6CT (left) comparing DX with K6IR at the Peninsula in Hong Kong. *(tnx K6IR)*

☐ **Radiosporting:** While VE3BMV's interesting monthly is essentially a contesting periodical, it does hit heavily on DXing as we know it. Further details from Radiosporting, Box 65, Don Mills, ON M3C 2R6, Canada.

☐ **K6IR:** This HR DXer (3 to go to have 'em all) reports on his interesting trip to BY, VS6, HL and BV, and notes that BV2B is looking great in his retirement.

☐ **TV5SDP/TV6SDP:** J28EI/F6CZB/C3Ø AAK, Dany, reports that this early March special-events operation noted the Salon de Provence Telecommunications Show.

☐ **ZA:** OK1MP notes that during CQWW CW the OK1DXZ/ZA and ZA1A activities were clearly by pirates (likewise a late-December operation that claimed to QSL via OK1MP).

☐ **Israel:** The Israel Amateur Radio Club invites foreign amateurs to participate in a 10-day tour of Israel in July. Information is available from Accent Tours, 225 S 15th St, Suite 916, Philadelphia, PA 19102, tel 215-545-7670.

☐ **Madison DX Club:** New officers for this Wisconsin-based club include President WB9NOV, VP N9BAF and Secy/Treas N9EJL.

Troster's Tips for Easy Listening

Suppose, for a change, *you* are the DX station. It seems to be almost every DXers dream to operate from a DX location sometime. And, you will be a better operator at home once you have had the experience of handling the barrage generated by your peers calling you. First, it is a tremendous difference (and a lot of fun) to be on the receiving end of a pileup, rather than being part of the QRM. You will begin to appreciate the very different (and real) operating problems a DX station has to contend with (compared with your problems at home). Second, realize that there is always someone out there who needs your particular country—for a new one of *some* kind: new DXCC, 5BDXCC, QRP, CW, phone, etc. Everybody loves you. So, you want to do a decent job. We'll start you on your DXpedition to fame next issue.

More next month from W6ISQ.

QSL Corner

Administered By Joanna Hushin, KA1IFO

Here is some information for those of you who would like to QSL a QSL manager or 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.

A22BW (DK3KD)
AP2SQ (W3HNK)
CE9AM (CE3EEO)
CEØFQU (WB3CQN)
D68WB BP 540, Morini, Grand Comore, Rep of Comoros
EI8EK (WA9AEA)
EL2AY (N5GAP)
FG5BP (KA3DSW)
FG7BP (KA3DSW)
HC5KA (KT1N)
S9ØAS (IT9AZS)
TF3XUU (SM5CAK)
TG4NX (TG9NX)
TU2JJ (KNØJ)
TU2NG (N5GAP)
ZP5JC (LU8DPM)
5Z4RT (KA3DSW)
6W6NJ (N5GAP)
8P6OH (W2FLO)

QSL Manager Volunteers

WA4PMF
KA3DSW
DL1HBT/KA9STS

Special Notes

☐ K4BC is not the manager for 9X1M, 9X1MS.

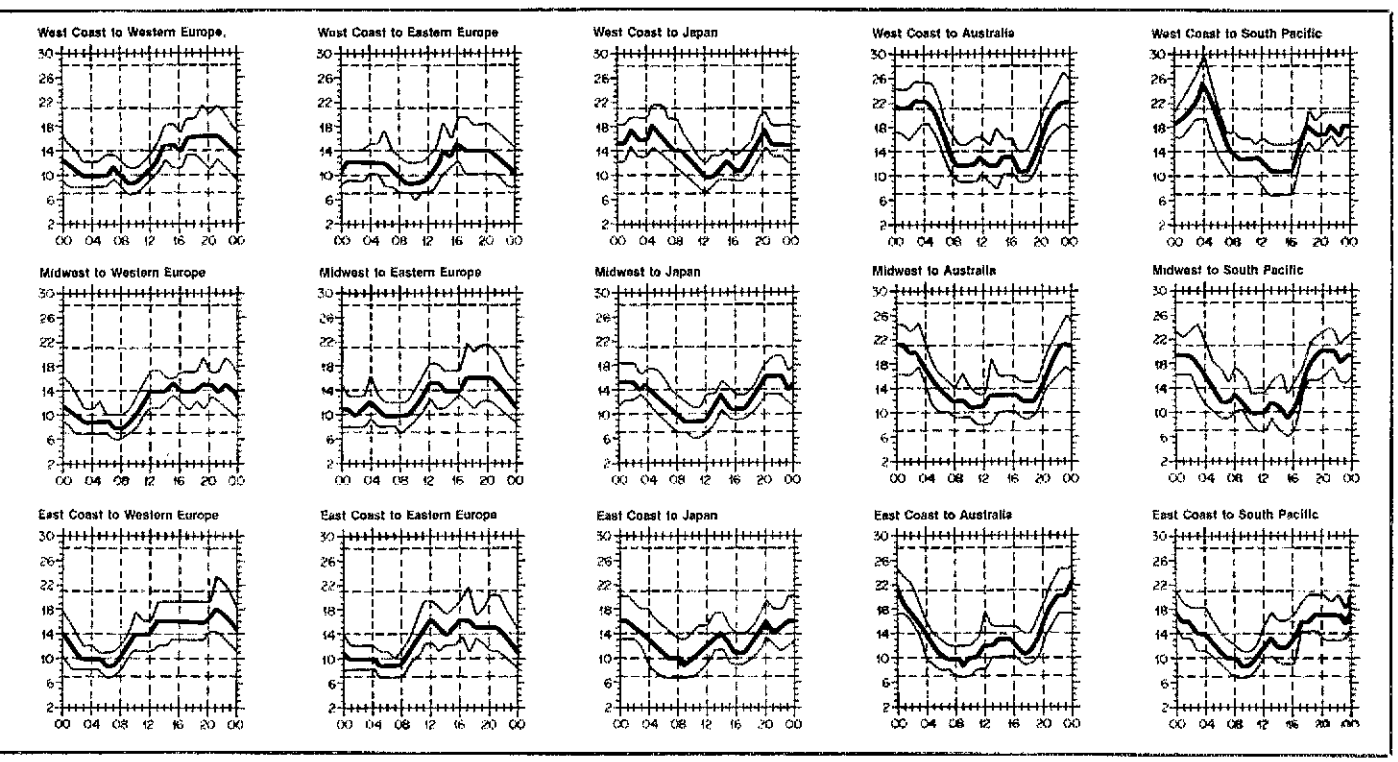
☐ KZ8Y is not the manager for TG9NX.

☐ If you are a manager for a DX station and do not wish to receive cards via the bureau, please notify your bureau in writing. This will help bureau managers, who are having a problem with a large backup of cards and nowhere to send them. Your cooperation would be appreciated.

☐ Mauritania QSL Bureau (5T5) is no longer in operation. It closed as of Dec 1985.

☐ QSL the Maui, Hawaii Amateur Radio Club via AH6AZ.

☐ QSL Corner, Dec 1985 *QST*, contains information and addresses for ARRL Incoming Bureaus. March 1986 QSL Corner contains information on the operation of the ARRL Outgoing Service. For additional information on bureau operations (Incoming and Outgoing), send an SASE to ARRL QSL Bureau, 225 Main St, Newington, CT 06111.



the lowest curve (optimum traffic frequency, or FOT). See April 1983 *QST*, page 63, 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 April 16 to May 15, 1986, assume a sunspot number of 10, which corresponds to a 2800-MHz solar flux of 72.

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 October 1 through October 31, 1985. An SASE will bring you the rules and application forms for participation in the DXCC program.

New Members

Mixed

DJ7AE/106	I1SOP/245	JA3THL/308	VE3AXU/110	YU5CEF/105	WA1PTZ/119	KF4BU/105	KA7FEF/100	WA8LLY/107
F6BCP/106	I3TNN/110	JH7XTS/120	VE3MQV/102	ZC4MR/110	W2DJH/102	KE8OT/195	N7CFA/101	KA9OTD/105
FP5DF/122	I3ZKD/272	LA2QP/104	VE6CB/108	ZS5NK/126	W2RK/105	NS4X/105	KD8KY/106	N9ANO/100
G4DIB/102	JR1CVV/183	OK2RU/287	VK2EXW/147	7X2ED/114	WA2UKA/100	NS6V/101	KX8Q/178	N9CWQ/101
GM3WFJ/127	JE2LPC/221	SP8EPF/110	WP4O/100	KW1V/102	K4YT/DU/111	W6AUG/262	NM8C/131	W9JZ/124
HA4XX/118	JE2PMC/105	SV1JA/108	YU1FW/296	N1CPC/131	KZ4V/210	W6MFC/305	W8DYS/100	NØDH/211
HK1HHX/117	JR2QKH/161	TIØHC/108	YU2SWV/109	WA1HUM/135	KB4DFK/102			

Radiotelephone

DJ7AE/104	G4UCB/200	JA7GYR/134	SM3ETC/108	YB3BJT/113	W2RK/100	WB5INB/126	WA7MGF/101	N9CIW/104
DL2AAE/104	HA8XX/116	LU1HG/142	TR8SA/138	YU1FW/278	K3NEE/104	KE8OT/161	K8JRK/281	NE9O/135
DL3YAW/153	HK6BER/105	LU8DWN/108	VE3MQV/100	YV3XR/100	K4YT/DU/111	W6IYV/102	KX8N/140	W9JZ/115
DL8LT/104	JR1CVV/158	PA2HJH/103	VK2EXW/117	ZS5NK/126	W4IAA/109	W6SUP/162	NM8C/131	KB0RM/102
EA3AAY/118	JR2QKH/161	PAØFVH/151	Y81ZN/105	KD2LM/163	KA5RNH/105	WG6P/102	W8VJW/100	KYØR/114
EA8BCJ/133								

CW

DK2DE/105	F6IJV/128	I1SOP/112	LA9CM/113	PA3CXC/101	K2BK/260	N4IHT/101	W6AUG/223	AB0M/250
DL2SAD/118	FE6ACV/120	I1OOK/109	OK2RU/246	KR1B/101	K2ENT/223	K5CON/110	W6MFC/101	NØDN/180
F5ZI/103	G3SGQ/123	I4YCE/110	OZ2JI/114	KT1O/106	K4YT/121	KE8OT/113	K8CH/139	

RTTY

DL7WL/105	PT2BW/104		**160 Meters**					
			F6BKI/106	N4KG/106	DL7AA/102	W5YU/100	W2QHH/100	

5BDXCC

VK3RF	VE3JGC/W4	SV1PL	WØOIZ	GM3LYY	K2ENT	AE1Q	EA7LM	WØMHK
N9ER	KG9J	K4DLI	PAØMA	UA4FHR	KI2G	K7ZBV	OK2RU	JH6RYY
EA8AFS	WB2CJL	NU4D	WAØJYJ	UW3PZ	EA4BVE	SM5MNB	K8ZZU	AB4H
DL6OL	ND5N	KE2S						

Endorsements

Mixed

CE6EAT/303	HC4JL/282	OE1FT/351	WP4D/255	WA1YTW/295	K3NA/206	WM4Z/225	K7EG/310	KK9Y/125
CT4YN/261	IN3RZY/291	OH2VZ/332	YU1HI/282	K2DI/201	K3RT/308	K5SSB/287	K7JF/125	KM9W/228
DJ3TF/300	IT9JLA/311	OZ1GRS/153	YU1ZO/303	K2ENT/304	K3TUP/330	KC5CP/284	K7RLS/320	KR9P/289
DJ5KB/177	JA1BFF/269	OZ7GI/304	YU2CBM/321	K2IJ/306	KA3CTY/265	NJ5V/203	KB7WD/134	N9CPW/287
DJ5VQ/340	JA1CZI/276	PP5VK/187	YU2YM/318	K2JF/288	KF3C/254	W5MCH/226	KC7TB/202	N9DJ/304
DK2OX/308	JA1DM/355	PP5YC/321	YU3TE/297	K2QEY/176	W3DO/292	W5NF/251	N7ALX/274	W9MP/225
DK8ZB/168	JA1JAN/330	PY4OD/349	YU7BCF/203	K2UR/340	W3EYF/344	W5UCQ/328	N7BES/276	WB9NOV/300
DL1DA/319	JA1RWI/304	SM3EVR/319	K1NLQ/270	KA2AOT/124	W3ZN/327	WA5IPS/260	W7DAA/289	WB9OQU/301
DL1JW/354	JH1APK/314	SM5AHX/134	K1ST/317	KB2HK/286	AA4H/306	WB5ZGP/295	W7QZI/201	WD9AHJ/308
DL2SAD/191	JA2BXV/201	SM5AZU/338	KA1BU/305	KC2WQ/224	AE4X/352	K6JG/342	WA7MOK/287	AB0X/314
DL3YAW/193	JA2DN/284	SM7DMN/324	KB1JU/204	KF2O/318	K4KJZ/310	K6KII/354	K8CH/331	AE0K/314
DL3ZI/348	JA3BXF/323	SM7EXE/331	KT1O/136	KN2B/228	K4PR/291	K6LEB/342	K8KAE/321	KØJFN/268
DL4GBA/147	JA3JOR/317	SMØAGD/304	W1BFA/325	KU2C/206	KF4QD/151	K6SIK/151	KA8T/308	KØJGH/301
DL7NS/HB0/150	JA3MNP/325	VE1RH/125	W1BFT/300	N2EDF/226	N4AXR/309	KA6CJL/201	KN8Z/331	KØQYD/200
DL8MBS/227	JH3TKM/317	VE1YX/318	W1ESN/313	NI2V/238	N4JF/340	KA6IYE/202	KX8N/199	KØSI/201
DL9JI/274	JJ3FOZ/194	VE3CWE/300	W1GVZ/286	W2GQF/236	N4KG/335	KT6S/156	N8EKS/125	KJ0H/258
F6ACV/255	JA5AQC/313	VE3FEA/300	W1JOL/181	WA2IFS/300	NF4U/315	N8AN/330	WA8PYL/323	NØBZP/150
F6CUK/307	JA6HUG/314	VE3IR/315	W1KGH/334	WA2LMW/276	W4DTO/161	N8OJ/316	AF9R/288	NØJW/270
F6DYG/291	JA7AD/348	VE3JGC/175	W1LQQ/332	WA2PPV/277	W4LSI/173	W6AN/314	AJ9D/310	WØCAW/321
G3JEC/336	JA7BWT/211	VE3NI/297	W1NG/332	WA2YMX/151	W4OWJ/341	W6BJH/329	K9FN/326	WØEJ/293
G4CNY/300	JA7GLB/320	VE3WW/338	W1OO/341	WB2TKY/290	W4WG/330	W6HT/321	K9HA/305	WØJSN/261
HA9RT/159	JA7ZP/305	VE7DP/316	W1TN/293	AD3Z/317	W4YA/329	W6OK/294	K9WG/272	WØLYI/325
HB9AGI/215	LA9GV/311	VO1CA/287	W1TPK/309	K3HBP/270	WB4JEM/124	W6ZQK/154	KB9PB/146	WBØYJT/175
HB9BQT/152	LU5DO/356	VO2GD/286	W1WW/290	K3LVO/129	WD4HLK/302	WA6GFY/315		

Radiotelephone

CE6EAT/290	G3JEC/336	JA1RWI/281	VE3FEA/297	W1TN/278	WB2TKY/288	WC4B/150	W6MFC/302	KX8Q/177
DJ3CP/305	GM3LYY/154	JA3JOR/312	VE3JU/240	W1TPK/308	K3NA/145	K5GE/294	W6MKB/250	WA8PYL/313
DJ5VQ/326	HB9AGI/175	JA3MNP/324	VE3NI/291	W1VRK/286	K3RT/275	K5SSB/284	W6OK/291	K9FN/323
DJ6VM/329	HK8BVN/275	JH3TKM/313	WP4D/171	WA1YTW/292	K3RX/315	KB5IW/301	W6ORD/308	K9HA/303
DK2OX/306	I1JQJ/292	JJ3FOZ/194	YV1KZ/333	K2ENT/304	KF3C/255	NJ5V/202	W6PGK/296	K9UAA/305
DK8JS/262	I1XXM/250	JA5AQC/311	YV4ACY/225	K2SGH/300	N3CWP/225	NO5B/176	W6ZQK/147	KA9MOM/125
DK8MZ/310	I2IAU/245	JA6HUG/280	ZP5JAL/264	KB2HK/286	W3EYF/285	W5BPT/280	WA6OET/319	KC9LB/132
DL1JW/337	I2PKF/306	JA7GLB/319	ZP5JCY/275	KC2FC/270	W3IQS/293	W5LLU/284	WB8ALC/126	N9CPW/261
DL2SAD/182	I3ADI/325	JA7ZP/297	ZP5MJY/260	KC2WQ/224	W3ZN/312	W5UCQ/310	WD6BSD/307	NF9Q/249
DL6KG/329	IV3JNH/204	KL7D/291	K1JRE/175	KF2O/311	AE4X/325	K6SIK/150	K7EG/275	W9ITT/277
DL9JI/231	I5AFC/321	LA9GV/310	K1ST/312	NA2G/202	K4KJZ/310	KC6H/276	K7RLS/305	W9MWD/302
EA3AOC/311	I5ICY/292	OE1PC/308	KA1BU/301	W2GQF/324	N4AXR/309	N6OJ/285	N7BES/274	WB9NOV/298
EA5BCX/267	I5IGQ/287	ON5HU/308	KA1ND/301	W2YTO/305	N4CRU/302	W6AN/298	W7DAA/261	WD9AHJ/308
EA7CEO/262	I6ZJK/281	OZ3SK/346	W1BFA/311	WA2GWS/187	N4KG/323	W6BCQ/322	W7FJE/264	WD9GIG/184
EA7LM/273	I6ZAJ/297	PP5YC/318	W1LQQ/324	WA2IFS/295	NF4U/309	W6BWG/303	W7YR/318	KAØDMB/252
EA7LQ/311	I8KNT/313	PY4OD/288	W1NG/324	WB2EZU/279	W4KHW/299	W6CN/308	AC8H/292	WØDFT/196
EA7SJ/152	JA1DM/328	VE1YX/318	W1QJI/150	WB2IJD/250	W4LSI/154	W6HT/276	KN8Z/330	WØLYI/321
F6BDG/183	JA1JAN/326							

CW

CE6EAT/155	I1JQJ/158	JA3MNP/295	K1RH/295	K2DI/180	KZ4V/205	K6JG/305	W7KZK/164	N9DJ/209
DF2PI/227	I5XIM/299	PY4OD/233	K1ST/268	K2IJ/293	N4JF/291	KA6DXY/178	K8NA/260	WD9AHJ/303
DJ5VQ/284	I8JOV/200	OZ7GI/284	N1AFC/126	K2LFL/174	N4KG/301	KA6IYE/200	KF8K/186	KJ0H/201
DL2HBX/127	JA1CZI/252	SM3EVR/311	W1BFT/260	KF2O/226	W4PBC/128	N6AN/263	WA8YTM/198	KØSI/200
DL8MBS/157	JA1RWI/244	WP4D/224	W1LQQ/270	K3NA/150	W4WG/200	N6OJ/137	AF9R/208	WØCAW/251
G3GHY/174	JA3JOR/249	YU1ZO/268	W1NG/312	W3EYF/277	WC4B/175	W6BJH/298		

RTTY

W3DJZ/188		**160 Meters**						
		W1OO/146	W2SM/129					

DXCC Notes

Attention DXCC Honor Roll Members

A DXCC Honor Roll sticker is now available for your DXCC award. It is identical in appearance to the DXCC pin. To qualify, send to the DXCC desk the Year/Month/Mode that your *call* appeared in *QST* and your current Honor Roll total. Include an SASE with one unit of postage.

The totals shown below are exact credits given to DXCC members from November 1 through November 30, 1985.

New Members

Mixed

A22TE/104	JN1KEJ/232	JA8EC/118	OK3TTL/107	YV6CAX/131	KU4A/100	N5GAP/125	KJ8Y/108	K9EC/128
CT1TH/105	JA3HF/106	KA2AA/202	RT5UN/326	KA2UTV/101	N4ACF/101	WA5OYU/126	N8FZI/138	N9CAR/110
DL4FF/323	JG3NKP/130	OH2EQ/169	VE3CK/220	NI2N/109	KA5MIJ/140	NM7H/105	W8KJP/187	KIØA/110
IK8DOI/116	JA4ZD/185	OH2UBF/114	WL7AME/100	AF4Y/279				

Radiotelephone

A22TE/102	EA7DKG/144	HB9AWS/103	JH1CAO/110	RT5UN/216	AF4Y/261	N5CTK/103	W6UE/148	KJ8Y/108
DL2BAR/109	G4MBT/105	I2KVI/155	JN1KEJ/172	SM5BZQ/124	WB4MRH/110	N5GAP/102	N7GMT/101	N8FZI/138
DL4FF/307	G4SZD/108	IK8DOI/110	JA4ZD/179	ZS6TB/105	KA5MIJ/140	WA5OYU/117	W7LHO/189	WD9DZV/113
EA5BMK/106	G4XHA/100	JA1AUJ/106						

CW

DL4FF/264	G4ISK/132	JH1PEZ/173	JG3NKP/105	OZ7JZ/303	NI2N/101	W6UE/103	KA8HOK/106	W8KJP/154
DL9YX/270	I8RFD/189	JN1KEJ/173	OK3TTL/100	N1CPC/101	NN5G/109	W7LHO/110		

160 Meters

					Satellite			
G4AKY/107	OZ7JZ/103	W2FP/100	W4FX/102		W2YY			

5BDXCC

DL9YX	KD9GJ	N4AVB	ZS5BK	DL6QW	W7FP	OH3RF	N1ALR	OK1VK
KAØAYN								

Endorsements

Mixed

CX3AN/279	I5KXK/143	SMØBFJ/320	K1KOB/279	W3TVB/313	W4PTH/321	K6DT/341	W7SFF/284	W9DDX/303
DJ8CR/335	I8RFD/306	SP9AI/325	KX1A/261	AA4AR/312	W4YVZ/152	K6EXO/337	KA8OUT/127	WA9VGY/310
DL2YBU/141	I8WYD/211	UA9VB/344	N1ALR/281	K4CXY/309	W4ZMC/319	K6LAE/331	W8AD/330	W9FD/350
DL3OH/335	JA1ATF/291	VE4SK/328	W1DGJ/347	K4LNM/356	WA4GOX/151	K6OJO/329	W8JQ/342	W9GW/329
DL6ON/132	JF1CKL/254	VE5KX/280	K2ROR/200	K4LR/310	WB4PUD/290	KX6C/207	W8LU/316	WB9HIP/309
DL7ZR/236	JH1IFS/325	VE7AIW/280	KB2EN/305	KB4HU/302	AF5W/126	N6IZM/215	W8MEP/225	KØBLT/338
EA6ET/271	JH1PEZ/208	VK2AYK/176	KC2CO/263	KR4M/320	K5TA/300	NE6I/255	W8RV/289	KCØFJ/161
EI8H/331	JA2APA/318	YU1AM/328	KB2RZ/300	KV4F/310	KC5WB/290	W6BSY/357	WD8QBP/200	NØALL/300
F6BFH/321	JJ2AFV/262	YU3AW/312	W2KN/277	N4AJZ/300	KE5AX/298	W6DN/328	K9GX/311	NJØM/203
G3JEC/337	KP4AM/313	YU4BM/262	W2TA/317	N4AVB/309	KT5Y/151	W6GO/319	KC9LM/290	NKØN/245
G3VIE/318	OZ7JZ/331	YU7NLR/266	W2YC/281	N4BLX/304	N5CB/280	W6UE/179	KQ9W/293	WØJCB/300
G4FEU/295	SM1CXE/341	ZL4LZ/311	WA2UXC/298	N4IR/295	W5KGX/357	K7DVK/253	N9ADN/256	WØRYW/279
G4HVR/233	SM5BZQ/168	K1HDO/293	K3GT/296	N4UH/335	W5LFK/325	W7EDA/332	W9AMM/327	WAØSTV/201
I2CZQ/205	SM6CST/328	K1JIU/202						

Radiotelephone

CE3BBW/280	F6BFH/321	I8WES/302	VE7AIW/279	W1ONK/357	K4PQV/329	WB5TED/304	WA6RTA/327	N9ADN/255
CX4AAU/263	F6FWW/281	I8WYD/211	VK2AOU/204	AG2K/227	N4AJZ/262	WD5DBV/309	K7DVK/252	W9AMM/325
CX7BF/299	G3JEC/337	IØMBX/314	VP9CP/302	KB2RZ/300	N4AVB/307	K6CID/277	K7INM/231	W9DNE/331
DJ7AX/206	G3VIE/313	JF1CKL/254	YV5EF/175	KC2CO/260	N4BLX/304	K6DT/322	NK7Y/149	W9DDX/303
DJØOUR/249	G4FEU/293	JH1IFS/325	ZL4LZ/311	WA2UXC/298	W4BLB/250	K6EXO/331	W7BKR/317	WA9VGY/305
DK1WN/150	G4HVR/224	JA2APA/318	6W1DY/332	W3FZE/304	W4ZMC/270	K6OJO/328	W7EDA/296	WB9HIP/307
DK3SF/320	I1PQR/310	JH4KMA/194	K1HDO/271	WB3AMO/160	WA4GOX/144	K6VMN/276	KC8NY/288	KØRDJ/250
DL7ZR/190	I2BVG/318	KP4AM/303	K1IYD/168	WB3BGI/305	KT5Y/131	KB6V/280	W8JQ/316	KQØJ/259
EA1QF/311	I2WTY/307	LA4HW/305	K1KOB/255	WB3IHQ/126	W5GFM/130	NE6I/227	W8LU/302	NØDWU/176
EA3OD/307	I2YBC/323	ON4AAC/263	KA1PM/236	AA4AR/312	W5KGX/353	NM6L/132	K9GX/311	NKØN/245
EA6ET/251	IV3YRN/309	OX3KM/150	N1ALR/281	K4CXY/305	W5LFK/307	W6BSY/351	K9LJN/225	WØLEC/203
EA7BLU/296	I8ACB/316	OZ7JZ/317	W1DGJ/347	KB4HU/302	W5OPZ/174	W6DN/300	KC9LM/289	WØPT/306
F3DJ/347	I8SAT/321	UA9VB/331				W6GO/316	KQ9W/292	WBØWAY/302

CW

HB9QM/230	PY2RRG/154	W2YC/232	K4CXY/285	N4IR/284	K6DT/294	W6GO/296	W7EKM/260	KQ9W/275
JH1IFS/303	SM6CST/297	W3TVB/285	N4AJZ/178	W4ABI/126	NE6I/206	WA6PES/175	W8LU/257	W9GW/293
PA3BFH/154	K1HDO/175	AA4AR/295	N4AVB/153	WD5DBV/257	W6DN/253	W7EDA/282	K9GX/281	WØPT/265

RTTY

			160 Meters					
W1DA/125	W2FXA/125		N4JJ/158					

Strays

ARRL SEEKS 1989 NATIONAL CONVENTION SITE TO CELEBRATE LEAGUE DIAMOND ANNIVERSARY

The 1989 ARRL National Convention will be one of the main activities to mark the 75th, or Diamond, Anniversary of the American Radio Relay League. Accordingly, in addition to the usual criteria, the following will be used in selecting the site and the sponsoring local organization for this convention:

1) The convention shall give attendees a historical perspective, and a look ahead to the last quarter of the League's first century. Applicants should address as specifically as possible their plans in this regard.

2) The convention shall provide attendees with a commemorative souvenir that will form a lasting part of their Amateur Radio memorabilia.

3) The convention shall provide non-attendees with an opportunity to share in the experience through QSOs with a special convention station, through videotaped highlights for distribution by ARRL and its affiliated clubs, and through other means to be proposed by the convention committee at the time of application.

4) The convention application shall demonstrate financial and personnel resources sufficient to accomplish these aims, in addition to the usual high caliber of National Convention programs and exhibits.

5) The location will be selected so as to provide for a relatively large attendance.

Applications received by the ARRL Secretary by July 1, 1986 will be circulated to Board members, and the selection made at the 1986 Second Meeting of the Board from among the applications received. If no fully qualified applicant steps forward by July 1, the application process will be repeated prior to the 1987 Annual Meeting of the Board. The application itself, and supporting documentation addressed specifically to the above-listed criteria, will be duplicated for Board members at League expense; for other supporting material, such as Convention and Visitors Bureau pamphlets and letters from local officials, the convention committee should supply 24 copies of each at the time of application.

Correspondence

Conducted By Bruce Kampe, WA1POI
Information Services Assistant

All letters will be considered carefully. We reserve the right to shorten letters selected in order to have more members' views represented. The publishers of *QST* assume no responsibility for statements made herein by correspondents.

CODE PRACTICE AND TUNING UP

☐ I would like to express my thanks to the ARRL staff for providing the services of W1AW. For countless hours, I have sat in front of my rig, copying code from W1AW, trying so desperately to increase my speed and proficiency. I have recorded such transmissions on tape, then played them back while sending along with my straight key and code oscillator.

Oh yes, let's not forget those code proficiency runs. Sweaty palms, a pounding heart in the chest, and QSB on the band. Then in the middle of copying, a station comes on the air, completely covering W1AW's signal. Well, there's always next time, and eventually, you are able to copy okay. These proficiency drills not only give a person a great feeling of accomplishment, but may in fact, help the upgrading ham feel more at ease when the code test is given or help the contester increase his or her score. I used my code proficiency-award speed in the Novice Roundup of 1980, and took first place in the state of Oklahoma.

To me, the W1AW official bulletins are the most important of all transmissions made by the Maxim Memorial station. These bulletins provide the amateur population with the up-to-date happenings of ham radio. These include amateur satellite bulletins, FCC information, and propagation forecast bulletins. There is always some type of information sent daily that is of interest to the avid amateur.

All of this and more! All provided as a free service from the ARRL. Sort of sounds like an advertisement, doesn't it? Well, this is no advertisement, but rather a very sincere thank you from a fellow amateur. Keep up the *great* work. Hats off to you!!! I've got to go now. Time for the next W1AW CW bulletin.—*Carl W. Hickman, KA5DAV, Davis, Oklahoma*

☐ Trying to increase my code speed, I turned on my receiver on the night of January 30, 1986 to get some code practice in on HF. All bands were pretty much dead, no 10 to 15 WPM CW anywhere. Then I checked the W1AW schedule; yes, there was some code practice at 10 PM EST. After copying about 10 minutes of CW on 80 meters (conditions rendered W1AW's signals weak but copyable), I was literally struck by someone calling CQ exactly on W1AW's frequency. This signal was so strong that I had to quickly pull my headphones off or be deafened!

One of the reasons that I became a ham was the respect and courtesy shown to fellow hams. There was also a sense of pride in the professionalism in which hams operated. I try to reflect all these things all the time when I operate, either on HF or VHF.

People, when you tune up or call CQ over W1AW's signal, you are not hurting W1AW one bit! You are hurting those of us who copy or try to copy W1AW. That in turn, to me, shows a lack of respect, courtesy, and professionalism. This is not good, especially for the Novice or those with receivers wishing to become Novices. We all talk about getting young blood into Amateur Radio, but behaving like a lid will turn off most anyone to Amateur Radio. I don't care who it is. Come on, people, the time has come for us to get our act together!—*Lee Groce, N4AAD, Yadkinville, North Carolina*

☐ Why do those hams (and this includes those who know better) still tune up without a dummy load? In these days of sensitive receivers, don't they realize their tuning up is probably killing a QSO a thousand miles away? And this old trick of tuning up on one frequency, and then moving away to call CQ. It fools no one! There is the fellow who sends QRL (with no question mark), and before one can move the hand to the send switch he goes on to sending CQ about twenty times before giving his call. The odd part is, this is usually done by hams who know it is poor operating practice. Why spoil a great hobby for others, old and young? It would be a good idea if every ham listened at least ten minutes before hitting the key.—*Martin M. Hellman, K2TAJ, Staten Island, New York*

HAWAIIAN PERSPECTIVE

☐ In response to your letter in December *QST* ("Amateur Radio, What's That?" by Bill Roork, VE3MBF), I want to assure you that ham radio is alive and doing well in Hawaii. Also, we can stand proudly on our record of service in disaster and emergency situations. I am sorry that things did not work out as you had planned and will attempt to give some insight on the entire situation.

Hams in Hawaii are no different than anywhere else in the world, but the number of us is very small compared to the quantity of visiting hams that reach our shores daily, monthly, and yearly. Most of the local hams are involved as you are in your home QTH of everyday earning a living situation and we do not have the time to welcome every visiting ham that arrives on our shores.

You did not state what island you were staying on, but I really believe had you done more monitoring you would have made many more QSOs with local hams and even been invited to one or more of the local activities.

It seems that the hopes and desires of most visiting hams to the Islands is that they can meet a local ham and use his or her station to talk back home. Nothing wrong in those thoughts, however when you are overwhelmed by the sheer number of visitors you will become very timid in offering a welcome. The local ham here does like to socialize with visiting hams; but at times and places he would like to control. This I am sure is your attitude in your home QTH.

The local ham in the Islands with a visible station is under a constant imposition from visitors to use his station; there are even requests for contest use. The single visitor doesn't understand that he is only one of a multitude that has made the same request at most any time of day or night, and sometimes in a most objectionable manner.

Consider if you will, if these conditions prevailed in your community, and you had several visitors knocking on your door most every day of the week with these requests, would you be very active welcoming visitors on the local two meter repeater? I think not, so please don't expect us to be any different than you. The Aloha spirit does prevail, but there will always be some that don't understand. Aloha and 73. —*Frank Kephart, KH6DW, Kihei, Hawaii*

MOBILE GEAR

☐ I just want to register a complaint which you might want to pass on to all the ham gear manufacturers. I love to look at their new equipment. But where am I going to put it? My wife and I tour in a lovely XJ6 sedan. Have you ever looked inside of one of these cars? There just isn't room for anything. Possibly one could get a two meter rig in there someplace. I just have an HT on the shelf in the middle of the instrument panel with a mag mount antenna on the roof. I would like to have two meters, 450 MHz and 1.2 GHz installed in one mobile radio.

The next complaint is lack of memory in many of these rigs. Put at least twenty channels in. I pick a repeater in each town that I'll be traveling through and enter its frequencies in the memory. Then I write the memory channel number on the map. All my wife has to do is to tell me to go to the appropriate memory channel when we get in range. But with only ten memory channels I have to keep reprogramming as we drive along. I should be able to do that once before we leave home with enough memory.

So come on you guys, give us some small multiband VHF/UHF equipment. Lots of features I'll gladly pay the price, but shrink it into one compact unit. I'll gladly trade power for small size. Even with the HT I seldom go to high power when out on the road. These modern repeaters are really good.—*Edwin J. Sande, WØIEQ, Aurora, Colorado*

THE CHRISTMAS GIFT

☐ What a delightful little tale was "The Christmas Gift" by Bruce Vaughan, NR5Q.

It is always a joy to work the type of fellow represented in that story with his HQ-129X, Viking II, and beautiful bug-generated CW.

Even more pleasurable when he comments that for a forty-six-year-old kid, I'm "pounding my own bug pretty darn well."—*Dick Downey, KA2JIZ, Amsterdam, New York*

[Editor's Note: The fellow in "The Christmas Gift" had an SX-28 and a DX-60. The ham that Dick is mentioning has an HQ-129X and a Viking II. There is a lot of nice, older ham gear that is still on the air.]

PROOF OF LICENSE AT POINT OF SALE

☐ At a time when we amateurs are finding more and more unlicensed operators invading our bands, I find it especially disturbing to note that amateur-equipment dealers are contributing to the problem by selling transceivers to unlicensed individuals. Out of my last four visits to a popular Southern California dealer, I witnessed three sales of transceivers to obviously unlicensed customers.

I am aware that dealers are not obligated to check for proper licensing prior to making a sale. However, I believe that it would be in our hobby's best interest if they would. Many of *QST*'s readers no doubt remember when a ham could purchase a ten-meter linear amplifier without difficulty. Unfortunately, when the CB clan discovered that these amplifiers would work well on eleven meters, the FCC found it necessary to inconvenience legitimate operators by banning the sale of all ten-meter amplifiers. It is not difficult to imagine further restrictions being placed on the sale of amateur equipment, if the misuse of that equipment continues to escalate on the amateur bands, and those of other services.

It is both ironic and shortsighted that amateur equipment dealers are willing to jeopardize the same hobby that supports their businesses. —*Edward F. Accomazzo, WB6WGL, Upland, California*

Conducted By Bill Tynan, W3XO
Send reports to PO Box 117, Burtonsville, MD 20866
or call 301-384-6736 to record late-breaking information.

The Trans-Pacific Duct: Its History and Future

The fact that VHF signals propagate 2500 miles and more across the Pacific between Hawaii and the Mainland is well known. Most, including this conductor, were convinced that the propagation penetrates only a few miles inland on the eastern end, and is limited to southern and central California, extending no farther north than the Bay Area. Certainly, almost all openings until summer 1985 attested to the truth of the inland-penetration belief. Then came the record-breaking propagation of last July that shattered the myth that signals from KH6 reached only a few miles from the coast. On those occasions, stations as far inland as 100 miles were able to contact KH6HME and/or KH6IAA operating from the upper slope of Mauna Loa on Hawaii's "Big Island."[1] It remains to be seen how far north they go, but more on that later.

These trans-Pacific openings are not particularly rare occurrences. Many such openings have taken place since the first 2-meter contact between John Chambers, W6NLZ, and Ralph (Tommy) Thomas, KH6UK, on July 8, 1957.[2] These two repeated the feat in June 1959, this time on 1¼ meters.[3] They continued their tests, trying valiantly to bridge the same gap on 70 cm, but were never successful in those attempts. They did experience a near miss on July 20, 1960, when W6NLZ heard signals from KH6UK, but nothing was heard in the opposite direction. It was later found that a receiver problem at KH6UK was to blame for the lack of a two-way.[4]

Then followed a hiatus of 13 years in the trans-Pacific contacts, probably attributable to lack of activity. The two pioneers had left the scene, KH6UK returning to New Jersey and reassuming his former identity of W2UK, and W6NLZ becoming a Silent Key.

The next big reported trans-Pacific opening began July 26, 1973 and was of massive proportions, lasting into the first few days of August. During this time, literally hundreds of contacts were made, many of them through the 16/76 repeater located at the 8000-foot level on Mauna Loa. In addition to the repeater contacts, many direct 2-meter QSOs were completed, including a number between ground-level stations at both ends of the path. One of these was KH6HLP, who was operating from atop an ocean-front hotel in Hilo and using a Gonset Communicator IV he keyed with the microphone push-to-talk button. (For those too young to remember, the Communicator series were 10-W AM rigs popular in the '50s.) It was definitely determined that best results on the California end were obtained by those operating from elevated locations within view of the Pacific. Many, including K6YNB (now N6NB), journeyed to choice spots to take full advantage of the conditions. This opening also produced the first trans-Pacific 6-meter tropo contacts, and they probably still stand as that band's tropospheric DX record. Among the 6-meter exchanges, KH6IJ worked W6KQG in Sebastopol, north of San Francisco, along with K6UQH located at Saratoga, south of the Golden Gate City. Upon being alerted that the KH6EQI 6-meter beacon at Pearl Harbor was being widely heard on the West Coast, KH6GRU (now KH6HI) got on the band and worked W6BPC, WA6JRA and K6QEH, all of the Los Angeles area.[5-7]

Some of the Hilo amateurs hastily assembled for a short visit to the city during our recent trip to Hawaii. Left to right are KH6HME, WH6AXL, AH6P, KH6IAA, AH6J and column conductor W3XO. *(photo by W3XO's XYL)*

June 28, 1976 saw the next big opening from California to Hawaii. It did not last as long, nor was it as widespread as the 1973 session. Also, it did not reach much north of Santa Barbara, and no direct contacts were made with ground-level Hawaiian stations. At one point, however, K6YNB, operating portable at Malibu Beach, north of Los Angeles, was heard directly on 146.22 by KH6IOR Hickam Air Force Base near Honolulu while Wayne was busy working KH6s through the 22/82 repeater on Mauna Loa. Thanks to the growing popularity and efficiency of SSB, this opening did result in more direct, nonrepeater, contacts than had any previous one, including the huge 1973 affair. This was due to KH6IAA taking a 2-meter sideband rig and a 4-element beam up Mauna Loa.[8]

Even though these excellent openings, not a single 70-cm contact had yet been made. W6FZJ (now W1JR) and KH6BZF almost made the grade in August 1973, only to be thwarted by an equipment failure. It wasn't until July 18, 1979 that a successful 70-cm two-way was established. A new element had been added, which made it much easier to spot the presence of favorable propagation. Two beacons had been installed at the 8000-foot level on Mauna Loa—one on 2 meters and one on 70 cm. On this occasion, WB6NMT San Diego heard the 70-cm beacon and called its keeper, KH6HME. It was five hours before Paul could get free of work commitments and make his way up the slope from Hilo to the beacon site. But, once there, he made the initial contact with Louis, without delay. W6YDF, WB6ESQ and WB6WLR were also able to complete 70-cm QSOs with KH6HME/KH6 that historic evening.[9]

July 23, 1980 brought another trans-Pacific opening, this one lasting a total of nine days. Once again, WB6NMT heard the 70-cm beacon, but KH6HME was unavailable to go up the mountain, so the honor was left to KH6IAA. However, it was another day before Al could get free of work commitments and make the trek. Once there, he worked Louis plus AA6DD, N6NB and a number of other 70-cm stations. He also worked WB6NMT on 2-meter SSB but, strangely, few other 2-meter contacts were made during this opening. N6NB and WB6NMT also exchanged reports with KH6IAA/KH6 on 223.5-MHz FM, for the first trans-Pacific 1¼-meter work since the W6NLZ-KH6UK contact 20 years before. A few days later, KD6R, at 4500 feet atop Mt Palomar, worked KH6IAA/KH6 to set the still-standing 70-cm terrestrial DX record, and demonstrated that California stations located at high altitudes can get into the duct. Previously, it had been believed that about 2000 feet was the limit on that end.[10]

The day for 23 cm arrived on June 24, 1984, when N6CA heard the beacon he had constructed and shipped to Hawaii several years before. While KH6HME proceeded up Mauna Loa, Chip collected gear and headed for Palos Verdes, near the site of W6NLZ's earlier successes. They soon contacted, establishing a new 23-cm terrestrial record.[11]

Since their installation on the upper slope of Mauna Loa, the beacons have been the single best tool for determining the presence of propagation across the Pacific, especially on the higher bands. Since they began operation, W6PJA has been keeping records of reception at his QTH in Fullerton, a suburb of Los Angeles. Bob, who designs VHF amplifiers for Henry Radio, was instrumental in constructing equipment for the 2-meter and 70-cm beacons, and thus has a special interest in listening for them. He notes that a 10-GHz unit is now ready to go and should join the others at the site soon. His records show that, beginning in July 1979, soon after the 2-meter beacon was placed into operation, its signals were heard in California on 12 different days during the remainder of that year. The following year, signals made it across the Pacific on 20 different days, beginning July 7. Many openings were quite weak, with signals running only a few decibels out of the noise, but on other occasions they hit levels of S9 and above. 1981 was a dry year by comparison, with only three days of propagation. Openings during eight days were noted for 1982, but only a single day in 1983. Things improved again in 1984, with 8 openings observed.

But 1985 can certainly be considered a banner year. The W6PJA report lists 21 days on which openings were experienced, including those of July 12 through 14 and July 28 (see note 1). W6PJA's observations and other reports display quite a distinct pattern. Most trans-Pacific openings occur from July through September, but some have been observed through December and a few experienced during February and April. The

23- and 13-Cm Standings

Listings are call, state, number of states worked, number of call areas worked, number of grid squares worked and best DX in statute miles for farthest terrestrial contact. Call areas are the 10 continental US call areas plus KL7 and KH6, plus VE and XE call areas, plus other DXCC countries not located within the borders of the US, Canada or Mexico. Those not submitting updates or otherwise showing an indication of interest in being listed in the Standings over a two-year period are subject to being dropped. They will be reinstated upon written presentation of continuing activity. It is not necessary to have worked any new states or grids in order to remain in the Standings or to be reinstated, merely an indication of activity and interest in being listed. Compiled February 9, 1986. Deadline for next update is August 5, 1986. The deadline is the date that update reaches PO Box 117, Burtonsville, MD 20866. It is preferable, but not mandatory, that updates be on special forms available for an SASE to the PO Box just mentioned.

23 Cm

W2SZ/1	MA	17	8	34	—
K1FO	CT	15	7	21	468
K1PXE	CT	13	5	—	448
W1JR	MA	12	8	29	655
WA1JOF	MA	12	4	18	725
W1RIL	MA	11	6	19	—
W1XP	MA	7	5	—	300
K1LPS	VT	7	5	—	288
W1QXX	MA	6	3	—	260
K2UYH*	NJ	22	32	—	770
WA2LTM*	NJ	17	6	—	770
W2VC	NJ	16	7	28	537
W2DWJ	NJ	15	5	—	—
K2YCO	NY	11	8	—	570
W3EVJ	NY	10	6	—	426
K2JNG	NY	10	4	—	305
W2PGC	NY	6	6	—	473
N2BJ	NY	5	3	8	—
WA2FUZ	NY	5	3	—	125
WA2EUS	NY	4	5	—	320
K2OVS	NY	3	2	—	135
WA3JUF	PA	14	5	20	300
W3IP	MD	11	7	18	369
WA3NZL	MD	11	7	—	780
W3HMU	PA	11	5	—	300
K3IUV	PA	9	4	—	290
K3HZO	MD	9	—	12	—
KB3QM	DE	7	—	7	—
K4QIF	VA	15	6	—	790
WA4NXY	KY	13	5	21	730
W3IY/4	VA	10	5	—	481
WS4F	GA	7	3	10	625
WA4OFS	FL	5	2	13	—
K4NTD	FL	4	2	—	847
K4KJP	FL	2	2	—	670
W4VHH	GA	2	1	—	350
WB5LUA*	TX	20	23	49	1073
W5HN	TX	10	4	—	1071
W5DFU	OK	7	3	13	600
WB5AFY	TX	7	2	23	—
WA5TKU	TX	5	3	18	1112
WA5VJB	TX	4	3	—	952
K5DHU	TX	5	1	12	—
W5ASH	TX	4	2	9	1066
K5MWH	AR	4	2	—	200
W5HPT	TX	4	1	—	571
KR5F	TX	3	2	—	750
W5UWB	TX	3	2	—	720
N4JS/5	MS	3	2	—	467
W5RCI	MS	3	2	—	—
WB5LBT	LA	3	2	—	—
N5BBO	TX	2	2	3	1042
K5LLL	TX	2	2	—	847
W5LDV	TX	2	2	—	847
K5SW	OK	2	1	4	—
W5UKQ	LA	2	1	—	365
WA5DBY	TX	2	1	—	—
WA5HNK	TX	1	1	5	250
WA5TBE	TX	1	1	—	571
W5GVE	TX	1	1	—	366
K5PUF	TX	1	1	—	290
N6CA		8	10	30	2472
K6ZMW		4	3	—	402
W6KGS		3	2	—	362
W6XJ		2	3	—	250
W6OQQ		2	2	—	200
WB6NMT		1	1	—	296
KC6A/6		1	1	—	130
N6TX		1	1	—	112
K7GNV/7	AZ	5	3	6	426
N6NB/7	UT	4	2	—	295
WB5TCO/7	AZ	2	2	2	403
WA7JUO	NV	2	1	—	—
W7LUX	AZ	1	1	—	130
W8YIO	MI	16	12	30	551
K8WW	OH	16	7	32	448
WA8TXT	OH	15	8	20	604
WB8BKC	MI	15	7	33	650
WB8PAT	OH	4	3	—	405
W9ZIH	IL	20	9	—	790
WB9SNR	IL	14	8	20	760
WA9FWD	WI	8	3	8	—
W9UD	IL	5	4	—	760
W9JIY	IN	5	3	—	300
W9WCD	IL	3	3	—	770
W9AAG	IL	2	2	—	350
WBØDRL	KS	16	6	35	—
WØRAP	IA	13	4	26	678
WØOHU	MN	12	5	18	814
WAØTKJ	KS	9	3	18	—
KCØQR	NE	6	1	6	430
WØYZS	MO	4	2	—	425
KØALL	ND	4	2	—	283
WØUC/9	WI	3	2	4	—
WØPW	CO	3	2	3	97
KØTLM	MD	3	1	7	—
WØZJY	KS	3	1	—	170
NOØY	KS	2	2	4	170
WØMDL	MN	2	2	—	340
WØVB	MN	2	2	—	290
KH6HME		2	2	—	2472
VE3LNX		7	5	18	—
VE4MA*		5	7	12	800
XE2BC		1	1	—	370

13 Cm

W2SZ/1	MA	6	3	10	—
W1JR	MA	3	1	1	100
WA3AXV	PA	6	3	11	194
WA3JUF	PA	5	3	10	—
W4HHK[1]	TN	8	5	6	582
WB5LUA	TX	4	2	15	508
W5HN	TX	3	1	10	230
WA5VJB	TX	3	1	8	185
WB5AFY	TX	2	1	3	—
K5PJR	OK	1	1	1	271
WA5DBY	TX	1	1	1	65
WA8TXT	OH	3	3	4	291
W9ZIH	IL	5	2	—	340
WB9SNR	IL	4	2	4	—

*some contacts via EME
—information not supplied

specific weather structures responsible are not entirely clear, but there is observational evidence for openings to be accompanied by a band of clouds, defining a front, running between the section of the West Coast in which signals are heard and the Hawaiian Islands.

As with our experience in the eastern part of the country, tropical storms (hurricanes) seem to play a role in producing openings. During the massive 1973 session, no fewer than four tropical storms were in the general area (see note 7). No propagation to Hawaii has ever been noted much north of the San Francisco Bay Area, but W6PJA points out that, on many occasions, cloud formations begin at Hawaii and terminate on the coast of Oregon or Washington. He believes that one reason so many more instances of Hawaii beacon reception have been reported in southern and central California over the past year or so than previously, is that many more amateurs are listening. On the other hand, few probably listen in areas much north of the San Francisco area. This, he believes, could account for the lack of reception reports from there north. Bob speculates that people in northern California, Oregon and Washington may be missing openings that would be categorized as "truly remarkable," if ever detected. He pleads for VHFers in those northern coastal areas to begin listening for the Hawaii beacons. For further details on what to look for, contact Robert J. Cook, W6PJA, 1406 Maralem Dr, Fullerton, CA 92635.

For those in the areas already well known to be visited by trans-Pacific ducting, there remains many new adventures. There are other bands on which to span the ocean. Who will be first on the new 33-cm band? Is propagation possible on 3 cm? A 10-GHz beacon is ready to go up on Mauna Loa, so the tool to find out will soon be in place. But suitably equipped stations on the Mainland are needed, too.

Notes

[1]*QST*, Oct 1985, p 60.
[2]*QST*, Sep 1957, p 63.
[3]*QST*, Aug 1959, p 68.
[4]*QST*, Sep 1960, p 78.
[5]*QST*, Sep 1973, p 102.
[6]*QST*, Oct 1973, p 95.
[7]*QST*, Nov 1973, p 100.
[8]*QST*, Sep 1976, p 46.
[9]*QST*, Sep 1979, p 81.
[10]*QST*, Oct 1980, p 73.
[11]*QST*, Sep 1984, p 59.

ON THE BANDS

Record-breaking DX on 2 meters, numerous contacts on 1¼ meters and 70 cm, South America and Hawaii worked and a New England station heard in Sweden on 6 meters, new grid squares and states added on all bands. This is a very preliminary sketch of the fallout from the tremendous aurora of February 8. Occurring, as it did, so close to deadline, I have only a few reports via the telephone answering machine plus over-the-air comments and my own observations to go on this time. Therefore, I won't attempt to provide a synopsis of this momentous event this month. Instead, I plan to devote all of the May column to coverage of "The Aurora of February 8, 1986," truly one of the biggest VHF propagation days in many years.

6 Meters—From EI9D comes word that he and some other Irish stations are receiving 6-meter operating permits. The copy of the authorization that Jim forwarded to me specifies the same ERP, antenna and operating location restrictions that apply to the general authority given all UK Class A amateurs. (See last month's column.) However, it adds one very significant stipulation that will severely handicap the EIs. It states, "Operation is permitted only outside of peak broadcasting hours." Just why this provision is included, when no time limits are placed on the Gs, is somewhat of a mystery. Also, the reason for granting 6-meter operating authority only to those holding special permits, when all Class A licensees in the UK are permitted to get on the band, is also unclear. Hopefully, these specific provisions will be modified before too long. In any case, it's nice to know that there will be at least a few EIs on 6 meters.

Another piece of good news comes via a letter from OZ1FDH. Claus says that OZ1PJJ, who is an active VHFer in Denmark, will be moving to Greenland for the next two years. He plans to work 6 and 2 meters as well as 70 cm under the call OX3LX from a QTH OZ1FDH says is about as close to Canada and the US as one can get in Greenland. Plans include setting up beacons under the call OX3VHF on 50.045 and 144.902 MHz. Claus says that Bo is looking forward to making many contacts.

VHF/UHF Century Club Awards

The ARRL VUCC numbered certificate is awarded to amateurs who submit written confirmations for contacts with the minimum number of Maidenhead grid-square locators indicated in italics for each band listing. Initial qualifiers are shown first, followed by endorsements, for December 16, 1985 through February 13, 1986. An SASE to Awards Desk, ARRL HQ, will bring you the rules and application forms.

6 m (50 MHz)

100

103	K5UR
104	WD8CTX
105	K2OV6
106	KD7IY
107	W5NZS
108	NB9L
109	WA1WIF
WB8KAY	150
W1WHL	150
W1JR	200
KA6JGH	200
WD4FAB	200

70 cm (432 MHz)

50

43	K5UR
44	WØRT
45	G6JNS
46	N9KC
47	G6DZH
KD8SI	70
WB5AFY	100
W4GJO	120
WØRAP	130
K1FO	150

2m (144 MHz)

100

82	K2GK
83	KB9QC
84	WB9UQE
85	W2SZ
86	WB3LJK
87	G6JNS
88	G4UXC
89	K8RZB
90	AF9Y
91	G6DZH
W1JR	125
K4CAW	125
K5YY	200
KD8SI	250

1296 MHz

25

14	WA8TXT
15	VE3LNX
16	WB2NPE
17	KD5RO
W1JR	30

220 MHz

50

W1JR	70

Canadian NewsFronts

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General Manager: Raymond Staines, VE3ZJ

Meet the General Manager

This month, we'd like to introduce you to the CRRL General Manager, Ray Staines, VE3ZJ. Ray hails from the United Kingdom. He came to Canada in 1957. Ray was first licensed as a radio amateur in 1964. Over the years, he has held several calls: VE3FVE, VE7AAE, VE3HPI and, finally, VE3ZJ, which he received in 1977. He is 53 years old, married to Audrey, VE3KGS, and has three children, two of whom are radio amateurs.

Professionally, Ray is a Certified General Accountant. For many years, he worked for a large national trust company, acting as a trustee for businesses, often where the owner had died and the trust company had an interest in the business. Back in those days, Ray had 200 to 300 businesses to look after. Now he has just one: CRRL.

As General Manager, Ray works out of the CRRL Headquarters office north of London, Ontario. What's a typical day like? In the morning, you'll probably find Ray heading into London to do the CRRL banking and to visit the post office. On most days, there will be 80 to 100 pieces of mail waiting at Box 7009. Then it's back to the office to work at the computer, processing memberships and printing out membership certificates. Later, he'll answer dozens of letters on every imaginable topic concerning CRRL and Amateur Radio. Still later, it's into the mailing room to fill orders for CRRL, ARRL and RSGB books and materials, and the dozens of "freebies" CRRL keeps on hand to make Amateur Radio a bit more pleasant for all of us. On certain days, Ray works on mailing out the CRRL bulletins, prepares the mailing labels for *QST*, or bags up a couple of hundred *QST*s for those of you who sent in your membership renewal after the mailing labels for the next month's *QST* were sent off! (Incidentally, you can help Ray—and the CRRL budgets—by sending in your renewal early; Ray says, "Thanks!") And always, there's the updating of accounts and the tracking of inventory.

CRRL General Manager, Ray Staines, VE3ZJ, takes a break at the CRRL computer. *(VE3CDM photo)*

We're lucky to have Ray. His energy and enthusiasm are unparallelled. Even when the work piles up, he remains positive. And with his vast business and accounting experience, Ray has ensured that the new CRRL is starting on the right track.

DOC NEWS

☐ In mid-January, too late to be timely on these pages, DOC informed CRRL that effective with the February 12 Amateur Radio examinations, there would no longer be a regulations test for the Advanced Amateur certificate. CRRL is checking how this change will affect the requirements for the Digital Amateur certificate.

☐ DOC also informed CRRL that effective April 1, amateurs receiving a license for the first time only will pay $26 instead of $20. That fee drops to $20 in the following year and, of course, remains at $20 for all of us who presently have a station licence. Something new: Amateurs who need a station license for only part of a year may pay on a pro-rated basis. Finally, also effective April 1, candidates for the various Amateur Radio certificates will have to pay a fee of $5 for each portion of the examination they try. That means that someone writing the theory, regulations, Morse code sending and Morse code receiving will have to pay an examination fee of $20. (Oh, for the good old days when the fee for an entire examination was 50 cents and the radio inspectors never bothered to collect!)

☐ Time is running out for those who wish to comment on DOC's *Proposal for Restructuring the Amateur Service*. The 180-day comment period ends on May 16. Please send a copy of your comments to CRRL.

CRRL NEWS

☐ ARRL is still getting the bulk of Canadian applications for the IARU Worked All Continents awards. If you live in Canada, please send your application to the IARU member-society for Canada: CRRL. CRRL Awards Manager Garry Hammond, VE3XN, will process your application promptly and forward a nice certificate for your shack.

☐ If you haven't received a lot of cards through your CRRL incoming QSL bureau lately, you're not alone. To save on postal costs, outgoing bureaus around the world are waiting until they amass large numbers of cards and can make bulk shipments. With poor band conditions, there have been fewer DX contacts, and it's been taking longer to amass those cards. CRRL Central Bureau Manager Andy McLellan, VE1ASJ, reports that the number of cards he is receiving now is less than 50% of the number of cards he was receiving two years ago. He advises patience; better days *are* ahead.

☐ CRRL has made a formal submission to DOC, asking DOC to continue the practice of issuing special call-sign prefixes to help Canadian amateurs mark special events in the life of the country. The submission outlines how amateurs could become involved in issuing the prefixes, minimizing involvement—and costs—for DOC.

SECTION MANAGER REPEAT SOLICITATION

Since no nomination petitions for the office of Section Manager, Maritimes-Newfoundland Section, were received by December 6, 1985, the cutoff date stipulated in the Section Manager Election Notice that appeared in October and November 1985 *QST*, nominating petitions are hereby resolicited.

Guidelines for submitting a petition, and for the election of the Section Manager, are as appeared in October and November 1985 *QST*, except that the new cutoff date will be June 6, 1986. If more than one valid petition is received, election ballots will be mailed out on or before July 1, 1986, and returns will be counted after August 19, 1986. A Section Manager elected as a result of these procedures will serve for an 18-month term that will begin on October 1, 1986.

SECTION MANAGER APPOINTMENT

Don Welling, VE1WF, has agreed to continue as Section Manager, Maritimes-Newfoundland Section, until a new Section Manager has been elected.

NOTES FROM ALL OVER

In last month's column, we were remiss in not mentioning the substantial work of Ralph Cameron, VE3BBM, in the Jack Ravenscroft, VE3SR, case. Ralph was with Jack from the very beginning, when Jack was trying to help his neighbour eliminate the interference. He headed the Jack Ravenscroft RF Susceptibility Fund, which made it possible for Jack to take the case to trial. He assisted Jack's lawyer in preparing a line of questioning that would present Jack's case in the best possible light. He was one of two amateurs (the other was CRRL Director Ray Perrin, VE3FN) who testified on Jack's behalf. Certainly, Ralph deserves a lot of credit. At press time, no word on the outcome of the trial. However, the verdict should be out as you are reading this.

Conducted By Stan Horzepa, WA1LOU
75 Kreger Dr, Wolcott, CT 06716
CompuServe ID no. 70645,247

Trends in Frequency Coordination

During the last few months, the following trends have been noted on the repeater frequency-coordination front. The 15-kHz vs 20-kHz channel-spacing battle on 2 meters seems to be cooling down. A year ago, this was a hotly contested fight in which proponents of the 20-kHz band plan were trying to convince 15-kHz-bound frequency coordinators and repeater owners that 20 kHz was preferable. By now, most of the locales that considered switching to 20-kHz channel spacing have either done so or have stuck with 15-kHz spacing. There are no new 15-kHz territories to conquer, so the battle is at a (temporary or permanent?) standstill.

The locales that have switched to the 20-kHz spacing have not had too much trouble making the transition, with the notable exception of Alabama, where a split has developed between the Alabama Repeater Council, which has officially adopted 20-kHz spacing, and some Alabama repeater owners who are not happy with the plan. The unhappy repeater owners are attempting to organize an Alabama chapter of the CVRA-South Eastern Repeater Association. (CVRA-SERA is a 15-kHz frequency coordinator whose jurisdiction presently encompasses eastern Kentucky, Georgia, North Carolina, South Carolina, Tennessee, Virginia and West Virginia; Tennessee and Georgia lie on the northern and eastern borders of Alabama, respectively).

Regionalized Coordination

While on the subject of CVRA-SERA, that brings us to another trend we are seeing: the consolidation of local, individual frequency-coordination entities into larger, regional groups. CVRA-SERA is a regional group that has been around a long time and continues to add local groups to its jurisdiction (Georgia was the most recent state to join CVRA-SERA). In addition to CVRA-SERA, two new regional groups were formed in the latter half of 1985. The Mid-America Coordination Council, Inc (MACC) is a regional group in the Midwest that now represents Iowa, Kansas, Missouri, Nebraska, South Dakota and Wisconsin. Don't be surprised if MACC attracts other Midwestern states into its fold.

Meanwhile, the New England Spectrum Management Council (NESMC) was formed to represent five New England states (excluding Vermont). There have been efforts in the past to organize this natural grouping of states, but all have failed for one reason or another. However, NESMC has a good cross-section of the New England repeater/VHF/UHF bigwigs and, as a result, has an excellent chance of survival. The only area of contention is the potential custody fight over the state of Connecticut, which has representation on NESMC, but is actually coordinated by the Tri-State Amateur Repeater Council, which also coordinates southeastern New York and northern New Jersey.

Repeater Information On Line

The third trend, the movement to establish a national data base of all coordinated repeaters, has taken a step forward as a result of the January meeting of the ARRL Board of Directors. The Board approved implementation of the data base at ARRL Headquarters that would be available by telephone to repeater frequency coordinators. (In a separate action, the Board reiterated that the ARRL is not a national frequency coordinator and does not choose, endorse or certify frequency coordinators. The ARRL's role is to offer support services to the frequency coordinators chosen by served groups throughout the nation.)

FOOD FOR THOUGHT

The following is contributed by Chuck Hite, W3SOG, of the Frederick (MD) Amateur Repeater Group.

Although many radio amateurs never meet personally, the amateur phone bands and especially the "party line" of any 2-meter FM repeater let us know each other better than we know some of our own relatives. Just as an artist paints his outlook on life into his pictures, a poet expresses his innermost feelings in his verse and a good musician's emotions can be felt and heard in his music, we can't avoid putting some of ourself in our Amateur Radio conversations. Even a CW operator becomes recognizable by the way he handles a straight key, a "bug" or an electronic keyer.

Often, what is said on the air says more about the speaker than it does about the subject under discussion. For this reason, it behooves us to choose our words carefully. Each of us represents the face of Amateur Radio to all with whom we come into contact, either in person or on the air. Like a dirty face in the mirror, a recording of our conversation played back to us could be reason for us to regret our careless conduct.

Profanity has no place in polite conversation, no matter how prevalent its use has become on commercial radio and television. It is offensive to many people, and it may still be illegal under FCC regulations. And even if it doesn't jeopardize the license of the operator or the trustee of the repeater, it smudges the reputation of Amateur Radio. It suggests that either the user lacks adequate vocabulary to express himself effectively, has a painful lack of consideration for the feelings of others, is too lazy to think before he speaks or is not in full control of his faculties, or a combination of two or more of the above.

It does matter what others think of us. We would probably be shocked if we knew who and how many listen to our transmitted conversations. People, many of whom are not licensed amateurs, but who represent a cross-section of the general public, are equipped with radio scanners or other general-coverage radio receivers that cover the amateur bands. Many monitor our repeater frequencies daily. What kind of an impression are we creating in their minds?

If one has nothing to say, it is a good policy not to say anything. Talking, just for the purpose of keeping the repeater circuitry hot, so we don't lose our turn in the big roundtable or because we just can't say goodbye, is not courteous operation. A repeater that is quiet some of the time is useful when needed.

FREQUENCY COORDINATION NEWS

☐ Georgia was officially voted in recently as a full member district of CVRA-SouthEastern Repeater Association. (CVRA-SERA now represents seven states.)

☐ Minnesota Repeater Council voted in November to retain their current upright 15-kHz-channel-spacing 2-meter band plan. According to repeater council chairman Rick Whiting, WØTN, the main reason for rejecting the 20-kHz band plan was the fear that 20-kHz spacing would result in fewer available repeater pairs.

☐ Wisconsin Association of Repeaters (the frequency coordinator of that state) application for membership in the Mid-America Coordination Council (MACC) was approved, making it the sixth state to join MACC. Nels Harvey, WA9JOB (PO Box 23928, Milwaukee, WI 53223) is the Wisconsin frequency coordinator.

REPEATER LOG

According to Dec 1985 reports (continued from last month's column), repeaters were involved in the following public-service events: 330 vehicle emergencies, 42 drills/alerts, 17 fire emergencies, 14 medical emergencies, 6 public-safety events, 4 power failures and 1 weather emergency.

The following repeaters were involved (followed by the number of events): WA1DGW 15, WA2IAF/KA2PBT 2, W2UL 20, WA2ZWP 4, WB4LAI 12, WA6BJY 3, W6FNO 308, W8BI 12, WB8SMC 39.

Strays

***QST* congratulates...**

☐ the following radio amateurs on 50 years as ARRL members:

- Howard Brokate, W5RO, of El Paso, Texas
- Robert McCarty, W2EJ, of Sedona, Arizona
- Charles Colston, W9RXO, of Alton, Illinois
- Bill Adams, W6BA, of Twentynine Palms, California
- Hugh Byal, WØAIX, of Mingo, Iowa
- Douglas Campbell, W2ND, of Ridgefield Park, New Jersey
- David Kennedy, N4SU, of King, North Carolina

On Line

Conducted By Stan Horzepa, WA1LOU
75 Kreger Dr, Wolcott, CT 06716
CompuServe ID no. 70645,247

Ham Radio Bulletin Boards

The influx of computers into Amateur Radio has resulted in the use of landline bulletin boards (BBS) as an adjunct to our hobby. In past installments of this column, information concerning ham radio-related BBSs has been published as it was received. Table 1 represents all of the previously mentioned BBSs that are still active (as of mid-January) and BBS information received since the last installment of On Line. The "parameter" column indicates the BBS data rate (3 = 300 bit/s, 12 = 1200 bit/s, 3/12 = both 300/1200-bit/s, operation). Following the data rate is the number of character bits, parity and stop bits (for example, 8N1 represents 8 character bits, no parity, 1 stop bit). In this listing, parity is either none (N) or even (E).

Table 1

Location	*Name*	*Tel No*	*SYSOP*	*Parameters*	
AL	The Bulletin Board[1]	205-758-5017	W4WYP	3	8N1
AL, Mobile	—	205-649-2894	NN4Y	3	—
CA, Southern	RBBS	818-998-0319	K6IYK	—	
CA, Southern	Westlink Report BBS	805-251-5558	—	3	8N1
GA, Carrollton	Computer Message Centre	404-834-9097	KB4EUX	3	8N1
IA	Sunshine BBS	319-557-9659	AI9D	3	8N1
KS	A*C*E*	913-677-1288	—	3/12	—
MA, Boston	MassHamBBS[2]	617-923-7605	—	3/12	—
MI, Fenton	Fenton TBBS	313-629-2854	—	3/12	8N1
MI, Flint	Flint Area BBS	313-238-4984	KA8OCN	3	7E1
MN	Amateur Radio Commodore Club Computer Newsletter	612-431-1149	WAØCQG	3/12	8N1
MN	Digital Newsletter	612-291-0567	KØTG	3/12	8N1
NJ	Micro-Fone BBS	201-494-3649	—	—	
NM, Las Cruces	Timex Sinclair Amateur Radio Users Group (FIDO)[3]	505-646-5194	—	—	
NY, Long Is	Bald Hill Tech Control	516-736-2208	W2JUP	3/12	8N1
NY, New York	Packet of New York	212-250-7090	—	3/12	8N1
TX	Lamar University BBS	409-838-3761	WB5VNX	3 7E1	
WA, Seattle	Ham-Net BBS	206-285-3040	—	—	
WI, Milwaukee	Milwaukee County ARES	414-543-0988	WB9YSG	3	8N1

[1]2000-0700 EST/EDST except Tue & Thu
[2]1800-0800 EST/EDST M-F, 24 hrs Sat-Sun
[3]FIDO network 15 node 1006 (15/1006)

HAMNET AND HAM/LINK

For several years, CompuServe's Hamnet has provided an electronic conference addressing all aspects of Amateur Radio. Its packet-radio section is a vital meeting place for those interested in computers and Amateur Radio. Its regulars include a who's who of the packet-radio community. Hamnet's SYSOP, Scott Loftesness, W3VS, welcomes all to join the Hamnet gang by simply entering GO HOM-11 after logging onto to CompuServe. For more information about CompuServe, call 800-848-8199 (in Ohio, call 614-457-0802).

Now, there is another on-line Amateur Radio conference called Ham/Link. It is part of American People/Link, a new, low-priced time-sharing service. Ham/Link's chairman, Ed Raso, WA2FTC, had been running a dial-up BBS called Ham Radio Net for more than a year. The popularity of that BBS convinced him to become part of the People/Link time-sharing system. For more information about People/Link, call 800-524-0100. (This column's conductor is active on both Hamnet and Ham/Link; my CompuServe ID number is 70645,247 and my People/Link ID is WA1LOU.)

TRS-80 MODEL 100: PACKET RADIO AUTO-ANSWER MAILBOX

Radio Shack's TRS-80® Model 100 lap-top computer has been programmed to function as an automatic-answering mailbox for packet-radio applications by Dick Roux, N1AED (25 Greenfield Dr, Merrimack, NH 03054). The computer responds to connects with a stored message that you create, and then proceeds to store received messages in a file with the time and date of the connection. The file may be read or printed at any time, and then it may be cleared from memory or more messages may be appended to it.

The program also has the ability to handshake with the WØRLI message-forwarding system to allow you to have your mail forwarded directly to your Model 100. Another feature of the program is a call sign look-up table, which you create to add the personal touch. As a result, when K7UGA connects with you, your mailbox's greeting is prefaced with "Hello Barry ..."

Dick has also written a companion program that sets a Kantronics TNC to the parameters required by the mailbox and then automatically loads the mailbox program. Both programs may be obtained from Dick by sending him an SASE for printed listings of the programs or a blank cassette tape and a postpaid cassette mailer for recorded copies.

PX: Hodgepodge

This month's PX offering consists of a medley of programs for a variety of computers.

Program 113: a radio club membership management program written in dBase II® by Ted Chapman, KF4KN (90 cents postage and a 9- × 12-inch manila envelope).

Program 114: an actual and allowable stress calculator for masts with up to 10 stacked antennas. It was written on a Compaq® Deskpro by Marty Woll, N6VI.

Program 115: an intermod calculator for the Commodore® 64 by Ray Poulin, W3UT.

Program 116: a logging and duping program for the IBM® PC by Dick Bass, K9RFW.

Program 117: a graphics program that displays the ARRL diamond in full color on a Leading Edge® computer by Norm Chalfin, K6PGX.

To obtain a listing of the PX programs, send a business-size SASE with 39 cents postage to ARRL, Dept PX, 225 Main St, Newington, CT 06111 (CRRL members can send their SASEs to CRRL, PO Box 7009, Stn E, London, ON N5Y 4J9). Use a separate SASE for each program request and write the PX program number of the desired program at the lower left-hand corner of the SASE. Please do not send correspondence other than PX requests to Dept PX.

IBM PROPAGATION FORECASTER

A propagation prediction program, called MUF.BAS, for the IBM® PC has been developed by Tony Gargano, N2SS (32 Bryant Rd, Turnersville, NJ 08012). The program utilizes WWV's solar-flux numbers to generate MUF (maximum usable frequency) predictions for a 24-hour period. The predictions may be displayed as either a table or graph.

Features include a convenient DX location look-up table, which can be customized to suit individual needs. Besides displaying the MUF prediction, the display includes other useful information, such as the date, the latitudes and longitudes for the selected path end points, the beam heading, path lengths, the number of hops, and both the solar flux and sunspot numbers.

The program is easily modified for your location to be used as the default for one end of the path. You are then able to run the path between your QTH and any selection from the look-up table, between your QTH and a manually entered location or between two manually entered locations.

Tony is distributing his program under the shareware concept (after you try out the program and find it of value to you, a $20 contribution is requested); it consists of three files: MUF.BAS (the program file), MUF.DOC (nine pages of documentation) and README.MUF, which instructs the uninitiated on how to print the documentation file. All of the programs are available on several bulletin boards.

HELP

☐ Atari® aficionados: G. C. LaGrange, W5AKQ (318 E Circle Dr, Baytown, TX 77521) is looking for cable pinout information for his Atari 600XL.

☐ Sanyo® owners: Scott Selby, KH2BU (NASA St DN, Dandan, Guam 96916) seeks RTTY and CW software for his Sanyo MBC-555.

Conducted By Bob Atkins, KA1GT
103 Division Ave, Millington, NJ 07946

Directional Couplers

Directional couplers are often used in microwave equipment to transfer or split power between various system components such as antennas, mixer and local oscillators. Such directional couplers allow transfer of some fraction of the power traveling in a fixed direction in one transmission line to power traveling in a fixed direction in a second transmission line. Figure 1 may make this clearer. The directional coupler will transfer power traveling in line 1 in the direction A to B to line 2 traveling toward port D. The directional coupler is a reciprocal device, which means that power traveling in line 2 from D to C will transfer power to line 1 traveling toward port A. Similarly, power traveling in line 1 from port B to port A will be coupled and appear at port C, and some fraction of the power traveling from port C to port D will appear at port B. The nature of the transmission lines is not important. They can be coaxial, microstrip or waveguide. On the lower bands, the coaxial directional coupler is perhaps most common (though it may not be recognized as such by many) since it can be found in all VSWR and most power meters. On the higher microwave bands, waveguide-based directional couplers are most common and can quite easily be constructed by the amateur.

To understand how a simple waveguide directional coupler operates, consider the arrangement shown in Figure 2. Two lengths of waveguide run side by side, with two holes in their adjourning walls spaced ¼ wavelength apart. Power traveling from A to B may couple via these holes into the second waveguide. Power coupled into the second waveguide traveling toward port D will receive in-phase contributions of power through holes 1 and 2. Power that tries to travel in the direction toward port C will receive out-of-phase contributions from power coupling through holes 1 and 2. This occurs because they are spaced ¼ wavelength apart, producing a total of ½-wavelength path difference for power coupling through holes 1 and 2 from the first waveguide traveling in direction A to B to the second waveguide in direction D to C.

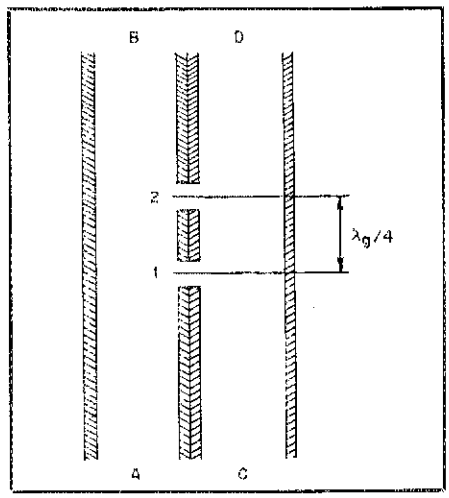


Fig 2—Simple two-hole sidewall waveguide directional coupler.

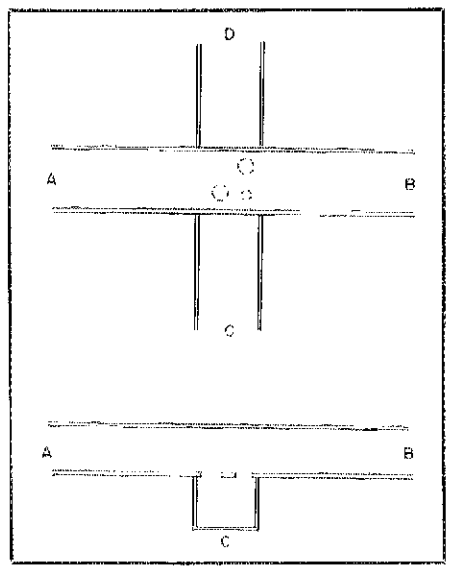


Fig 3—Crossed waveguide directional coupler.

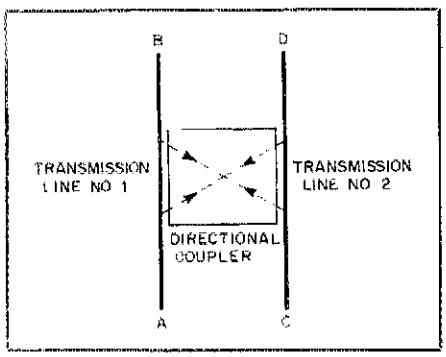


Fig 1—Schematic representation of a directional coupler.

The degree of coupling is a measure of how much power couples from one waveguide to the other. If 50% of the power in the first waveguide couples to the second, the device is said to be a 3-dB coupler. If 10% of the power is coupled, it is a 10-dB coupler; if 1% of the power is coupled, it is a 20-dB coupler, etc. With reference to Figure 2 the general formula is

Coupling factor = 10 log (Pa/Pd) dB

where

Pa is the power supplied to port A
Pd is the power measured at port D

A second important parameter is the directivity of the coupler. This is a measure of the power measured at the desired coupling port to that measured at the other coupling port. With reference to Figure 2 and power traveling from A to B, it would be given by

Directivity = 10 log (Pd/Pc) dB

where

Pd is the power measured at port D
Pc is the power measured at port C

A typical value might be 30 dB, meaning that the power measured at port C would be 1/1000 of the power measured at port D.

Directional couplers may be in-line sidewall couplers, as previously described, or they may have other geometries, such as the cross coupler shown in Figure 3. In this design, the two waveguides cross, one on top of the other, at right angles, and holes in their common wall area couple power between them. Simple designs such as these have a quite-restricted operating range, and their directivity drops off quickly as the operating frequency diverges from the design frequency (not usually a problem in amateur work).

Last month's New Frontier showed how directional couplers can be used for power measurement and for supplying the local oscillator signal to a mixer. Figure 4 shows how a directional coupler can be used to measure VSWR in a waveguide section. Detector A measures forward power, while detector B measures reflected power. Such a setup can be used to properly match an antenna feed or to measure the quality of a home-constructed waveguide load.

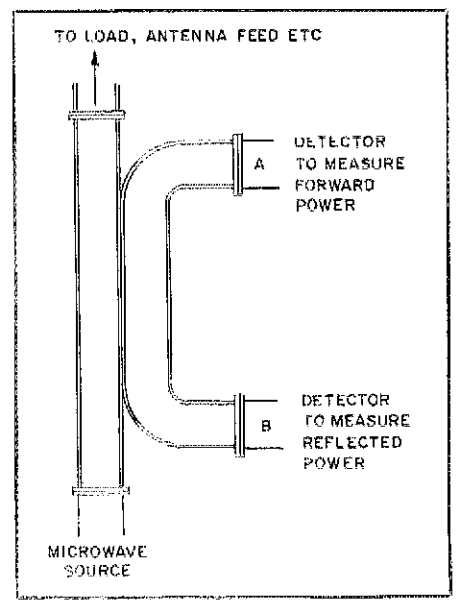


Fig 4—Directional coupler as used for waveguide VSWR measurements.

Conducted By
Vern "Rip" Riportella, WA2LQQ
PO Box 177, Warwick, NY 10990

Prospects for Mobile and Portable OSCAR Operation

Never is the advantage of using OSCAR satellites more obvious than when the sunspot cycle is at its low ebb. While the MUF hovers in the 15-MHz range, and would-be 10- and 15-meter band users reluctantly slide into the ever-more-crowded 20-meter band, satellite use goes merrily on its way!

OSCARs historically have used frequencies that were only mildly affected by F2-layer density. Mode A transponders, such as those used on AMSAT-OSCARs 6, 7 and 8 and all the Russian RS-series, use a 2-meter uplink and a 10-meter downlink. Occasionally, during periods of high solar activity, the ionosphere becomes sufficiently radio-opaque to noticeably attenuate 10-meter radiation through the ionosphere. Listening to AO-7 or RS-1 as it passed "behind" various attenuating zones while its apparent signal strength varied by 10 dB or more was an educating experience. It was as if a buddy of yours were groping through the fog with a flashlight. One moment he could be seen fairly clearly, the next only dimly.

There are, however, more reasons to want to move up in OSCAR frequency than just to avoid the occasional highly attenuating ionosphere. Spectrum capacity and obtainable antenna directivity are two other very strong motivations for moving to the UHF regime in future satellites. In fact, the current AO-10 satellite has set the course with its combination Mode B and Mode L transponders.[1] Future satellites such as Phase 3C, to be launched later this year, will use a combination of Modes B, J, L and S (see Table 1).

Table 1
Phase 3C Transponder Frequencies

Mode B
Uplink: 435.425-435.575 MHz
Downlink: 145.975-145.825 MHz
General Beacon: 145.8125 MHz
Engineering Beacon: 145.975 MHz

Mode JL
L Uplink: 1269.575-1269.325 MHz
L Downlink: 435.725-435.975 MHz
General Beacon: 435.650 MHz
J Uplink: 145.82-145.86 MHz } Option 1
J Downlink: 435.93-435.97 MHz }
or
J Uplink: 144.44-144.48 MHz } Option 2
J Downlink: 435.93-435.97 MHz }

Digital Mode L (RUDAK)
Uplink: 1269.675 MHz
Downlink: 435.675 MHz

Mode S
Uplink: 435.625 MHz
Downlink: 2401.337 MHz
S Beacon: 2401.267 MHz

Notes
(i) It is currently undecided which of the two J input options shall be implemented. In either option, there is an overlap whereupon signals originated at 24 cm and 2 meters can result in a downlink between 435.93 and 435.97 MHz.
(ii) RUDAK is a digital-only transponder that will use PSK.
(iii) Mode S will be a soft-limited FM transponder that can also accommodate up to four SSB signals.
(iv) Although minor revisions in frequency may be anticipated, the frequencies presented are those currently planned.

Never is it as obvious why it is strongly desirable to move up in frequency with OSCAR than when one closely looks at future satellite systems. Many future satellites will continue the high-orbit tradition begun with AO-10. In its high, elliptical orbit, AO-10 can relay signals originating from nearly a hemisphere, putting in contact all those within its view. And it can do this for hours on end. Phase 3C will continue this tradition in another elliptical orbit with improved characteristics for the higher latitudes. Discussions have begun regarding orbital options for a possible follow-on called Phase 3D. Some very clever combinations of two or more satellites in true Molniya (elliptical) orbits yield many of the desirable characteristics of a geosynchronous orbiting satellite while reducing substantially the cost and engineering burden of the latter. In any case, the future high-flying satellites will glimpse much of the earth during the course of their orbit.

Thus, while viewing so much of the earth's surface, it is necessary to have a QSO capacity (spectrum) commensurate with the potential user-load. Where can the necessary spectrum of several hundred contiguous kilohertz be found? Quite plainly, the only option is in the UHF regime.

Another reason for the appeal of UHF use with OSCAR is the reduced size of highly directional antennas as compared with VHF or HF antennas of comparable gain. Using large, heavy antennas on a spacecraft is not just inconvenient, it's impossible. Launcher constraints of size, mass and cost limit the types of antennas to be used aboard OSCAR. From a high-flying OSCAR such as AO-10, the earth subtends an angle of about 16 degrees when viewed from apogee. So it's notably wasteful to scatter RF across the cosmos using an antenna with, say, a 45-degree 3-dB beamwidth. Rather, one wants to concentrate all the RF toward the earth. Given the constraints mentioned, one can best achieve this using UHF or above and the compact, highly directional antennas achievable there.

A similar situation exists with your ground station. You want to concentrate as much power as possible in the direction of the spacecraft and, conversely, avoid spraying the sky with RF that misses the target. Again, this is most effectively achieved with a given-sized array when the wavelength used is relatively small, ie, the frequency is in the UHF (or higher) regime. "Well," you might retort, "I've got a few acres of real estate here and don't mind putting up a real monster antenna to work OSCAR." But even though you might thoroughly enjoy merely the prospect of establishing an aluminum monster to work future OSCARs, and even if we ignored the strong spacecraft engineering motivations for using UHF and above, using VHF and below would make much less likely one of the most striking and powerful future prospects of OSCARs: portable and/or mobile OSCAR use. Using UHF and SHF equipment now becoming available, it is conceivable to have highly portable or even mobile-in-motion OSCAR QSOs on a regular basis in the not-too-distant future, say 3 to 4 years. The gating technologies are just about available, and early conceptual designs for both Phase 3D and Phase 4 (geosynchronous) systems suggest a strong potential for portable and/or mobile use. But the concept rests totally on using UHF and SHF frequencies to achieve the link budgets required for reliable communication.

With just a smidgen of imagination one can envision satellite-portable terminals being erected at remote locations for emergency communications or even sport. Imagine pulling into a major disaster zone with your four-by-four truck, unloading a few modest shipping containers, assembling a half dozen connectors, setting up a tripod, aiming at the sky and being in touch with the hemisphere within a half hour of arriving! Further, imagine connecting a portable FM repeater to your satellite terminal making it a gateway terminal and affording local 2-meter emergency communicators a channel to the satellite and hundreds of other stations as required. Or, by interfacing a portable linear translator to your terminal, provide integrated digital and voice services in/out of the affected area. Here we might find high-speed packet data working side by side with voice QSOs linking the affected area with support activities across the hemisphere.

Perhaps the ultimate in OSCAR technology will be attained when OSCAR mobile-in-motion QSOs are regularly afforded. Yet the day when this too will be reality is fast approaching. The enabling technology may be available as derivatives of NASA's so-called MSAT-X project. Later this year the FCC is expected to rule on several commercial applicants' proposals to implement a mobile satellite communications system. It is a distinct possibility that amateurs may obtain this capability nearly concurrent with commercial applications.[2]

Whether for spectrum availability, ionospheric transparency or reducing the size of antennas, the move to higher satellite frequencies is both desirable and inevitable. The prospect of promoting smaller, more efficient earth stations for use by mobile, portable and apartment-dwelling amateurs is a highly attractive one. And the prospect of using gateway access and integrated digital/voice channels over future OSCARs builds on concepts now being architected.[3]

Next month we'll take a closer look at what a gateway is and how it functions.

Notes
[1]Mode B uses a 70-cm uplink and a 2-meter downlink. Mode L uses 24 cm up and 70 cm down.
[2]Interestingly, one of the commercial proposers for MSAT-X would use technology first used aboard AO-10. Thus, in this sense, Amateur Radio satellites are carrying on a venerable tradition of ham radio dating back decades, ie, technologies developed by amateurs finding commercial applications.
[3]Information on getting started on OSCAR may be obtained from the author for a business-sized SASE to the address shown above. ■

Affiliated Clubs in Action

Conducted By Leo D. Kluger, WB2TRN
Club Program Manager, ARRL

MORE GREAT IDEAS FROM KB9UM

Details on Stanley W. Henson's booklet, 14 Ideas for More Radio Club Fun, *were given in the December 1985 column. Here's the tenth idea from the Contests and Activities heading.*

Novice Net

The Novice Net is an on-the-air CW practice session for beginners in Amateur Radio who would like to gain some CW operating experience with strong local signals. Typically, the Novice Net pairs up one or two new Novices with an "old pro" in the club for regular CW contacts across town. The practice sessions are kept at 5 WPM, and "talk-thru" assistance by telephone is readily available. The sessions are continued until the Novices have confidence in their new communications abilities and have the bugs worked out of their station and operating procedures.

Our more experienced club members assist the beginners to give them encouragement and to provide those important "fellow club member" QSL cards. We use the 80-meter frequency of the state's slow-speed training net (at a different time than when the net meets) and encourage our Novices to participate in the slow-speed group for additional CW practice.

POWER IN NUMBERS (FISCAL, THAT IS)

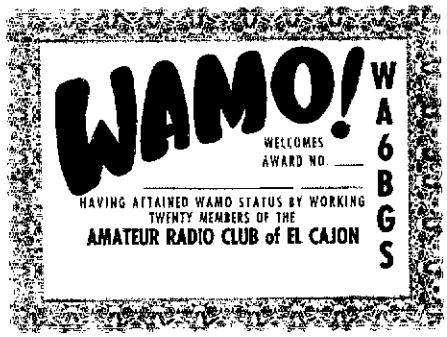
Just as the ARRL's strength is that it represents some 140,000 radio amateurs, a radio club has buying power that individual radio amateurs can't usually muster up. The Richardson (Texas) Wireless Klub has put this to good use, as reported in their newsletter, *The Chawed Rag.* Taking advantage of club members who had earlier committed themselves to the project, the club purchased a roll of coaxial cable at wholesale, bulk prices and then resold it to the members who were participating. It's a good idea that can be extended to any hardware item, computer diskettes, antenna wire, etc.

The club has a Purchasing Chairman who researches suppliers to discover which ones will sell lot buys to club members at reduced rates. The Chairman features one product at each meeting, where the members are given the opportunity to sign up to buy the item. If, after two months, enough people sign up to meet the lot-buy requirement, the purchase is made. If not, no sale. It takes a fair amount of work on the part of the Purchasing Chairman, but the results are worth it.

EASY (AND INEXPENSIVE) PUBLICITY

The Amateur Radio Club of El Cajon (CA) sponsors the WAMO! award. The award is given to anyone living outside of the local county who works 10 or more club members. Edward De Mers, KF6AW, the Club's Certificate Manager, hopes that similar programs can be set up by other affiliated clubs. Amateurs living in the club's immediate county need to work 20 members for the award. Colored endorsement stickers are awarded for every five additional club members worked, and Century certificates are marked as such by a seal and ribbon placed on their lower-left edge.

A typeset rules and log sheet are distributed to all interested amateurs. The certificate text is printed on blank certificate stock, so the entire program's cost is well within the budget of most active clubs.



New Special Service Clubs

Becoming a Special Service Club (SSC) is not for every Amateur Radio group. It takes commitment, planning and, mostly, a membership that sets the highest standards for itself. A number of your fellow clubs have recently undertaken the commitment and become SSCs. Here's a rundown of each of these special groups, their city, state and number of members:

Dayton ARA, W8BI, Dayton, OH (702)
Green Fox ARC, Markesan, WI (26)

Renewing Special Service Clubs

After completing a year of Special Service, SSCs go through a review process with their respective Affiliated Club Coordinators. With successful programs behind them, they plan their next 12 months of activities. Recently renewing SSCs are presented here, each club name followed by the city, state and number of members:

Suffolk County ARC, W2TFJ, Bayport, NY (105)
Lincoln ARC, KØKKV, Lincoln, NE (251)
North Seattle ARC, W7DA, Seattle, WA (49)

Volunteer-Examiner Information

from the ARRL/VEC, 225 Main St, Newington, CT 06111

Locating A Test Session: Sessions are advertised publicly via local Amateur Radio club newsletters and repeaters. A printout of sessions in any state and some overseas locations is available from ARRL HQ for an SASE. We list ARRL/VEC sessions plus those of other VECs who inform us of their testing schedules.

Registering to Take an ARRL-Coordinated Test: A completed FCC Form 610 application and a check or money order for the test fee, payable to the "ARRL/VEC," should be sent to the local VE Team where you intend to be tested. "Walk-in" candidates may be allowed at some sessions, but registering in advance helps. If you write to a VE Team, send an SASE to cover postage and handling.

Test Fee: For ARRL-coordinated sessions held during calendar 1986, the test fee is $4.25, payable to "ARRL/VEC." A check or money order is preferred.

What to Bring to the Session: Bring the *original* plus a photocopy of your current FCC-issued Amateur Radio license, and the *original* plus a copy of any temporary upgrade certificate issued by a VE Team less than 1 year prior to the test date. (Duplicates of lost licenses are available through the FCC's Gettysburg office.) Also bring two forms of positive identification (including a photo ID, if possible) and at least two pencils and a pen. Scratch paper and answer sheets are provided.

Calculators: Nonprogrammable and "scientific" calculators are welcome. Pocket computers that store words are not allowed. Programmable calculators will be allowed only at the discretion of the VE Teams; be prepared to demonstrate that the memories have been cleared.

Exam Format: Written element exams are four-choice multiple-answer tests. A score of 74% or more is required to pass a written element exam. Most VECs assemble tests based on the ARRL-issued multiple-choice question pool. Code test transmissions are played from an audio tape prepared by the ARRL/VEC with message contents similar in format to an Amateur Radio QSO. The code test is "fill-in-the-blank" style and may be passed by answering at least 7 out of 10 comprehension questions correctly *or* by copying on paper at least one continuous minute of perfect copy from the code test transmission. The ARRL/VEC does not require a code sending test, based on the FCC's recommendation. Code tests may be copied on typewriters, but prior arrangement with the VE Team is required so that other candidates are not disturbed.

ARRL/VEC Retest Policy: A candidate who fails a written element and who has exhausted all code test possibilities at a session may not be retested during that same session. If a convention or hamfest test session schedules multiple sittings, a failed candidate may request that the VE Team retest him or her at a subsequent sitting. Retesting is allowed *if* the VE Team has a *different* test version available and the VE Team determines that it has the time and resources available to accommodate the retest. A candidate for retest is required to pay another test fee, and may be required to complete a fresh application Form 610 at the Team's request.

Special Tests: Candidates who require special assistance, materials or equipment because of physical disability must attach to the application a signed and dated physician's statement certifying the nature of the disability, plus a letter explaining what special assistance, materials and/or equipment must be used to conduct the examination. (See Section 97.26[g] of the FCC Rules.) Be sure to notify the VE Team well in advance so that special arrangements can be made. If Braille or tape-recorded written tests or special-pitch code tapes are needed, contact the ARRL/VEC at least one month in advance to ensure materials will be available. Further questions about testing persons with disabilities should be addressed to the ARRL Program for the Disabled at HQ.

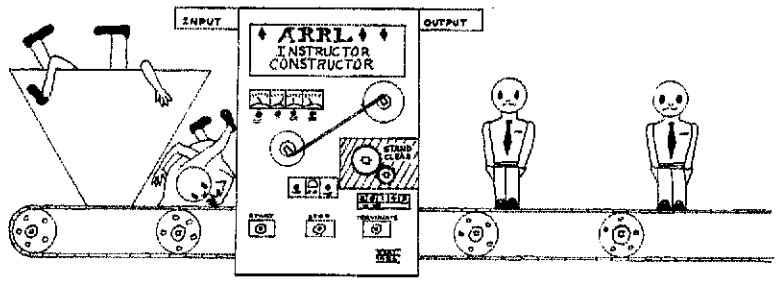
How to Become an ARRL-Accredited Volunteer Examiner: Qualified Advanced or Extra Class licensees (see Section 97.31 of the FCC Rules) are invited to notify the ARRL/VEC of their interest in becoming an accredited VE. Send us your name, call sign, license class and full mailing address. Information will be sent via *Third Class Mail,* which may take about three weeks to arrive.

Registering an Upcoming Test Session with the ARRL/VEC: Complete a Test Session Registration Form and submit it to the ARRL/VEC office *at least 30 days in advance of your session. We need four weeks or more advance notice of a session* to serve you in the most cost-effective and accurate way.

In Training

Conducted By John Foss, W7KQW
Training Manager, ARRL

ARRL HQ AND AMATEUR RADIO INSTRUCTORS ENTER NEW PARTNERSHIP



Recognizing the need to improve our relationship with instructors, we're starting a new program. All of our past instructors have been sent a card on which they're asked their interest in participating. We'll use the returns to begin building a new instructor data base. Those who return the card to ARRL HQ by the date specified on the card will receive a reregistration application and a complete description of the new program. Of course, there may be instructors who aren't on our list but who would be interested in this new program. These instructors need only drop a note to the Training Manager, ARRL HQ, asking for an application blank. The main purpose of this new program is to help us serve both our instructors and their potential students by keeping our instructor list up to date.

Several new privileges are available to those who register for the new instructor program. Each such instructor receives a package of instructional material that includes the following items: (1) a copy of the latest edition of *Tune In the World with Ham Radio* (including the beginner's code-tape cassette); (2) a copy of the latest edition of each license manual (Technician/General, Advanced and Extra); (3) a copy of the latest edition of *The FCC Rule Book;* (4) a copy of *First Steps in Radio,* by Doug DeMaw, W1FB; and (5) a copy of the latest edition of each *Instructor's Guide* (presently available are the Novice and Technician/General; the Advanced is being prepared now.)

Each instructor registered in the new program will be able to purchase ARRL instructional material either from dealers or directly from ARRL HQ. Ham-equipment distributors in the instructor's vicinity will receive a box suitable for holding business-size cards containing the instructor's name, address and telephone number. These cards will be available to persons who ask the dealer about the process of becoming a ham. These instructors also will receive occasional bulletins from ARRL Headquarters and referrals from among the inquirers who contact ARRL Headquarters. Dealers will receive a computer printout of the names and addresses of inquirers referred to instructors and/or affiliated clubs in the dealer's locale.

The process of reregistration as an instructor is simple. The applicant fills out a brief questionnaire summarizing his/her experience (if any) in teaching Amateur Radio and/or any other subject, and the applicant's salestax permit number. The permit number may be either that assigned to the instructor, to the instructor's club, to the instructor's company or a nearby dealer with which the instructor has an agreement concerning the ordering and sale of books and other training material. Obtaining such a permit is quite easy in most states. The permit establishes the fact that the instructor is purchasing the material for resale, thus relieving the League of the necessity of collecting sales tax on the purchase. (If the applicant's state has no sales tax, a federal or state business ID will be required.) The application form should be returned to ARRL Headquarters with a check for $20 to cover the cost of processing the application.

Instructor registration obtained in the new program is valid for one year. To renew the registration for the succeeding year, the instructor must purchase one or more instructional books (limited to the titles mentioned above) from League Headquarters and request at the same time that the registration be extended for one year. The instuctor may purchase an entire new set of instructional material for $20 if he/she wishes, but there is no requirement to do so. Only one set per year may be purchased at this special price, however.

The registration fee of $20 is guaranteed only during 1986. Adjustment of the fee might be necessary in future years because of possible increases in printing and mailing costs. Another reason for price adjustment is the addition of new items to the list that the registered instructor may purchase at a discount and will receive without additional cost with the initial registration under the new program. Watch this column for announcements of new training material.

We hope you will like the new program. We expect you'll find it a great improvement. It has been developed after consultation with many instructors and dealers, including Gordon West, WB6NOA, and Peter Kemp, KZ1Z, the two latest recipients of the Herb S. Brier, W9AD, Memorial Instructor of the Year Award. Let us know how you like our new program and what additional features you'd like to see.

ON RECEIVING MAIL

Letters! Do we get letters! And we want those letters. Hundreds of hams each year send us suggestions—for conducting this column, for improving our existing publications, for revising our training program, for new publications. All these suggestions are more than welcome. The more suggestions we receive, the more certain we are that we're doing at least some things well—otherwise you wouldn't bother to write. And knowing that you care spurs us on to even better performance.

Our goal, of course, is to do the best job possible, given the resources we have available. (If we had more resources, we could do an even better job.) The great majority of your suggestions are good; some are excellent. Some we have adopted; some we haven't. Why then, when we receive an excellent suggestion, do we not adopt it? Did we forget? Were we uninterested? Were we too busy? Didn't we care?

None of these is the reason some of your top-notch suggestions don't get adopted. Nine times out of 10 the reason is financial. Yes, of course we have the money—but only if we take it from an equally worthy project that already has been funded. Sometimes it's possible to do just that, especially if that project is coming in under budget. But usually it's not possible. No organization *ever* has the resources to do everything it would like to do to further the purpose for which it exists.

Yet some of our loyal readers might be unaware of the multiplicity of problems surrounding the production or major revision of any publication, tape or audiovisual—ours or anyone else's. First, and probably the most difficult, is the great disparity of backgrounds of the students using our training material. Some are five years old; others are 89. Some have had no formal schooling; others have earned PhD degrees from major universities. Some are whizzes at mathematics; others live in mortal terror of having to make simple calculations. Some students have no scientific background; others are scientists, physicians or professional engineers. Some are retired and have plenty of time to study at home; others have a hard time finding even half an hour per day to do their homework. For most, English is the native language, but some speak no English and read it only with great difficulty. Students in all these categories use the same League publications. How can we reach them all in one or two books?

Admittedly, it's tough. The copy for everything we publish is read by hams *and* nonhams with widely different backgrounds. Their suggestions are collected. Then, the manuscripts are revised in the light of those suggestions and are again circulated for comments. Eventually, we decide to print a particular text in a particular format. That's what you buy when you purchase a League publication. No publication ever suits everyone to a "T," but we've done our best to see that ours suits as many students with as many different backgrounds as is humanly possible. That your League has been in business for 70 years is reasonably good evidence that we've done a satisfactory job. Yet this fact in no way excuses our mistakes. Anything can be improved and should be. Here at your League Headquarters, the name of the proverbial game is *quality.*

So keep the suggestions coming. We'll do our best to implement as many of them as we possibly can. We'll acknowledge your suggestions, too. Everyone who makes a considered suggestion will hear from us, whether or not we can implement it immediately. And keep on recruiting new members and new hams. Together we can reach our goal of making each of our training publications as helpful as possible to as many people as possible as soon as possible. Your Training Branch has no other reason to exist.

YL News and Views

Conducted By Joan Gibson, KG1F
RR 1, Box 1465, Waterbury, VT 05676

Happy Silver Anniversary, Buckeye Belles

On March 6, 1961, a "YL" named Buckeye Belle was born of the imagination and organization of Shirley Rex, K8MZT, and nine other YLs: W8HUX, W8OTK, W8MBI, W8HWX, W8RZN, W8SPU, W8GSH, K8HGD and K8ITF. "Having attended YL conventions and noting the activities of organized groups of women amateurs, I felt it would be a good idea to have the Ohio YLs get together," said the founder. Letters suggesting the formation of an organization went out to various groups of amateurs throughout. W8HWX took on the task of researching the current Callbook for names and addresses of Ohio YLs, and sending out hundreds of letters to prospective members. The response was so enthusiastic that by July of the same year the newly formed Buckeye Belles had 82 members.

In the early years it was a relatively loose-knit organization held together by the enthusiasm of its members and the now well-known newsletter, *The Buckeye Burr*. The group did not require dues, but would accept donations to cover the costs of publishing and mailing the newsletter. During the Belles' first years, regional representatives toured the state meeting new YLs, explaining the organization and recruiting new members. During the founding year, W8MBI and K8ITF designed what is now the famous Buckeye Belle Certificate (for details, contact the Certificate Custodian, K8ITF). Even though in their 25-year history the Belles have issued nearly 400 certificates, there have been only three Certificate Custodians!

Due to the phenomenal growth of the Belles, the members voted at their first annual meeting in 1962 to organize into a club-type group with officers and committees. The Columbus-area Buckeye Belles, headed by W8LGY, hosted the first anniversary (annual) meeting. At this gathering, the YLs adopted a set of by-laws, and Marjorie Farinet, K8ITF, was voted the Belles' first president. Although the organization continued a "no-dues" policy, it now required an annual subscription fee for those interested in receiving *The Buckeye Burr*.

In June of 1962, this fledgling organization, 160 strong, accepted the challenge of hosting the fourth International YLRL Convention, slated for 1964. K8PXX's slogan, "Migrate to the Buckeye State in 64," inspired YLs to gather in the Buckeye State to make the 25th anniversary of YLRL a glowing success.

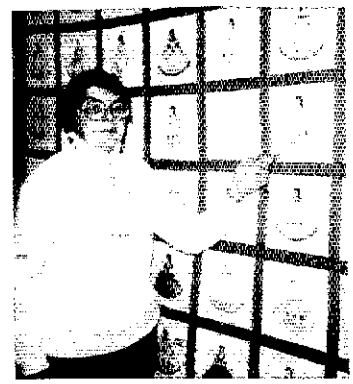
Ten years later, one of the founding Buckeye Belles, Marie Helminski, W8MBI, became a Silent Key. To honor Marie, the Buckeye Belles applied for and received the Buckeye Belle Memorial Station License W8BMI. This license was entrusted to Station Custodian Ruth Rickett, W8LGY, on May 28, 1965. On June 3, 1965, the station was heard for the first time on a 6-meter net, and five days later it made its debut on 75 meters.

The W8MBI net operates every Tuesday at 8 PM local time on 3.972 and welcomes all amateurs. The honor of being Memorial Station Custodian has gone to W8LGY, WA8KMT, WB8FIC and W8RZN, current custodian. In addition to the Tuesday net, the Buckeye Belles operate a Monday net at 9 AM local time on 3.950. Since its inception in February 1968, its one and only net control has been Beulah Shelly, WA8EKQ! Wednesday morning at 10:30, the Belles can be heard on WD8IKC's CW net on 3.725.

At the annual meeting in 1969, a new tradition developed by WA8DWL was introduced into the installation ceremony of Buckeye Belle officers. Nellie Swan's beautiful candle-lighting tradition assigns special-colored candles to signify each of the club's officers and her purpose and duty to the club. At that same meeting, Vice President K8CKI's personal greeting, "I'm proud to be a Buckeye Belle, aren't you?" became a trademark of the Belles. Due to the financial crunch of the late '60s and the club's reluctance to raise dues, Buckeye Belles started their now well-known gift shop to supplement their treasury.

(continued on page 66)

Buckeye Belles of 1962 at the Dayton HamVention® are (l-r) K8GWF, W8LGY, W9YWH, K8ITF, K8DHF, K8HGD, WA8FSX, K8MZT, K8TFL, WA8AHU, W8VWL, WN8ADS, W8VWL's daughter, K8VWU, K8TKS and K8UKM. *(photo courtesy WB8FIC)*



WB8FIC, President of the Buckeye Belles, with the exquisite quilt made by members.

DX-YL to North American YL Contest

Dates/Times: CW—1800Z Apr 9-1800Z Apr 10, 1986; phone—1800Z Apr 16-1800Z Apr 17.
Eligibility: All licensed women operators throughout the world.
Procedure: DX YLs call "CQ North American YL" and NA YLs call "CQ DX YL."
Operation: All bands may be used. No crossband operation. Net contacts, repeater contacts and contacts with OMs do not count. Stations may be worked and counted once on each band and mode.
Exchange: Station worked, QSO number, RS or RST, state or country. Entries in log must also show time, band, date and transmitter power.
Scoring: (A) Phone and CW will be scored as separate contests. Submit separate logs for each contest.
(B) DX YLs, including Hawaii and Alaska, may contact all the North American continent (48 contiguous states and Canadian Provinces).
(C) Contestants on the North American continent (the 48 contiguous states and Canadian provinces) may contact DX YL stations, including Hawaii and Alaska.
(D) A station may be counted once on each band for credit, and one point is earned for each station worked once on each band.
(E) Multiply the number of QSOs by the number of *different* states and provinces *or* countries worked. A multiplier is counted *only once* in the contest. It is *not* counted on each band.
(F) Contestants running 150 W or less on CW and 300-W PEP or less on SSB, at all times, may multiply the results of E by 1.25 (low-power multiplier).
Logs: All logs must show state or country to qualify for awards. Do not send carbon copies of logs. Please print or type. *Logs must be signed by the operator,* and *no logs will be returned.* Remember to file separate logs for each contest. Logs must show claimed score and be postmarked by *May 5, 1986,* and be received no later than *May 28, 1986* or they will be disqualified. Please send logs to YLRL Vice President NM7N.
Duplicates: For each duplicate contact that is removed from the log by the Vice President, a penalty of three additional and equal contacts will be exacted.
Awards: Cup to 1st place DX Phone; Cup to 1st place NA Phone; Cup to 1st place DX CW; Cup to 1st place NA CW. Plaque to highest combined CW and Phone NA score. Plaque to highest combined CW and Phone DX score. 2nd and 3rd place DX and NA winners in each contest will receive certificates.
Suggested Frequencies: The same in all contests.
Note: Since band allocations in other countries are often different than in the US, North American YLs should look for DX YLs in other parts of the bands, especially on 40 and 80 meters.

Silent Keys

Administered By Nancy A. O'Neill

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

N1ARS, Burton G. Howarth, South Yarmouth, MA
W1BJE, Philip F. Taylor, Goffstown, NH
WB1CAW, Joseph H. Lapointe, Granby, MA
KA1KSZ, Omer J. Simard, Hartford, CT
W1TB, Basil B. Gordan, North Windham, ME
W2BAM, Samuel L. Sherman, Brooklyn, NY
WA2DWI, Gerald J. Bryerman, Scottsdale, AZ
K2DZD, Peter J. Cocuzza, Brooklyn, NY
N2EFE, Paul L. Mott, Tuckerton, NJ
KA2FQD, Alvin K. Winter, Tucson, AZ
W2KTQ, Walter O. Lee, Fairfield, NY
W2LYZ, M. Daidone, Orange, NJ
W2NRO, Charles J. Stager, Toms River, NJ
W2UVM, Malcolm H. McCrum, Islip, NY
WA2VHE, Charles F. Osborne, Oneida, NY
K3BB, W. T. Burton, Jr., Villanova, PA
*WA3BZM, Michael J. Mattleman, Windham, NH
WA3ERG, George F. Walmsley, Sr., Philadelphia, PA
WB3HNK, Leonard W. Theodore, Palmyra, PA
K3OQP, C. Amedee Balsley, Uniontown, PA
W3SKU, Winston C. "Shorty" Lundergan, Lock Haven, PA
W3WB, William C. Benjamin, Parkville, MD
W3YXF, Joseph H. Rushton, Lansdale, PA
WA4CLM, George E. Whitten, Memphis, TN
K4DWH, Harry B. Schramm, Boca Raton, FL
W4EF, Ralph A. Owen, Tuscumbia, AL
W4FDI, William T. Pooler, Bonita Springs, FL
KI4FX, H. K. Taspinar, Richmond, VA
K4GUS, G. T. Magee, Birmingham, AL
N4IEV, Robert W. Dickinson, Altadena, CA
K4ITR, Robert J. Curry, Pinellas Park, FL
WA4JGC, Waldo M. Wattles, Westminster, SC
KA4KOJ, Arlie E. Everhart, Alcoa, TN
W4KXM, Dennis P. Wyatt, Jr., Macon, GA
W4MC, John R. Warner, Charleston Heights, SC
WB4SHB, Rufus F. Gatlin, Jr., Lake Park, FL
W5CX, Norman C. Matlack, Dallas, TX
W5DER, Harry L. Watkins, Portales, NM
N5EIB, C. E. Eves, Alamogordo, NM
W5GSY, Harold L. Sudbury, Blytheville, AR
WA5JYY, D. H. Godwin, Kermit, TX
K5KAZ, M. Linton Jones, Bryan, TX
W5KQE, Charles Ray Williams, Haynesville, LA
K5KXG, Ross J. Kelly, Palestine, TX
W5NW, Wayland "Soupy" M. Groves, Odessa, TX
AA5Q, Lewis C. Fay, Fort Worth, TX
*W5SFI, George R. Holbert, San Antonio, TX
AE5T, Chester A. Hall, Jr, Rogers, AR
K5VXJ, Elbert A. Owen, Raton, NM
*W5VZN, Dale W. Dycus, Denver, CO
W5WVF, Doomas T. Easton, Albuquerque, NM
W6BXV, Charles A. Alker, Auburn, CA
W6CKC, L. D. Herring, Blytheville, AR
W6CP, Clinton M. Barrick, Mesa, AZ
KA6CXX, Kenneth W. Dillwith, Inglewood, CA
N6DQE, James W. Walker, Delano, CA
KD6ED, Thomas C. Stephens, Pasadena, CA
W6FHU, Leonard W. Shmitka, Canoga Park, CA
WA6III, Ray Kaiser, Phoenix, AZ
KB6IM, Randall L. Gardner, Christianstead, St Croix, VI
W6LAY, Theodore H. Shepherd, Hollywood, CA
W6LLV, Norman A. MacIntyre, Saratoga, CA
K6MJL, William B. Floyd, Palo Alto, CA
W6MWD, Ray C. Foote, Los Angeles, CA
*N6OZ, Donald E. Gilbeau, Stockton, CA
*W6QBD, J. H. Harwood, Lucerne Valley, CA
WB6QKJ, Bill R. Rie, Pasadena, CA
W6SHV, J. B. Stafford, Stockton, CA
W6YHI, John P. Drummond, Loomis, CA
W6ZGC, Helmut "Mickey" Mecke, Barstow, CA
KA7AUG, Richard L. Ahrens, Prescott, AZ
W7CTC, Roy A. Foster, Jr., Bellevue, WA
KA7ELX, David C. Rimes, Winlock, WA
*KX7M, Carl M. Anderson, McMinnville, OR
WB7PVA, Bernard E. Corpe, Hood River, OR
W7UUU, E. L. Troutman, Glendale, AZ
KA8AWT, Roger A. Fleming, Bluefield, WV
K8BNS, Edwin G. Price, Jr., Ottawa, OH
WA8CWA, Thomas Shelby, New Bremen, OH
WB8EKB, Robert B. Morgan, Dayton, OH
W8HCE, Bernard L. Michaelson, Xenia, OH
WA8HIT, Ben A. Hitt, St. Clairsville, OH
KA8KSC, Donald B. Tuttle, Dayton, OH
W8LIP, Clyde F. Davenport, Jr., Ann Arbor, MI
K8LRK, David J. Smith, Zanesville, OH
WB8ONC, Donald Schneider, Columbus, OH
W9AK, Henry Klaus, Peoria, IL
WA9BMA, Edwin J. Bach, Port Washington, WI
W9FTY, Gildea Hutchinson, Mequon, WI
WA9GQG, Donald F. McLennan, Lombard, IL
WA9OLE, Donald M. Overmyer, Fort Wayne, IN
W9TUD, Chester G. Cook, Campus, IL
WD0ACC, Leonard R. Russell, Winfield, KS
N0AVL, Charles J. Hrdlicka, Kimball, SD
W0ELE, Harold L. Stewart, Sr., Colorado Springs, CO
W0ENQ, Don L. Spaulding, Denver, CO
K0IPS, Carl E. Larson, Hemingford, NE
WA0JIJ, Willis E. Boughton, Clay Center, KS
KD0KJ, John R. Wable, Wheat Ridge, CO
WA0LOH, Jerry R. Larson, Mora, MN
W0OXR, Merton O. Jackson, West Cliffe, CO
W0QAS, Richard O. Wheeler, Springfield, MO
WA0TVH, Michael Legler, Lawrence, KS
WB0UGD, John R. Bixby, Geneva, NE
WB0WXQ, Janice A. Becker, Aurora, CO
W0ZOB, Delmer L. Hansen, Coleraine, MN
DL6MH, Josef Reithofer, Straubing, Federal Republic of Germany
XE1BT, Antonio Cruz-Uribe, Green Bay, WI

*Life Member, ARRL

In order to avoid unfortunate errors in the Silent Keys column, reports of Silent Keys are 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

April 1936

☐ A black stripe across the cover foretells the tragic story inside—the February deaths of our League president, Hiram Percy Maxim, and vice president, Charles H. Stewart. "Thus passed into immortal history the man who (co)-founded our society and gave it its name and who has been constantly our leader and our inspiration . . . and the man who was our legislative expert and who gave of his services in a fashion never excelled in our annals."

☐ Jim Lamb's noise-silencing circuit is the current hot topic in radio-communications circles. This month he gives us details on using the development for noiseless reception with crystal-type single-signal receivers, particularly the avoidance of crystal "pinging" from electrical interference.

☐ An eight-tube high-performance superhet comes from the equally fertile mind of George Grammer—an inexpensive design based on results-per-dollar. A planetary dial gives especially smooth control.

☐ An amateur with outstanding ten-meter performance, W6JN, shares details of his rotary beam antenna—three half-waves stacked vertically end-to-end, each with its reflector. A 70-foot tower is needed to support this baby.

☐ Crystal control is highly desirable for stability, but leaves you "rockbound." W9DRD recommends using a variable-gap holder to achieve frequency excursions of up to 24 kc. at 20 meters, yet retain stability of signal.

☐ Don Mix, W1TS, prefers even more flexibility and uses a two-tube electron-coupled oscillator/exciter unit for maximum freedom to roam the bands.

☐ Using a cathode-ray tube to monitor voice signals is an excellent idea, says W9HYO, and is neither as complicated nor expensive as you might think. He offers helpful tips on the hookup.

☐ Last month, W9UZ showed us some inked paper tape recordings of various ham "fists." This issue, he details construction of the entirely homemade recording unit—for less than ten bucks.

☐ Faced with limited floor space (but no height limit) for his transmitter, W1JPE mounted "breadboard" units vertically at the rear of a tall rack, with the entire front left open for coil-changing and tuning.

☐ It's not for the average ham, but the advanced amateur who builds W1CBD's combination beat-frequency-oscillator and signal generator will save a bundle over the purchase of a commercial unit—with no sacrifice in performance.

☐ "To a Lady with Red Hair," one of the short-story classics by W4VT, can still bring a lump to the throat of anyone who remembers hamming in the '30s.

25 Years Ago

April 1961

☐ We are being blamed for interference to television reception actually caused by second harmonics from Citizens Band operation at 27 Mc. The Editor suggests adding a responsible CBer or two to your TVI Committee.

☐ K6SNO applied some basic workshop techniques to solid and perforated sheets of aluminum, and came up with a cabinet enclosure that rivals any commercial product.

☐ That expert scavenger of old television sets, W1ICP, this month has produced a 150-watt multiband amplifier, with tubes picked up in war surplus to keep down the cost even more.

☐ W1HDQ put the 6CW4 "nuvistor" tube through extensive tests in v.h.f. receiving gear and found considerable improvement in performance, particularly in the noise figure.

☐ For less than $100, W1TQZ built a parabolic-type reflector for 1296 Mc. to get set for moonbounce activity.

☐ Aluminum angle pieces, bamboo spreaders and loading coils were packaged by K1DRX as a transportable three-band quad primarily for Field Day use.

☐ KH6UK and W6NLZ were chosen dual winners of the General Electric Edison Award for their outstanding trans-pacific achievements on v.h.f. F.C.C. Commissioner Fred Ford, featured speaker at the presentation ceremonies, paid considerable tribute to amateur radio as a U.S. institution.

☐ The *S.S. Hope*, a hospital ship financed largely by contributions, carried W8OLJ/MM on its extensive Pacific travels to provide people-to-people contacts.

☐ Some 3000 members of the Amateur Radio Emergency Corps participated in the 1960 Simulated Emergency Test, manning 952 mobiles and portables as well as 149 fixed stations on independent power.

☐ W4RXY presents an extensive discussion on Greenwich Mean Time and many reasons why it is desirable as the time system for world-wide communications.

☐ In the space of a six-pack, W3QZO built a ten-meter walkie-talkie full of interesting ideas, such as combining a homemade converter with a cheap b.c. set to get a good double superhet.

☐ The famous Gonset Communicator has gone high-hat, the mark IV model a far cry from its fledgling days—higher performance, styling . . . and price.

☐ Though a public-relations expert not unfamiliar with *television studios, Lenore Kingston Conn, W6NAZ*, was overwhelmed to find herself the subject of the nationwide show, "This is Your Life." NBC news producer K6DUE pulled the trick.—*W1RW*

IARU News

Conducted By Richard L. Baldwin, W1RU
HC 60, Box 60, Waldoboro, ME 04572

President: Richard L. Baldwin, W1RU
Vice President: Carl L. Smith, W0BWJ
Secretary: David Sumner, K1ZZ
Assistant to the Secretary: Naoki Akiyama, N1CIX/JH1VRQ

Regional Secretaries:
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Secretary, IARU Region 1
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Birmingham B17 8QB
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Secretary, IARU Region 2
9 Sidney Lanier La
Greenwich, CT 06830
USA

Masayoshi Fujioka, JM1UXU
Secretary, IARU Region 3 Association
PO Box 73, Toshima
Tokyo 170-91
Japan

The International Amateur Radio Union—since 1925 the federation of national Amateur Radio societies representing the interests of two-way Amateur Radio communications.

Amateur Radio Administration

If you were going to start up an Amateur Radio Service from scratch in a country, what would you need to know? That question was answered once last year in a week-long course conducted under the auspices of the United States Technical Training Institute, and will be answered three times during 1986.

The USTTI was established in the fall of 1982 by Michael Gardner, President Reagan's Ambassador to the ITU Plenipotentiary Conference in Nairobi, Kenya. It is a joint venture between the leaders of the US telecommunications industry and ranking officials from the Federal government. The goal of this joint venture is to share United States telecommunications advances on a global basis by providing a comprehensive array of free telecommunications training courses each year for deserving men and women from the developing countries of the world.

The USTTI catalog lists course 86-202 as "Amateur Radio Administration," and the course description in the catalog reads as follows: "This course will provide insights into the Amateur Radio Service and Amateur Satellite Service. The applicable frequency bands, international regulatory structures, technical standards, and licensing procedures are reviewed in depth. The course will be tailored, to a large extent, to the student's needs. The principal instructor is expected to be R. L. Baldwin, President, International Amateur Radio Union."

The Participant Learning Objectives are to be able to help create, administer and foster an Amateur Radio Service among the citizens of one's country.

This is a course for administrators, not for Amateur Radio operators. Its goal is to help an administrator, presumably from a developing country, to learn what he or she needs to know to understand and therefore effectively administer an Amateur Radio Service. Last June, we had five students from Africa, the Orient and the Caribbean. This year, also in June, we will repeat the course in Newington. The "principal instructor" will, just like last year, get a great deal of valuable help from the ARRL HQ staff, AMSAT and IARU Region 2. We think you probably wouldn't be surprised to learn that during the course the students will also learn quite a bit about the value of the Amateur Radio Service and why it should be supported, about the help provided by amateurs during disasters and about the merits of the so-called common license.

In Nairobi in September and in Tokyo in November a version of the course will be given under the auspices of the International Telecommunication Union. Again, the course will be aimed at administrators from developing countries. In Nairobi, the course will be held at the ITU Training Center, and in Tokyo at facilities arranged for by the Japan Amateur Radio League. No, Japan is not a developing country! However, it happens to be a good location for an Asian course, and we expect to have some assistance from JAMSAT. Current plans are for there to be several students from the People's Republic of China.

This is the sort of activity that ties in with IARU's long-range plans for ensuring that the Amateur Radio Service is recognized as a valuable radio service, one that should be supported at ITU conferences. The people that attend these courses may not be *this* year's attendees at an ITU conference, nor next year; but, we think the odds are they may be the conference decision-makers some day. When that day comes, we want them to have a favorable attitude toward Amateur Radio. This course is a good investment toward that goal.

YL News and Views

(continued from page 64)

Homecooked food and handmade crafts were donated by club members and sold at local hamfests and Belle meetings. Proceeds from the sales helped to meet the group's expenses, but inflation took its toll: In 1975, after 14 years of following a "no dues" policy, the group voted to raise dues.

For a number of years, OMs, both from Ohio and other parts of the country, had requested the Buckeye Belles to organize a dues-paying auxiliary that would work to support the group's causes. Until 1969 the YLs had resisted opening their club to anyone other than Ohio YLs. But that year a motion was passed at the annual meeting to allow the spouses of the Buckeye Belles to become Honorary Members. Hence, the Buckeye Beaus was founded. In 1977, the Belles voted another major change and agreed to permit out-of-state subscribers to *The Buckeye Burr* to become Associate Members. This obviously was a popular decision because today Associate Members number over 50, including three DX-YL adoptees and one shortwave listener.

Through the years the Buckeye Belles have been staunch supporters of YLRL. Besides hosting the 1964 International Convention in Columbus, Ohio, the Belles and Chix-on-Six Club co-hosted the 1971 Mid-West YLRL Convention in Cleveland. A Belle, WA8EBS, served as YLRL President in 1974 and 1978. Other members have served YLRL as District Chairman, Circulation Manager, Receiving Treasurer and Editor of *YL Harmonics*.

On April 12, 1986, the Buckeye Belles will commemorate their 25th anniversary with a gala celebration at the Holiday Inn in Delaware, Ohio. Among the many activities planned will be a presentation of two handmade Buckeye Belle quilts. These most unusual quilts are made up of squares embroidered by a Belle or Associate, and each has her call letters on the skirt of the Belle. One quilt will go home with a Buckeye Belle or Associate Belle present at the meeting, and the other will go to a member unable to attend the anniversary banquet.

Although there will be only two recipients of the quilt, all amateurs and family attending the Buckeye Belle Silver Anniversary celebration will be a part of the proud heritage of this fine, upstanding organization. Through the years, Buckeye Belles boasted a membership ranging in age from age 8 to 80, consisting of homemakers, students, secretaries, pilots and business professionals of all types. Among their many talents and hobbies are achievements in sewing, drawing, arts and crafts, music and the cuisine arts. More importantly has been the membership's involvement in local, national and international emergencies, and assisting other hams to develop proficiency in Amateur Radio. Though the membership has fluctuated and changed through the years, the club's principal aims of good fellowship, emergency help and the improvement of Amateur Radio have continued to attract members and associates from around the world. Congratulations to the Ohio Buckeye Belles on their Silver Anniversary.

[Thanks to Jean and George Blakeslee for their research efforts and assistance in this article. Letters of commemoration and congratulations to the Buckeye Belles can be sent via President Jean Blakeslee, WB8FIC, 448 N Sandusky St, Delaware, OH 43015—Ed.]

Coming Conventions

NORTHWESTERN DIVISION CONVENTION (UPDATE)

The Northwestern Division Convention scheduled for May 31-June 1 in Vancouver, Washington, has been canceled.

ARKANSAS STATE CONVENTION
April 12-13, Little Rock

Central Arkansas Radio Emergency Network (CAREN) proudly invites all hams to the 10th annual Arkansas Hamfest and Arkansas State Convention. Again this year the hamfest will be held at the North Little Rock Community Center, Pershing Blvd, Little Rock. *Free admission.* The "world famous" Boat Anchor Inn will be open all day Saturday and Sunday. A repeat of last year's social and Bar'b'que is scheduled Saturday evening. Covered flea-market area for the bargain hunter. Dealers include Moorly Electronics, Texas Towers, Generation Products, BCD parts and Memphis Amateur. Flea-market space is $5 (bring own table). Rental tables are $5 as long as they last. CAREN will sell your equipment in the Flea Market for a 10% commission. Free parking and refreshments available. For more information, write to Dale Temple, W5RXU, 1620 Tarrytown, Little Rock, AR 72207, tel 501-225-5868.

MISSISSIPPI STATE CONVENTION
April 19-20, Jackson

The 1986 ARRL Mississippi State Convention/Capital City Hamfest again will be hosted by the Jackson ARC, and held at the National Guard Armory, 1420 Raymond Rd. Hours are 9 AM-5 PM Saturday and 8 AM-1:30 PM Sunday. Top attractions include commercial dealer exhibits, a large indoor flea market, concessions and abundant free parking. Overnight accommodations are available for self-contained RVs.

An ARRL forum is planned with Delta Division Director Clyde Hurlbert, W5CH, and Mississippi Section Manager Paul Kemp, KW5T. Mississippi Sideband Net, MARS and VHF/UHF forums are also scheduled. Admission is free. Flea-market tables will be available at $5 each. Motel reservations may be made through the Holiday Inn Southwest; for special rates, specify that you are a hamfest participant. Talk-in on 16/76. For more information, contact Harvey Little, WD5BSJ, 177 Old Canton Hills Rd, Jackson, MS 39211, tel 601-956-3480.

MISSOURI STATE CONVENTION
April 11-13, Kansas City

The PHD ARA will sponsor the 1986 ARRL Missouri State Convention on Friday, Saturday and Sunday at the Old Kansas City, MO Airport. There will be a complete program of forums: ARRL, FCC, DX, VE, computer, packet radio, Amateur TV, and many more. Largest indoor flea market in the Midwest. All inside the 45,000-sq-ft, one level, air-conditioned building. Unlimited free parking adjoins the site; RVs welcome—no hookups.

Saturday night banquet at the world famous Gold Buffet. Guests include Paul Grauer, WØFIR, Midwest ARRL Director; Gerald Hall, K1TD, Associate Technical Editor of *QST*; John Foss, W7KQW, Manager, ARRL Training; Bill Pasternak, WA6ITF, Producer *Westlink Radio News;* and others. Registration $4 (good all 3 days). Swap tables $10 each and includes 1 registration with each table. Banquet tickets $10.50 each. Please order banquet tickets and swap tables in advance.

Exams Friday at 6:30 PM and Saturday at 9 AM, limited to first 40 per session; walk-ins if space is available. You are urged to register at least 5 days in advance by sending a $1 fee and a properly completed 610 form. Talk-in on 34/94. For information and registration, send to PHD ARA, PO Box 11, Liberty, MO 64068-0011, or call 816-452-9321 or 216-781-7313.

MICHIGAN STATE CONVENTION
April 11-12, Saginaw

The 1986 Michigan ARRL State Convention will be held at the Florentine Inn, 400 Johnson St, beginning at 6 PM Friday. Hospitality rooms, eyeball QSO, Wouff Hong. Civic Center doors open at 8 AM on Saturday (6 AM for sellers). Dr Tony England, WØORE (NASA astronaut) is the featured speaker at the Saturday morning forum and evening banquet. Net meetings include Wolverine, Michigan Traffic System, QRP, QMN, ARES/SKYWARN, Great Lakes Emergency and Traffic, MACs, Navy MARS, TASYLs, Novice, BR/MEN and Thumb. ARRL forum with scheduled panelists League President Larry Price, W4RA, Great Lakes Division Director George Wilson, W4OYI, Vice Director Al Severson, AB8P, Michigan SCM Jim Seeley, W8MTD. Michigan Repeater Council forum discussion on the new 20-kHz 2-meter band plan for Michigan. DX forum with Rick Dorsh, HC8X (NE8Z) on Galapagos. Exams. Banquet tickets are $15 and will be available until April 6. Tables $8, tickets $3.50. For information or reservations, write to Saginaw Valley ARA, PO Box 6662, Saginaw, MI 448608, tel 517-631-4817 or 517-752-9740.

MIDWEST DIVISION CONVENTION
April 18-19, South Sioux City, Nebraska

The Midwest Division Convention of the ARRL will be held at the Marina Inn under the sponsorship of the 3900 Club. The convention will feature forums by Walter Maxwell, Larry Price, Lew McCoy and other noted authorities on subjects relating to Amateur Radio. There will be an indoor flea market, and commercial exhibitors will be on hand to answer questions on the latest equipment. Bring your 2-meter rig for a free "tune-up" courtesy of Burghardt Amateur Center. Volunteer exams will be given on Friday. Preregistration information should be directed to Dick Pitner, WØFZO, 2931 Pierce, Sioux City, IA 51104. Flea-market reservations should be sent to Glenn Holder, KØTFT, RR #1, Hinton, IA 51024. The Saturday night banquet will include entertainment and Siouxland notable Don Stone as the speaker. Women's programs are scheduled for the two days, so be sure to bring the XYL. For more information, contact Al Smith, WØPEX, 3529 Douglas St, Sioux City, IA 51104.

NORTH CAROLINA STATE CONVENTION
April 13, Raleigh

Raleigh, the City of Oaks, and the Raleigh ARS welcome you to the 14th Annual RARS Hamfest, NC State ARRL Convention and Computer Fair to be held, as last year, in the 110,000-sq-ft "indoor only" location, the Jim Graham building, NC State Fairgrounds, Hillsborough St, just west of the Raleigh Beltline. Registration by mail is $3.50 each until April 7 and $5 at the door. A flea-market space, 1 table and 2 chairs (ours only), will be $6 each. FCC amateur exams will be given the same day. Register for them by April 7; contact John Johnson, WM4P.

There will be an ARRL forum, packet-radio seminar, women's program, QCWA, MARS, ARRL NTS/ARES meetings, CW and homebrew contests and ARRL, AMSAT and RARS booths. Dealer setup 4-10 PM Saturday and 6-8 AM Sunday. Free welcoming party in the building Saturday 7-10 PM. Wouff Hong ceremony. Talk-in 04/64 and 28/88. For preregistration, flyer or dealer information, contact Rollin Ransom, NF4P, 2447 Fairway Dr, Raleigh, NC 27603, or call 919-779-5021.

April 5-6
Nebraska State, Kearney
April 11-12
Michigan State, Saginaw
April 11-13
Missouri State, Kansas City
April 12-13
Arkansas State, Little Rock
North Carolina State, Raleigh
April 18-19
Midwest Division, Sioux City, Nebraska
April 19-20
Mississippi State, Jackson

ARRL NATIONAL CONVENTIONS

September 5-7, 1986—San Diego, California
July 10-12, 1987—Atlanta, Georgia
August 19-21, 1988—Portland, Oregon

Strays

***QST* congratulates...**

☐ Jack Kelleher, W4ZC, of Annandale, Virginia, on being appointed Chairman of US CCIR Study Group 2. CCIR Study Group 2 advises the ITU on technical matters relating to most space radio services.

☐ Alex F. Dolgosh, K8EUR, of Middleburg Heights, Ohio, on being named Director of Marketing for The Antenna Specialists Company.

☐ Robert E. Levy, KA6UCK, of Santa Clara, California, on being promoted to Sales Manager, National Accounts, for The Antenna Specialists Company.

Hamfest Calendar

Administered By Bernice Dunn, KA1KXQ
Convention Program Manager

[*Attention*: The deadline for receipt of items for this column is the 5th of the second month preceding publication date. Hamfest information is accurate as of our deadline; contact sponsor for possible late changes. For those who send in items for Hamfest Calendar and Coming Conventions: Postal regulations prohibit mention in *QST* of prizes of any kind and games of chance such as bingo.]

Arkansas (Rogers)—May 3: The Northwest Arkansas ARC will hold its 6th Annual Hamfest at the Rogers Youth Center, 315 W Olive St, 8 AM-4 PM. Commercial exhibitors and flea-market tables, $2 per space. First come, first served. Doors open at 6 AM for exhibitors only. General admission free. Parking available. Snack bar on premises. Talk-in on 16/76, 63/03 and 52. For more information, write to Roy Milliren, AF5W, 2014 S 16th St, Rogers, AR 72756.

California (Fresno)—May 2-4: The Fresno ARC will hold its 44th Annual Hamfest at the Airport Holiday Inn. Inside air-conditioned dealer spaces and swap tables. FCC exams will be given. Good parking and programs. DX and Emergency programs. Forums and demonstration. Talk-in on 34/94. For additional information, contact: Harry H. Billings, Fresno ARC, PO Box 783, Fresno, CA 93712, or call 209-268-6314.

Colorado (Aurora)—Apr 27: The Aurora Repeater Assn will hold its annual ARA Swapfest at the National Guard Armory, 55 S Potomac, 8 AM-3 PM. Tables, FCC exams. For more information, please write to Aurora Repeater Assn, PO Box 31043, Aurora, CO 80041, or call John at 303-344-1915.

Colorado (Grand Junction)—May 10: The Grand Mesa Repeater Society will hold the Seventh Annual Western Slope Amateur Radio and Computer Swapfest 9 AM-4 PM at the National Guard Armory, 482-28 Rd. Admission is free, and swap tables are $5. Features will include an indoor swapfest, Amateur Radio exams, a packet-radio demonstration, auction and refreshments. Talk-in on 146.82 and 449.20. To reserve a swap table and for further information, send an SASE to Larry S. Brooks, WB0ECV, 3185 Bunting Ave, Grand Junction, CO 81504, or call 303-434-5603.

†**Georgia (Marietta)—Apr 19:** The Kennehoochee Hamfest, sponsored by Kennehoochee ARC, will be held at the Cobb County Civic Center (Exit 112 off I-75). Vendors, 7 AM-4 PM; public, 8 AM-3 PM. FCC exams, 10 AM by CAVEC. Talk-in on 28/88. In case of rain, flea-market space available inside. For more information, write to Gene Tudor, Kennehoochee ARC, PO Box 1245, Marietta, GA 30061-1245.

†**Illinois (Kankakee)—May 4:** The Kankakee ARS will hold their hamfest at the Kankakee County Fairgrounds. Admission is $3. For more information, call Don Kerouac, K9NR, at 815-932-3111.

†**Illinois (Mattoon)—Apr 20:** The Moultrie ARK will have their hamfest 8 AM-3 PM at the Coles County Airport located on Rte 16 between Mattoon and Charleston. Fly in or take the Charleston exit from Interstate 57 and go about one mile east on Route 16 to the airport. The hamfest will be inside a large, heated hangar. Admission $2 in advance, $3 at the door. SASE appreciated. No extra charge for vendors, but bring tables. Lunch available. No overnight camping. Talk-in on 655/055 or 52. For more information, write to MARK, PO Box 79, Sullivan, IL 61951, or call Vernon Jack, K9SWY, at 217-728-7596.

Illinois (Sandwich)—May 5: The Kishwaukee ARC will have their Dekalb Hamfest at the Sandwich Fairgrounds on Suydam Rd, just north of Rte 34. Tickets are $2 in advance, $3 at the gate. Inside display tables, $5; dealers welcome. Overnight camping, no hookups. Free parking. Talk-in on 94, 13/73. Outside selling space free. Hamfest markers at airport on Rte 34. For ticket information, write to KARC, Box 334, Sycamore, IL 60178.

†**Indiana (Columbus)—Apr 5:** The Third Annual Columbus ARC Swapfest will be held at the 4-H Fairgrounds, south of Columbus, on SR 11 (formerly 31A). Talk-in on 146.790. Admission $2; under 16 free. Exhibit space: $3/8′ table, $2/6′ table. Food, drink and free parking available. For more information, write to Chuck Roberts, WD9DWI, 2950 S Lake Dr, Columbus, IN 47203, or call 812-579-6576.

Indiana (Greencastle)—Apr 12: The Putnam County ARC will hold its Fourth Annual Hamfest and Auction at the Putnam County Fairgrounds, north of Greencastle, on US 231. Admission $3; under 12 free. Doors open for setup at 6:30 AM; open to public 8 AM; auction at 1 PM. For flea-market space: tables are $3; your own table, $2. Commercial exhibits welcome. Talk-in 33/93. For more information or reservations, send an SASE to Kent Douglas, K9JCR, RR 4 Box 586, Greencastle, IN 46135, tel 317-672-8237, or Nick Aubrey, N9FCB, RR 2 Box 592, Greencastle, IN 46135, tel 317-653-5290.

Kentucky (Erlanger)—Jun 7-8: The Northern Kentucky ARC will hold their Hamfest at the Best Western Vegas Convention Center. Admission is $5, under 12 free. For more information, contact John Thernes, 60 Locust Ave, Covington, KY 41017.

Louisiana (Baton Rouge)—May 3-4: The BRARC will hold their hamfest at the Catholic High School in Baton Rouge. Free admission. VE exams Saturday and Sunday at 8:30 AM; 30-day advance registration. Send SASE, Form 610 and check for $4.25 (payable to ARRL/VEC) to George Perry, W5LVX, 17424 Lady Constance, Greenwell Springs, LA 70739. Limited number of walk-ins available. Swap tables, forums and new equipment dealers. Talk-in on 146.79. For further information, SASE to Rick Pourciau, NV5A, 879 Castle Kirk, Baton Rouge, LA 70808.

Massachusetts (Braintree)—Apr 20: The South Shore ARC will again hold its annual indoor flea market at the Viking Club, 410 Quincy Ave, 11 AM-4 PM. There will be 8-ft tables for $12 (includes 1 free admission per table) only if paid for *before* Apr 20. Send appropriate amount to Ed Doherty, 236 Wildwood Ave, Braintree, MA 02184. Tables will cost $18 on the day of the sale. Checks should be made payable to the South Shore ARC. Confirmation of check receipt will be sent. *No* cancellation refund after Apr 16. Doors open at 9:30 AM for vendors only, 11 AM for the general public with an enterance fee of $2. Plenty of parking. Rain or shine; first come, first served. For more info, call Ed, W1MPT at 617- 843-4431 evenings.

Massachusetts (Cambridge)—Apr 20: The MIT Electronics Reaserch Society and UHF Repeater Assn will be holding their flea market on Albany and Main St in Cambridge. Doors open 10 AM-4 PM. Admission $1.50. Free off-street parking for 500 buyers. Tailgate room for 200 sellers. In case of rain, covered tailgate area is available for all sellers! Sellers $5 per space, includes 1 admission, set up 9 AM. Talk-in on 52 and 449.2/444.2. For space reservations or further info, contact Jamie at 617-262-5090 or 617-253-2060.

Massachusetts (Fitchburg)—Apr 26: The Montachusett ARA will hold a flea market at the Knights of Columbus Hall on Electric Ave. Doors open at 8 AM for sellers and 9:30 AM-3 PM for buyers. Talk-in on 144.85/145.45 and 52. Refreshments available. Admission, $1; tables, $8. For table reservations, send check payable to MARA, c/o James Beauregard, 7 Mountain Ave, Fitchburg, MA 01420.

Massachusetts (Framingham)—Apr 13: The Framingham ARA will hold its Annual Spring Flea Market and exams at the Framingham Civic League Bldg, 214 Concord St (Rte 126), downtown Framingham. Doors open 10 AM; setup for sellers 8:30 AM. Admission $2; tables $10 (includes 1 free admission); preregistration required for tables and exams. Talk-in on 75/15. Walk-in exams given on a space-available basis. For table reservation, contact Jon Weiner, K1VVC, 52 Overlook Dr, Framingham, MA 01701, tel 617-877-7166. To register for license exams, send completed form 610, copy of ham license and check for $4.25 (payable to ARRL/VEC) to FARA, PO Box 3005, Framingham, MA, 01701.

†**Maryland (Timonium)—Apr 6:** The Greater Baltimore Hamboree and Computerfest, sponsored by the Baltimore ARC, will be held at the State Fairgrounds in Timonium. Gates open 8 AM. Admission $4. Talk-in on 07/67 and 52. For more information, write to James Green, WB3DJU, PO Box 56, Phoenix, MD, or call 301-666-1886.

†**Michigan (Grosse Pointe Woods)—Apr 6:** The South Eastern Michigan ARA (SEMARA) will hold its 28th annual hamfest Swap and Shop at the Grosse Pointe North High School, 707 Vernier Rd, 8 AM-3 PM. Features include ARRL, DX and RTTY forums. Advance tickets $1; $3 at door. Advance tables $8; $10 at door. Talk-in on 75/15 and 52. For information, write to SEMARA Hamfest, PO Box 646, St Clair Shores, MI 48080, or call Fred Lewis, NK8M, at 313-881-0187.

Minnesota (Duluth)—May 10: The Arrowhead RAC proudly announces "SWAPFEST 86," which will be held at the Holiday Inn, 207 West Superior St, downtown Duluth. Doors open at 8 AM for vendors; general public 10 AM. Admission $4 at door. $5 for 5-ft tables. Food available; free parking in the Holiday Inn ramp located on First St. There will be an "all you can eat" banquet held after the swapfest, which will be followed by a presentation by Dr James Blackman, K0EVE. The banquet requires advanced registration by April 25. Talk-in on 34/94. For more information, contact Bill and Diane Cossette, 15 Manitou St Duluth, MN 55808, or call 218-624-7188.

Minnesota (Rochester)—Apr 5: The Rochester ARC will sponsor the 9th Annual Rochester Area Hamfest at the John Adams Junior High School, 1525 NW 31st St. Doors open 8:30 AM. There will be a large indoor flea market for radio and electronic items, refreshments and plenty of free parking. Talk-in on 22/82. For further information, contact RARC, c/o WBOYEE, 2253 Nordic Ct NW, Rochester, MN 55901.

†**New Jersey (Flemington)—Apr 12:** The Cherryville Repeater Assn will hold their Flemington Hamfest at the Hunterdon Central High School. Doors open 8 AM-4 PM. Admission $4. 200 indoor tables, displays and forums. Breakfast in the cafeteria at 6 AM only! Talk-in on 52, 975/375, 615/015, 222.52/224.12, 449.850/444.850. For more information, contact Bill Inkrote, K2NJ, RD 10, Box 294, Croton-Quakertown Rd Flemington, NJ 08822, tel 201-788-4080.

†**New Jersey (Stirling)—May 4:** The Tri-County Radio Assn will hold their hamfest at the Passaic Township Community Center. For more information, contact Robert Mack, WA2VMH, 312 Oak Pl, Piscataway, NJ 08854.

New Jersey (Trenton)—Apr 19-20: The 11th Trenton Computer Festival will be held at Trenton State College 10 AM-5 PM both days. TCF-86 is oriented toward computers and will be of interest to hams who are also interested in computing and digital electronics. A pocket-radio Forum and sessions on Amateur Radio-related software will again be part of TCF. There will also be the usual commercial exhibits, electronics flea market, many technical sessions and user group meetings of interest to the ham and free short courses. Admission to all activities is $7 both days or $5 Sunday. Students/senior citizens are $3. For further information, write to TCF-86, Trenton State College, Hillwood Lakes CN550, Trenton, NJ 08625, or call 609-771-2487.

†**New York (Melville)—May 4:** The Suffolk County Radio Club will hold their hamfest at the Republic Lodge 1987 on Rte 110. Doors open 8 AM-3 PM. Admission is $2 for buyers, $5 sellers (outside spaces) and $7 (inside spaces). Activities include electronic flea market with free parking. Refreshments available. Talk-in on 145.21 and 52. For more information, contact Bill Sullivan, N2ETG, 23 Manchester La, Stony Brook, NY 11790, tel 516-689-9871 (evenings).

†**New York (Owego)—May 3:** The Southern Tier ARC is holding their 27th annual Hamfest at the Treadway Inn. Admission $4. For more information, contact Bill Thompson, W2MTA, RD 1, Rock Rd, Newark Valley, NY 13811, or call 607-642-8930.

New York (Vestal)—May 3: The 27th annual Southern Tier ARC Hamfest will be held at the Treadway Inn. Flea market opens at 8 AM. Vendor displays and sales, tech and nontech talks and refreshments. There will be a dinner at 6:30 PM (advance tickets only for the dinner). Take NY Rte 17 to exit 65. Talk-in on 22/82, 16/76 or 52. For further information, send SASE to PO Box 7082, Endicott, NY 13760.

Ohio (Dayton)—Apr 25-27: Dayton HamVention®, Hara Arena and Exhibition Center. Giant 3-day flea-market starting noon Friday and continuing all day Saturday and Sunday. Technical forums, ARRL and FCC forums, new products and exhibits, special group meetings, and much more. Admission: $8 advance, $10 at door. Banquet: $14 advance, $16 at door. Flea-market space $20 in advance (valid for all 3 days). Checks for advance registration to Dayton HamVention, Box 2205, Dayton, OH 45401.

Ohio (Dayton)—Apr 25: The Dayton-Cincinnati Chapter of the Quarter Century Wireless Association will hold its 1986 Annual Banquet Fri evening of the Dayton Hamvention. Leland Smith, National QCWA President, will speak on "The Future of Amateur Radio." Happy hour at 6:30; dinner at 7:30 at the newly remodeled Imperial House, 175 and Needmore Rd. For tickets and information, contact Bob Dingle, KA4LAU, 657 Dell Ridge Dr, Dayton, OH 47429.

(continued on page 77)

†ARRL Hamfest

Public Service

Conducted By Michael R Riley, KX1B
Public Service Manager, ARRL

Presenting the Blue Ribbon Committee!

How many of you felt a tinge of pride when Amateur Radio was mentioned hundreds of times by the media during the recent Mexico City earthquake disaster? How many of you realized that members of our field organization were doing everything they could to serve the public? Amateur Radio reached new heights in the eyes of the world. Next time, we'll do even better!

The following was sent to all ARRL Directors on Februrary 13, 1986:

"President Price has appointed the following as members of the ARRL Blue Ribbon Committee on Emergency Message Traffic, created at Minute 66 of your 1986 Annual Meeting [complete list appears in accompanying sidebar]

"The charge to the Committee reads as follows:

"To review all aspects of ARRL involvement in the following areas, and to make such recommendations to the ARRL Board as the Committee may deem appropriate:

"1) Training of radio amateurs in how to conduct themselves during communications emergencies.

"2) Management of Amateur Radio involvement during a communications emergency, at the local, state, regional, national, and international levels.

"3) Reviewing existing systems and procedures, and recommending revisions or developing substitutes as appropriate, by which large volumes of record traffic can be handled swiftly and accurately, both within the United States and between this and other countries, fully utilizing the knowledge and technology available to the Amateur Radio community and with probable future developments in mind.

"4) Reviewing existing systems and procedures, and recommending revisions or developing substitutes as appropriate, for determining and declaring the existence of a communications emergency, and for mobilizing such Amateur Radio personnel and material resources as may be required.

"President Price has asked the Committee to submit an interim report to the 1986 second meeting, and to be ready to submit its final report to the 1987 Annual Meeting."

Ladies and gentlemen, your League has increased its commitment toward serving the public in time of need. Those of us devoted to public-service communications can justifiably be proud!

How Can You Help?

ARRL Vice Director Comstock would like you to know that your input on Blue Ribbon Committee-related matters will be seriously considered. If you wish, you may write the Blue Ribbon Committee member nearest you:

Thomas W. Comstock, N5TC, Chairman
1700 Dominik
College Station, TX 77840

Thomas B. Greenhalgh, W1QYY
PO Box 144
Dublin, NH 03444

Peter R. Jordahl, K5GM
1909 Wooten Drive
Austin, TX 78758

William M. Smith, W7GHT
Box 241
Craigmont, ID 83523

Joel Kandel, KI4T
5463 SW 92nd Ave
Miami, FL 33165

Gerald W. Boyd, KG6LF
345 B Avenue
Coronado, CA 92118

Thomas J. Abernethy, WA3TAI
1133 Apple Valley Rd
Accokeek, MD 20607

Michael G. Bruce, KA4BCM
1611 Chapel Lane
Owensboro, KY 42301

Richard A. Whiting, WØTN
4749 Diane Drive
Minnetonka, MN 55343

Michael R. Riley, KX1B
225 Main Street
Newington, CT 06111

SPOTLIGHT ON SERVICE ...

Next Time, Build an Ark!

It should have been an omen. On Thursday evening, September 5, 1985, KA8PTW was celebrating his 16th birthday. He and two companions played a few video games, then went to visit a friend. As they were driving, lightning struck the field beside the car. Even though the strike was some distance away, the induced voltage gave a severe jolt to the fellow who had his arm resting in the car window.

Thunderstorms were predicted for that evening, but the Genesee County, Michigan, ARES SKYWARN group did not receive any requests for assistance during the night. WA8SIG had been on duty at the local television weather center and was watching the weather-wire and radar monitor. Although no local watches or warnings were in effect, beginning at 10:30 PM Thursday he ran some crawls across the television screen alerting viewers to the potential for flooding. This was the only warning the county received. About 1 AM Friday, a large thunderstorm system moved into the area.

When W8WN's backup battery-powered alarm sounded, he discovered that the electricity was off in his town of Clio, about 15 miles north of Flint, Michigan. His generator, installed in his basement 12 years earlier, would be needed for the first time. His normally dry basement floor was covered by nearly one-half inch of of water. When the generator started, a quick check of the rain gauge indicated 4.75 inches and the descending rain looked like a wall of water. Several amateurs were discussing the rainfall and flooded streets on the local ARES repeater. Power was off in several areas of the county, and telephones were dead. The NWS reported that an upper-level convergence had settled over Clio and northern Genesee County, and that the rain was not likely to let up for some time.

The Flint Fire Department requested help from ARES to provide communications between their radio room and the battalion chief at a house fire. KA8OWR and W8WN, both driving four-wheel-drive vehicles, started for the fire scene while KC8BT reported to the fire station where lightning had knocked out most of the radio equipment and all of their telephone service. Flooded roads and blocked intersections turned the nine-mile drive to the fire station into a 45-minute odyssey. W8WN was then asked to provide communications for Fire Station Six, which also housed one of Flint's ambulances. Cars were stalled at nearly every intersection, and downtown Flint looked like a major tributary of the Flint River. This drive of about six miles took more than an hour to complete—even in a four-wheel-drive vehicle. Meanwhile, other operators had been sent to Civil Defense Headquarters, Police Central Dispatch and the National Weather Service, and several others monitored the rising Flint River. WD8JCN was staying busy at the NWS office.

Washed out bridges and roadways were reported during the day, but by midafternoon on Friday most of the water had drained away from the intersections and things seemed to be returning to normal. The local television station, running most of the day on their emergency generator, had expanded their newscasts to a full hour. Televised aerial views of Flint showed just how serious the flooding was. It was amazing that there had been no loss of life or serious injury, and that there were so few calls for rescues. We Amateur Radio operators received praise during the newscast for our work with the Civil Defense.

On Saturday night, the weather broke loose again. This time the National Weather Service warned of possible severe thunderstorms moving into the area, and the Genesee County SKYWARN Net went into operation. WD8JCN, operating as NCS from the NWS office, was informed that weather conditions were much like those of Thursday evening. Rain poured down as if from buckets, and there were several reports of funnels, but SKYWARN spotters could not confirm any of these. It took only about 15 minutes of heavy rain to once again cause flooding in some areas. After a couple of hours of operation, the net was disbanded, and everyone wondered what would happen next.

It didn't take long to find out. About 8 AM Sunday the Salvation Army notified the ARES group that an operator was needed for their mobile canteen that was on its way to Lapeer County. Calls on the Lapeer repeater brought no response, and no one could locate the Lapeer County EC's telephone number. So W8WN turned his responsibilities over to WD8LPN and

WD8KVD and started for Lapeer. Upon arriving, W8WN found that a small dam just upstream from the city of Lapeer was in danger of breaking. By this time KA8FIE, Lapeer County EC, and several others had been alerted to the situation. Although a large force of volunteers were quickly sandbagging the earthen dam, steadily rising water threatened to overflow its crest. Leaving one operator to monitor the dam, KA8FIE and the sandbaggers moved a mile upstream to attempt to block some of the inflow to the reservoir. Meanwhile, several other Lapeer County amateurs had scrambled to fill other communications posts. Local amateurs were in short supply, so operators from neighboring Genesee and Oakland Counties came to help, including one Ohio amateur who was on vacation at a nearby camp.

By late afternoon the sandbagging upstream had been completed and more layers of sandbags were placed on the dam itself when yet another series of heavy thunderstorms moved into the area. WD8JCN kept television viewers in Lapeer informed of the approaching thunderstorms by watching the radar on the Weather Channel. Meanwhile, at the small earthen dam, heavy rain, mud, and nearby lightning strikes forced an end to the sandbagging as the Genesee and Lapeer County ARES groups once again activated their SKYWARN nets.

The storms produced many strange cloud formations, causing a number of spotters to request second opinions. No tornado sightings in the area could be confirmed, however. False tornado warnings, plus a number of scares by amateurs seeing lower-level clouds being blown in divergent directions brought home once again the necessity not only of regular SKYWARN training but also of learning to pay close attention to changing cloud formations.

Never a dull moment, the weather pattern on late Monday afternoon once again appeared to be a repeat of the past few days. Following the immediate need for weather spotters, ARES members assisted the Red Cross with their disaster relief center in the northern part of Flint. Also, the Salvation Army continued to need communications support from radio amateurs. The region had been declared a disaster area by the federal government. This was the worst flood since 1938 and perhaps the worst flood in Flint's history. But as more than one ham remarked, "That nine inches of rain could have been snow!"—*Shelby Ennis, W8WN, EMT/A, Assistant EC, Genesee County*

IN SERVICE ...

☐ Thornhill, Ontario—December 10. Lindhurst Hospital lost its telephone service and requested assistance from members of the Thornhill Radio Amateurs Club and several other operators from the surrounding area. Radio amateurs were on call for 51½ hours to contact doctors, obtain lab reports and arrange ambulances. Equipment was set up to provide emergency phonepatch capabilities. (Libby Stevens, VE3IOT)

☐ Oklahoma City, OK—December 27. Over a dozen radio amateurs from all parts of the metro area joined Oklahoma City police on quick notice to search for a missing 75-year-old man. The search area covered 20 square miles, and the volunteers helped for more than three hours. Unfortunately, the missing man was found dead. (Steve Bense, WA4OLE)

☐ Atlanta, GA—December 30. Nine radio amateurs from the Alford Memorial Radio Club (Stone Mountain, GA) provided communications for the 1985 Peach Bowl Parade. The parade included bands, floats and other marching units from as far away as Wisconsin. The communicators relayed the proper lineup sequence from the formation area to the starting line of the parade. (W. R. Ronay, KB4JPN, PIA, GA)

☐ Lancaster, CA—January 1. Following an afternoon of riding motorcycles in the Mojave desert, WA6ZXF discovered his companion, a 12-year-old youth, was lost after he didn't meet at the scheduled place and time. WA6ZXF contacted several radio amateurs by 2-meter FM, who in turn notified the Los Angeles County Sheriff's office. A command post was set up to coordinate searchers, and 20 operators including members of the Antelope Valley ARC and the local RACES group participated. After looking three hours, the youth was found in safe condition by two motorcycle riders. (G. Allen Beale, WA6ZXF)

Mike Reed, WB5KFE, explains the operation of a new repeater he installed to assist amateurs in the Malvern, Arkansas, area SKYWARN program while Larry White, WB5QVE, Bill Cothren, W5BXJ, and Bernard Shack (kneeling) listen. *(W5BXJ photo)*

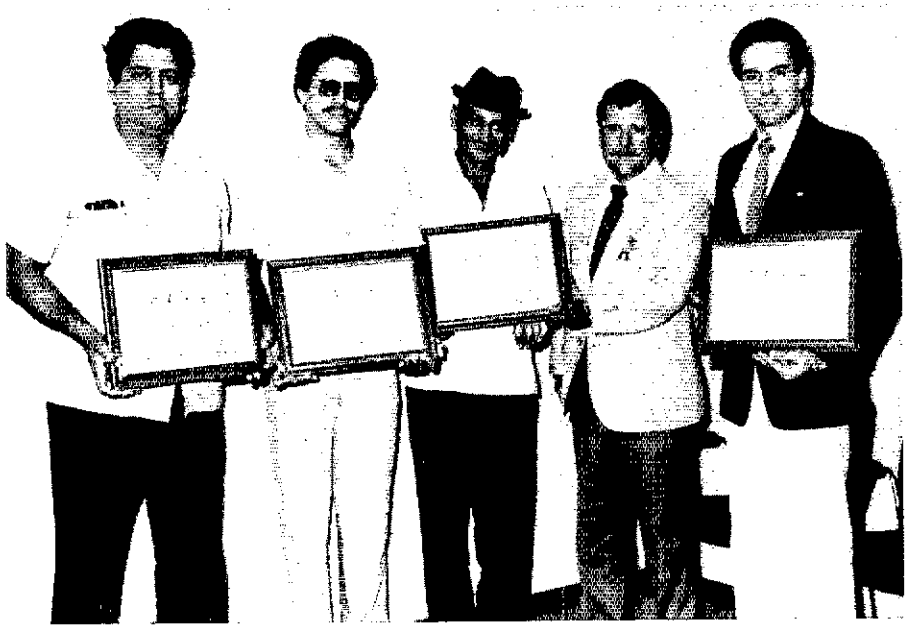
☐ Port Orchard, WA—January 11. KG7U was enroute southbound on State Highway 16 between Port Orchard and Tacoma when he encountered an accident in which a car had skidded on ice and overturned. The single occupant had been removed by other motorists.

KG7U, a CCRN in the Critical Care Unit at Olympic Memorial Hospital in Port Angeles, examined the young woman and found apparent minor injuries. Having set up a flare pattern, he proceeded to contact K7RWU, who contacted the Washington State Police. KG7U remained on the scene until relieved by Pierce County Fire/Rescue units. (Thomas H. Mitchell, KG7U)

☐ Atlanta, GA—January 13. While driving into Atlanta, W8CNL experienced a complete electrical failure in his truck. He called on the Atlanta Radio Club Repeater (146.82 MHz) and was answered by N4AJL, N4HGF, KA4EUB and W4BTX. After getting details about the problem, N4HGF called W8CNL's wife in Martinez, Georgia, while KA4EUB made all the arrangements for a wrecker. WA4WQW, who was listening, pulled his truck over to keep W8CNL company until the wrecker came. (Raymond McClure, W8CNL)

☐ DuPont, WA—January 19. A 10-car train, carrying over 200 passengers, derailed because of a roadbed washout in a remote wooded area between Olympia and Tacoma. WA7BOO, who was on board, provided an important link for passengers with his 2-meter transceiver. A network of radio amateurs in contact with WA7BOO relayed traffic from train passengers to their relatives while railroad crew members maintained communications with emergency personnel on their own frequencies during the rescue operation. (Dave Page, KA7TMI)

☐ Overland Park, KS—January 27. KIØA was monitoring a maritime traffic net when he heard a distress signal from a ship in the Gulf of



Puerto Rico amateurs were presented with certificates of appreciation for their efforts during a recent National Communications System "Night Tango" exercise. Shown are Frank Lopez, NP4MU; Carlos Flores, WP4J (past Section Manager, PR); Ramon Santos Vazquez, KP4FW; Thomas Holthauf (representing Night Tango) and Francisco Maldonado. *(photo submitted by Carlos Flores, WP4J)*

Mexico. He relayed the information to the net control station who was unable to hear the troubled vessel. The Coast Guard was alerted in both Portsmouth and Miami, but they, too, were unable to receive the signals from the ship. KIØA persevered and secured the position of the ship, passing it on to the Coast Guard. Air rescue units responded, and eight people were rescued. (R. Neal Luzier, WØFGE)

ARRL Section Emergency Coordinator Reports
January 1986

Thirty-six SEC reports were received, denoting a total ARES membership of 21,389. Section Emergency Coordinators reporting were: AB, CO, EMA, ENY, GA, IA, IN, KS, KY, LAX, MDC, MI, MN, NLI, NNJ, NTX, NV, OH, OK, ONT, ORG, PAC, SCV, SD, SDG, SFL, SK, SJV, SNJ, UT, VA, WNY, WPA, WA, WI, WV.

Transcontinental Corps
January 1986

Area	Successful Functions	% Successful	TCC Function Traffic	Total Traffic
Cycle Two				
TCC Eastern	99	79.8	455	920
TCC Central	82	88.0	231	540
TCC Pacific	113	91.1	370	666
Summary	294	86.3	1056	2126
Cycle Four				
TCC Eastern*	193	88.9	550	1118
TCC Central	60	96.8	251	506
TCC Pacific	116	93.0	566	1102
Summary	369	92.9	1367	2726

*TCC Eastern operates both cycles three and four

TCC Roster

N1BHH W1CE W1EFW K1EIC K1EIR WA1FCD K1GRP W1ISO KN1K W1NJM W1QYY KT1Q KA1T KW1U AK1W W2AET N2IC W2FAJ WA2FJJ W2FR W2GKZ W2RQ W2RRX W2XD N2XJ VE3AWE W3ATQ AA3B N3COY WB3EPU KK3F VE3FAJ VE3GSQ WB3GZU W3PQ KQ3T KB3UD AA4AT WA4CCK WD4FTK W4JL WA4JTE N4KB WF4X WB4UHC W4UQ K4ZK N5AMK N5BB N5BT WB5CIC W5CTZ W5GHP K5GM W5JOV W5KLV KD5KQ K5OAF N5TC K5TL K5UPN ND5T KD5RC KS5V KB5W KV5X WB5YDD VE6CHK KU6D W6EOT W6INH K6LL WF6O K6UYK W6VZT KA7CPT W7EP KD7EY KB7FE NN7H K7HLR KR7L W7LYA KA7MUL K7OVK W7TGU KF7R W7VSE WB7WOW KA8CPS K8OZ W8PMJ W8QHB AF8V N8XX WB8YDZ W9FC KA9FEZ KW9J W9JUJ WB9UYU ADØA NJØB KCØD KØEZ KAØEPY WØHI NØIA KJØG KSØU WADOYI

National Traffic System
January 1986

Net	Sess	Tfc	Avg	Rate	% Rep	% Rep to Area
Cycle Two						
Area Nets						
EAN	31	810	25.20	.560	93.0	
CAN	31	589	19.00	.407	100.0	
PAN*	55	394	7.16	.394	85.5	
Region Nets						
1RN	62	637	10.27	.526	98.6	100.0
2RN	58	278	4.80	.310	78.1	100.0
3RN	31	278	8.90	.500	96.0	100.0
4RN	62	502	8.10	.360	79.0	100.0
RN5	62	568	9.16	.374	92.0	100.0
RN6	53	206	3.89	.330	100.0	94.5
RN7	62	382	6.20	.283	90.6	100.0
8RN	62	278	4.48	.270	91.0	100.0
9RN	62	276	4.00	.321	96.0	100.0
ECN						100.0
TEN						100.0
TWN	62	258	4.16	.311	86.8	94.5
TCC						
TCC Eastern	99	920				
TCC Central	82	540				
TCC Pacific	113	666				
Cycle Three						
Area Net						
EAN	31	429	13.84	.710	95.7	
Region Nets						
1RN	31	110	3.55	.270	85.0	96.7
2RN	30	131	4.40	.315	88.7	87.1
3RN	29	36	1.24	.167	86.2	100.0
4RN						96.7
8RN						93.5
ECN						100.0
Cycle Four						
Area Nets						
EAN	31	818	26.39	.867	91.4	
CAN	31	656	21.20	1.003	100.0	
PAN						
Region Nets						
1RN	62	618	5.50	.320	87.5	90.3
2RN	57	120	2.10	.181	72.3	70.9
3RN	57	136	2.37	.226	92.4	100.0
4RN	62	535	8.60	.430	100.0	100.0
RN5	62	527	8.50	.536	85.7	100.0
RN6	29	413	13.00	.640	93.0	
RN7	62	250	4.00	.362	87.5	
8RN	61	252	4.13	.298	92.0	93.5
9RN	62	375	6.05	.988	88.7	100.0
TEN	61	284	4.60	.650	77.7	100.0
ECN	56	121	2.16	.227	91.1	100.0
TWN	61	204	3.34	.255	89.7	
TCC						
TCC Eastern	193	1118				
TCC Central	60	506				
TCC Pacific	116	1102				

*PAN operates both cycles one and two.
TCC functions not counted as net sessions.

ARRL Section Traffic Managers reporting: AB, AL, AR, CT, DE, EMA, EPA, GA, KS, KY, IN, ME, MDC, MN, MI, MO, NC, ND, NFL, NH, NLI, NNJ, NTX, OK, OH, OR, ORG, ONT, RI, SB, SC, SD, SDG, SJV, SFL, STX, TN, UT, WA, WMA, WNY, WPA, WV, VA, VT, WV.

Public Service Honor Roll
January 1986

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 ARRL Section Manager). 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; (9) Participating in a public service event, 5 points, no max.

This listing is available to Novices and Technicians who achieve a total of 40 points or more points. Stations that qualify for the Public Service Honor Roll 12 consecutive months, or 18 months out of a 24-month period, will be awarded a special PSHR certificate from HQ.

323
KC9CJ
168
K4SCL
167
K7VW
160
K5CXP
142
KK3F
138
W7LRB
134
KAØEPY
132
KA3DLY
130
WX4H
128
N4GHI
W9FZW
127
KD8KY
125
KA9FFO
121
W9YCV
KK1A
118
KW9J
115
K4ZK
KD7ME
114
KAØARP
113
KB4WT
K4NLK
WB1CMQ
111
KBØZ

109
WA2ERT
WF6O
108
AA4AT
WB2UVB
KT1Q
KA2MYJ
107
WB2OWO
W7VSE
106
WB8RFB
WB1GXZ
W2MTA
AG9G
WA2JBO
104
N7FXJ
KDØCL
WA4QXT
N5DFO
WA4JDH
KA8VOZ
103
N4KSO
WA4PFK
WB7WOW
WD8LDY
102
W9JUJ
W3FA
WA4EIC
W4ANK
KB5UL
101
K4JST
WB2IDS
KT5Y
N5AMK
W4PIM
N1DMU
W8JMD
N1DDC

KZ8Q
KB4OZ
100
K4VWK
N4EXQ
WF4X
AF8V
WA1FCD
KA2SPH
99
N7BHL
VE4IX
K6UYK
WA2FJJ
KC4VK
N1AKS
W9CBE
WØIKT
98
AE1T
WD8KQC
KW1U
97
K3JL
96
VE3WM
WB2VUK
WB8JGW
W4CKS
WD8RHU
95
N4KFU
K2GCE
WB1HIH
K2VX
94
KA2UBX
WB5SRX
WBØTED
93
WB4HRR
NN2H
WD5GKH

92
WB4WII
KJ3E
NOØA
AG2R
91
KJ9J
AA4HT
N9BDL
N3AZW
KA8GJV
90
KA1GWE
WA4CCK
N6AWH
VE3BDM
K2YQK
89
VE3DPO
KA4MTX
88
W7GHT
KF4U
WD8OUO
W2RRX
87
W9DM
N8GJO
86
KØGP
KB7FE
VE3GT
KA8CPS
85
KI4YV
K5OAF
WB2MCO
N2XJ
84
WB4ADL
W5CTZ
WA6ZUD
WA1YNZ
KC2TF

NF8B
WD8PAF
83
W6INH
NJ8R
82
WD4KBW
KØSI
KA1ON
WB2QMP
81
KC3Y
WAØTFC
KV5X
AC5Z
NK8B
WD4NYL
80
VE4AJE
ND2S
KA4YEA
W1RWG
79
WD4ALY
KB4BZA
WA8DHB
78
KA8TNT/T
K8UQY
KA5SPT
77
KG2D
W1TN
W1PEX
WD0BOX
N1CVE
76
VE4RO
KA4ERP
N3EGF
NØCLS
K2YAI
75
WD9DZV
AK1E
W3YVQ
KQ3T
K9UTQ

WB1CBP
WB8SYA
KD8RD
W5VMP
74
KA4TLC
KB5EK
N8EFB
KN1K
73
NG2T
K6UXO
VE3GSQ
WØKK
WA1TBY
72
W9NXG
KB4OGR
NJ4L
WA2KOJ
KA9RII
N3COY
WA4RNP
WB7WVD
71
K9ZBM
K3RXK
KCØAF
N8AEH
KB1AF
70
W4TAH
KAØODQ
N6HYM
N3EMD
N4PL
69
K7OVK
N7BGW
K4JUM
WA4EYU
KB4LB
W5KLV
K4ZN
KØERM
K5EIV
68
WDØGUF

K6YD
W4FMZ
N1BJW
AK2E
K8JDI
WD8KBW
67
K3NNI
WA4RUE
KA4FZI
WBØWNJ
WB5EPA
NZ5J
KA8KHS
WA6QCA
WB4ZDU
66
WB5YDD
KB4JPN
NM8I
N1BGW
K5UPN
65
WB9PFZ
WA3UNX
WA6WJZ
KAØKPY
WDØAIT
KB1PA
64
KA4YHS
VE2FMQ
NØBKE
WØOUD
AIØO
KB9LT
NZ5U
K5CVD
KC8UZ
63
W7JMH
KA1KTH
AA4GL
NG5O
K5RG
N2EQM
WB8KWC
WB6QBZ
62
NT4S

KF7R
61
KA1KPS
KA4GUS
KP4DJ
KK1E
WØYMB
WA2YBM
60
WA7VTD
ABØY
WA4MNR
N4JOA
N2FIZ
KØPCK
WB5FQU
N1DHT
K4EV
W4HON
K4MOG
K8ND
KD8XL
WD8EIB
NØDZA
55
WA2MGV/T
54
N2EVG/T
52
W1YOL/T
KA2CQX/T
49
KA6HJK/T
48
N9EQP/T
47
KA9RNY/T
N2FQP/T
KA1HPO/T
46
N6FWG/T
40
KA9MAB
KA7RFD/T

Brass Pounders League
January 1986

The BPL is open to all amateurs in the United States, Canada and US possessions who report to their SM 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 the standard ARRL form.

Call	Orig	Rcvd	Sent	Dlvd	Total
W3CUL	781	931	1463	81	3256
WAØHJZ	0	1377	31	832	2200
W3VR	436	329	650	21	1436
WB9YPY	0	768	49	504	1321
NØBQP	23	754	38	460	1275
W1ZHC	61	500	656	4	1221
KT1Q	2	358	340	7	702
KØRXK	0	339	339	0	678
W9JUJ	1	321	325	1	648
KC9CJ	0	369	35	222	626
WA4JDH	2	339	281	3	625
W1PEX	—	—	—	—	609
K8UYK	119	248	232	7	606
N4EXQ	24	252	255	41	572
WØACH	0	279	279	0	558
N4GHI	44	266	226	17	553
WX4H	0	260	246	9	515
WD4IIO	228	25	229	22	504

BPL for 100 or more originations plus deliveries:

WB2UVB	143
KØJAN	118
W9FZW	113
NZ5U	110
W4HAW	100

Independent Nets
January 1986

Net Name	Sess	Tfc	Check-Ins
Central Gulf Coast Hurricane Net	31	114	3946
Clearing House Net	31	326	471
Early Bird Net	31	359	—
Empire Slow Speed Net	31	50	407
Golden Bear Amateur Radio Net	31	42	2141
IMRA	27	1218	1794
Midwest RTTY Net	29	216	6
Mission Trail Net	31	141	1042
NYSPTEN	31	64	615
Southwest Traffic Net	30	260	1137
20ISSBN	27	733	264
75 Meter Interstate SB Net	31	242	1349
7290 Traffic Net	50	387	3040

Public Service Communications at the 1985 Scout Jamboree

Moving 26,000 people in one day and creating for a time the 14th largest community in Virginia requires a lot of coordination and communications. This was the task facing officials at the July 1985 Boy Scout Jamboree when they asked area amateurs for communications support on the day Scouts would arrive at Ft AP Hill in Caroline County, Virginia and the day after the close of the Jamboree.

A communications plan was drafted by WB4LNT and KB4XF on the basis of the experience and lessons learned at the 1981 Jamboree. The plan explained the amateur's role in providing communications support to the Jamboree Transportation Service, gave specific duties at each of the amateur locations, provided examples of the types of routine, urgent and emergency traffic that could be expected, and concluded with suggestions for coping with summertime humid heat.

A major feature of the plan was the establishment of a network of subnets and a master net. All operators normally monitored the master net frequency for general information. Progress reports from amateurs in the field were transmitted to one of four subnet control stations. The subnet control stations then relayed the information to the master net control station. Hams who participated came from four areas: Fredericksburg, VA, the center of the Rappahannock Valley Radio Club membership; Richmond, thanks to N4EXQ, State RACES coordinator; northern Virginia, with the help of WB4WZZ, DEC; and southern Maryland, through the efforts of WB3KAS of SMARC.

The Jamboree Transportation Communications Support Net was opened at 7 AM on the 22nd, with the arrival of buses and other vehicles carrying individual Scout Troops. On-the-air traffic consisted mostly of requests for bus guides or a mechanic to repair a bus that had broken down, and reports to officials on traffic-flow problems.

On the day of departure, amateurs assumed their positions between 6 and 6:30 AM. By 8 AM, status reports to Transportation Service officials were up to date. Amateurs at the gates got their incoming bus announcements out to the subcamps in near real time, and problems were limited to late buses and wrong destinations on drivers' manifests. The amateur net closed at noon, and the hams trailed out behind the last buses knowing they had helped to move 26,000 people smoothly.

Even though both the participating amateurs and the Transportation Staff felt that the tactical communications support at the Jamboree was a success, there are some lessons worth remembering. First, a written communications plan is worth the effort it takes to prepare. It tells everyone what is expected, but also lends itself to change if the unexpected happens.

Second, there is no substitute for experience. Those operators who had significant public service, traffic net or MARS experience made transmissions that were clear and to the point.

Third, some effort should be made to put amateurs who are familiar with each other in the same subnet, but hams should be flexible enough to assume those positions at which their skills and experience are most needed.

Finally, recognize that some tactical positions are multioperator positions. In our case, the master NCS position needed both a net controller and a traffic handler to receive the incoming information and to deliver it to those who need it.—*Jack Cavanagh, KB4XF, Fredericksburg, Virginia* QST

Satellite DXing

(continued from page 33)

tions are called modes. For example, Phase II satellites carried a Mode-A transponder that used 2 meters for the uplink and 10 meters for the downlink.

OSCAR 10 carries a Mode-B transponder and a Mode-L transponder. The Mode-B uplink is at 435 MHz, while the downlink is at 145 MHz (see Fig 3). The passband is 152 kHz wide. Mode L uses a 1269-MHz uplink and a 436-MHz downlink. The passband is 800 kHz wide—more than twice as wide as the 20-meter ham band.

Most of the activity on OSCAR 10 is on Mode B, so I'll limit the scope of this article to that mode. Mode L presents a different set of equipment requirements. After you get some Mode-B experience, you may want to try your hand at Mode L. By that time, you'll know whom to contact for advice.

Some of the hard-core HF DXers will choke thinking that this VHF/UHF stuff is too complicated and want to return to 20 meters. Not so! The VHF and UHF parts actually make life much easier than you might think. There is a wealth of readily available commercial equipment for satellite work, as we'll see next month.

Notes

[1]M. Davidoff, *The Satellite Experimenter's Handbook* (Newington: ARRL, 1984). Available from your local radio store or from ARRL for $10 ($11 outside US). Add $2.50 ($3.50 UPS) per order for shipping and handling.

[2]AMSAT, PO Box 27, Washington, DC 20044. Dues are $24 per year.

[3]M. Crisler, *A Beginner's Guide to OSCAR 10* (Washington, DC: AMSAT, 1985). QST

Strays

ATLANTA RADIO CLUB OFFERS SCHOLARSHIP OPPORTUNITIES

☐ The Atlanta Radio Club announces that it has two $1250 scholarships available this year. Applicants must be licensed amateurs graduating from high school and entering an accredited college or university for the first time as freshmen in 1986.

Candidates will be judged on their high school grades, citizenship/leadership, achievements in ham radio and financial need. Residents of Georgia and its contiguous states will be given extra consideration. For an application, write to Phil Latta, W4GTS, ARC Scholarships, 259 Weatherstone Pkwy, Marietta, GA 30067.

1985 SCOUT JAMBOREE ADDENDUM

☐ Two members of the Amateur Radio industry were inadvertently omitted from the list of contributors in the January 1986 *QST* article on the 1985 Scout Jamboree at Fort AP Hill. ICOM of America and EGE Electronics, Inc of Woodbridge, Virginia teamed up to lend the special-events station K2BSA crew a few rigs. Their generous support and willingness to help out at the last minute are greatly appreciated by all who participated in the event.

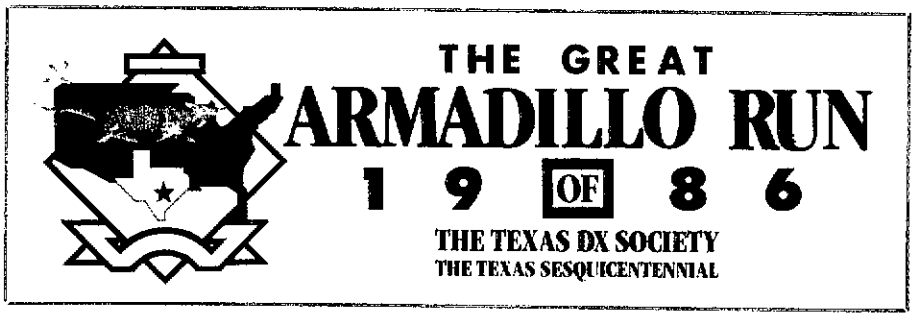
QST congratulates...

☐ the following radio amateurs on receiving Citations to New Fellows from The Radio Club of America, Inc: Herbert Becker, W6QD, of Los Alamitos, California; Andy Bower, K1NZW, of Niantic, Connecticut; Theodore J. Cohen, N4XX, of Alexandria, Virginia; La Neil Eitel, WA7LUN, of Dayton, Nevada; Marvin Grossman, W8AZO, of Cleveland, Ohio; Steven Gumport, WB2RVU, of New York, New York; Charles M. Lewis, W4BV, of Treasure Island, Florida; Merle B. Parten, K6DC, of San Carlos, California; Edward Rich, NØAA, of Washington, DC; W. B. Sloop, W4AAE, of Raleigh, North Carolina; Lester G. Schimpf, WA2FTR, of Holmdel, New Jersey; Gregory M. Stone, WB9PHA, of Lake Bluff, Illinois; Donald L. Stoner, W6TNS, of Mercer Island, Washington; Earl T. Van Stavern, W4NXP, of Ashland, Virginia; William A. Wickline, WA8WBO, of Cleveland, Ohio; and Anthony F. Yellin, W2EDA, of Richmond Hill, New York.

The Texas DX Society Announces the Great Armadillo Run of 1986

The Texas DX Society wanted to do something *big* to mark the 150th anniversary of the State of Texas (the Texas Sesquicentennial). So we decided what better way to celebrate than through the Great Armadillo Run of 1986, during which the Texas DX Society and other Amateur Radio operators and clubs will endeavor to activate, on May 3-4 and July 26-27, 1986, all 3076 counties in the United States! (The first Armadillo Run was held in 1983, when the Texas DX Society activated all 254 counties in Texas in one weekend). The armadillo is the Texas state mascot and symbolizes the "can do" spirit of our club.

As reported in October 1985 *QST* (page 50), this could possibly be the most ambitious operating effort ever undertaken in the history of Amateur Radio. As a result of the October article, support from the amateur community has been overwhelming. The Texas DX Society has been able to orchestrate this effort with volunteer coordinators throughout the country (see Table 1) who will coordinate the manpower to cover all the counties. The Armadillo Run will occur on the same weekends as the annually scheduled County Hunters' phone and CW Contest weekends, operating in parallel with them.



Official Armadillo Run Rules

Eligibility: All amateurs worldwide.

Object: To contact as many stations in as many US counties as possible and to activate all US counties during the Armadillo Run time periods.

Dates: Phone—May 3-4, 1986
CW—July 26-27, 1986

Rules: The contest rules and exchange are the same as for the County Hunters' Contests (phone and CW have different rules, so be sure to see Contest Corral, this issue). The same logs may be submitted for both the County Hunters' and Armadillo Run activities. Note: There are additional categories of entry and time periods for the Armadillo Run as noted below; these specific times must he highlighted in your log, and categories of participation noted on your summary sheet. The County Hunters' Contest runs from 0000Z Saturday to 2400Z Sunday; the Armadillo Run times are 1300-0100Z each day (12 hours per day), when stations designated as Armadillo Run stations will be covering their assigned counties in an attempt to activate all counties.

Categories:

1) Armadillo Run Station—each station in this category must have registered with a regional coordinator to volunteer to cover specific counties in one or both weekends either in a primary function or in a backup function. Classes are fixed or mobile, single-op or multiop. Awards will be made in each category. These stations may operate as Armadillo Run stations only between 1300-0100Z each day. Mobiles must be in each county a minimum of 30 minutes. Fixed stations must be on the air a minimum of 16 hours out of 24. Armadillo Run stations will activate their assigned counties on 20 and 40 meters.

2) Participating Station—Identical categories as for the County Hunters' Contests.

3) Participating Radio Club—any Amateur Radio club group that is participating in the Armadillo Run as a club project.

Awards: Separate awards will be made for the CW and Phone Contests. Highest-scoring fixed station in each category in each state will receive a certificate and an Armadillo Run patch. The top-ten mobile stations in each category will receive certificates and an Armadillo Run patch. Each participant will receive a participant certificate appointing him/her as a deputy sheriff of Armadillo County, Texas. The highest-scoring single operator fixed station and the highest-scoring single operator mobile station for each mode will receive a white, satin Armadillo Run windbreaker. The highest-scoring single operator combined-mode fixed and mobile winners will receive a white, satin Armadillo Run jacket.

Armadillo Run stations that cover all of their assigned counties will receive special certificates and an Armadillo Run patch. Special awards will also be made to stations making extraordinary efforts.

Participating clubs will receive a club-participation certificate. The Texas DX Society will also make souvenirs available to participating clubs to encourage internal club competition.

Scoring: The scoring will be the same as the County Hunters' Contests with the following exceptions: Australian counties count as multipliers; Armadillo County, Texas counts 5-times QSO points; Armadillo County, South Australia counts 10-times QSO points; any VK5 station counts 5-times QSO points (see March 1986 *QST*, page 12).

Deadline: Armadillo Run stations must be registered with regional coordinators or with the Texas DX Society by April 25 for

Table 1
1986 Armadillo Run Regional Coordinators

Please contact your regional coordinator and let him/her know of your individual or club group's intent to participate.

Call Area	State	Coord
WØ	CO	KCØVA
	IA	NØCOL
	KS	KØCS
	MN	WBØTVL
	MO	KØCS
	ND	NM5M*
	NE	WDØEQA
	SD	NM5M*
W1	—	K5MA
W2	NJ	W2GD
	NY	NM5M*
W3	DE	WA3ZMY
	MD	WA3ZMY
	PA	W2GD
W4	AL	WD4HRN
	FL	NM5M*
	GA	WD4HRN
	KY	N4IWY
	NC	NM5M*
	SC	N7AKT
	TN	KM4W
	VA	KB4XK
W5	AR	KG5J
	LA	W5WMU
	MS	W5WMU
	NM	W5FS
	OK	AD1S
	TX	KE5FI
W6	—	W6OAT
KH6	HI	NM5M*
KL7	AK	NM5M*
W7	AZ	NP4AI
	ID	W7GHT
	MT	K7EXK
	NV	W6OAT
	OR	N6TR
	UT	NM5M*
	WA	N7TT
	WY	N7NG
W8	—	N8ET
W9	IL	WB9NUL
	IN	N9AUV
	WI	NM5M*

*interim coordinator

phone and by July 18 for CW. Logs must be received within one month after the contest date. A letter from an official of each participating club stating an intent to participate, along with a list of eligible club members, must also be submitted by the log-deadline date(s).

Results: Armadillo Run results will be distributed to *QST* and other amateur magazines and to participating clubs. Results will also be available directly from the Texas DX Society for a 9- × 12-in SASE. Address all logs and correspondence to the Texas DX Society, 350 Magnolia Bend, New Caney, TX 77357.

Armadillo County Formed

On October 24, 1985, Texas Governor Mark White proclaimed that from March 2 to December 31, 1986 any amateur operating along the Texas Independence Trail can indicate his location as Armadillo County. The Texas Independence Trail is a series of highways designated by the State to show the path of the fight for Texas' independence. On "opening day," TDXS club station K5DX/A operated a Field-Day style all-band effort from Washington-on-the-Brazos, the site of the signing of the Texas declaration of independence. Listen for other K5DX/A operations throughout the Sesquicentennial from various historic sites along the Independence Trail. The USA County Awards Program, sponsored by *CQ* magazine, has indicated it will sanction Armadillo County for the duration of its existence such that Armadillo County will be accepted as a new county for awards credit.

Everyone Is Welcome

Why not join in the Armadillo Run? It should be one of the most fun on-the-air operating events of the year, if not of the whole sunspot cycle! And if your club or group wants to participate in a more formalized way by covering a county or two, so much the better. Contact the Texas DX Society and/or K5RC for further details. Remember: Every participant in the Great Armadillo Run of 1986 becomes an honorary deputy sheriff of Armadillo County, Texas, with all the associated rights and privileges, including being entitled to display the offical logo (see the cover).

If you are looking for an exciting operating event in the spring or fall, whether it be an individual or group effort, get on the air for the Armadillo Run. Many radio amateurs have spent years chasing all counties, particularly the "rare" ones. Here's your chance to work them all in just one or two weekends or, better yet, to provide a rare one to others. Be part of Amateur Radio history in the making! *—Tom Taormina, K5RC, 12610 Barbizon, Houston, TX 77089, tel 713-481-3816*

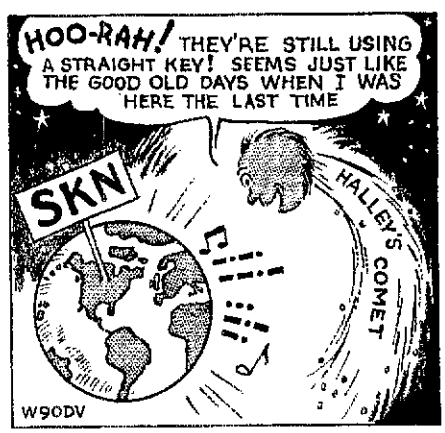
Straight Key Night 1985

By Michael B. Kaczynski, W1OD
Contest Manager, ARRL HQ

Competition will have its way,
First at work, then at play.
DX, contests, I've won the lot.
Just look at all them cards I got.

I will not chide the 3Y lost,
Nor 5A slim will grieve,
Nor cry with anguish "The band is dead,
And I must take my leave."

No,
When the year's hustle and bustle is done
Serenely I will wait for New Year's Eve
And just relax and have
A night of straight key fun.
—KØHT



Straight Key Night, the perennial evening when amateurs all over North America give up a night of partying and bring in the new year with their favorite hobby, Amateur Radio.

How old is SKN? According to our *QST* file, the first one, suggested by K4MD, was held in 1970. SKN was open to anyone, provided, of course, that contacts were made with a straight key. The event started at 8 PM local time on December 31 and lasted until 1 AM local January 1. Back then, just about everyone who sent in a report had a different idea as to who had the best fist. In all, 92 individuals were nominated for the honor. W8JO received the most votes, followed closely by W4KFC. W2YI, W5NW and W8ELL tied for third. Ten other SKers were nominated more than once for "best fist."

Soapbox comments were short and interesting. W6CQO reported SKN pleasurable and relaxing, while WB2ESF ended up with a sore elbow "but not for the usual New Year's reason."

SKN has progressed a bit since its inception 15 years ago, but we're sure most would agree that it's still pleasurable and relaxing. In 1985, 31 amateurs were found to have the best fist, with only four receiving more than one vote. W4YE and KA3IHS each received 3 votes, for a third-place tie. W2LYH received 4, and 1984's runner-up Leland Smith, W5KL, topped the field with six nominations.

Who was the most interesting? Again, 31 amateurs were on the list. W5KL (again) and Carol, KA5GIS, each received 2 votes, with WØAWP topping the field with 3.

All in all, SKN '85 was a resounding success, as evidenced by the 63 individuals who sent in reports which listed a total of 406 call signs. Let's see if we can top the 500 mark in 1986. C U then!

KEY KLIX

It appeared that more stations were using "CQ SKN" or "SKN" more often during their QSOs. This made it a lot easier to find stations as compared to other years (KA1FPP). I worked and heard more stations this time in spite of heavy QRN on 80 meters (K1PQV). I have an old tradition of wearing a tuxedo on New Year's Eve along with some of my friends. I was not the best fist, but I lay claim to the best dressed! (KF1J). My key was an old Army knee key, same as I used in the foxholes of Europe in WWII (W2KTF). Key used was an old WWII Navy key. Thanks for an enjoyable operating activity (W2LYH). SKN captures the "soul" of Amateur Radio (N3EQF). It was sure fun and I noticed quite a few QCWA members participating. I'm looking forward to next year! (W4YE). If they made cars like they used to make telegraph keys, we'd never need new ones. My oldest key dates back to 1875, and it's still workable (W4CDA). I was surprised at the number of "younger" hams who joined the "old timers" in this pleasant ham event (W5ETK). Contacting stations on SKN is like driving a Model T Ford (yes, I still have a Model T). It keeps you busy, the traveling is slow, but you get there just the same (W5KL). SKN QSOs were warm and personal, like handshakes without gloves (W7CAP). My tenth consecutive SKN report is my first with my new call. I traded WA7NXL for NN7A in April 1985. The new one is sure easier to send with a straight key! (NN7A). My favorite night of the year (W8CZR). Last year I accused Ken, W6FU, of having kissed the Blarney Stone. This year he admitted to it, and we rattled on for over an hour (WB6RXE). A wonderful opportunity to meet both newcomers and old timers—newcomers who use straight keys from necessity, and old timers who use them with nostalgia (WØAWP).

Results, 16th Annual 160-Meter Contest

By Michael B. Kaczynski, W1OD
Contest Manager, ARRL
and
Billy Lunt, KR1R
Assistant Contest Manager, ARRL

WA8MAZ and his motto, "Think!" finished number 10 in the single-op category.

The weekend of number 16, December 7-8, 1985, was marked with so-so propagation. Even though the 1985 contest didn't break the miraculous record of that in '84, over 400 entries (407, to be exact) were submitted for the event. Of these, 351 entries were single-op, with 49 stations subscribing to the "two or more heads are better than one" theory by going multiop.

Three of 1984's single-op top tenners made it back for '85. Richard, K5NA, numero uno in number 15, topped the list, as well as the Hudson Division again in number 16. Jeff, K1ZM, also in the Hudson Division, bettered his 1984 effort and slipped into second place with a 194k finish. KM9P, operator of K4VX/Ø moved up the top-ten ladder with a sixth-place entry. N4PN, N5DU and W1CF (WA2SPL, opr) were numbers 3, 4 and 5, respectively.

On the multiop side of things the contest was reminiscent of the shootout at the OK Corral. AA1K enlisted the help of a spotting net to haul in 100 multipliers and enough QSOs to top the very competitive top ten and break the elusive 202k mark. W8JI and his crew (KV8M and WA8TSO) put in a valiant effort, falling a little short of 200k, for second place in the standings. In fourth slot was W9RE, losing out to third place KS8S by just 500 points. Another shootout was between the OSU Observatory crew, W8LT, and W7FG. Both stations worked the same number of QSOs and multipliers (854/81), but the 'FG crew worked a few more 5-pointers for number 5. WØAIH/9 finished seventh, less than one kilopoint behind W8LT. If this fierce competition is indicative of what the future will bring, look out in '86!

If one could find any fault with the 16th ARRL 160-Meter Contest, it would most likely be with the lack of DX activity. How can we encourage more DX participation in this event? Do you have any ideas on the subject? If so, we'd like to hear from you. Send your ideas to the ARRL Contest Branch. C U next time!

New ARRL Band Plan

At the January 1986 meeting of the ARRL Board of Directors, a new band plan for 160 was recommended. Narrow-band modes, such as CW and RTTY, are encouraged between 1800 and 1840 kHz. CW and wide-band modes such as SSB and SSTV are suggested in the 1840-2000 kHz segment. Additionally, amateurs are encouraged to reserve the segment from 1830 to 1850 for intercontinental QSOs. North American stations may transmit in this segment for the purpose of soliciting DX QSOs. The new band plan is an expression of the day-to-day reality of how Top Band operations are now conducted.

Top Ten

Single Op		Multiop	
Call	*Score*	*Call*	*Score*
K5NA	202,800	AA1K	202,500
K1ZM	192,200	W8JI	181,170
N4PN	179,124	N9MM	172,452
N5DU	162,012	KS8S	172,304
W1CF (WA2SPL, opr)	161,100	W9RE	171,780
W3GM (KM3T, opr)	154,968	W7FG	142,641
K4VX/Ø (KM9P, opr)	140,630	W8LT	141,993
AA4S	135,450	WØAIH/9	140,250
WB8JBM (KW8N, opr)	135,372	WM4T	135,756
WA8MAZ	120,666	K9RS	134,596

SOAPBOX

Lots of stateside activity but very little DX, therefore QRM in the "DX Window" was at a minimum except for a few "hardheads" calling CQ (W1WY). I have never missed one of these contests! (W1QV). We had aurora on the band Thursday, so absorption was very high most of the weekend. Heard GMØ, UG6, XE, Santa Barbara and Sacramento Valley, but no QSOs (WA2SPL, opr W1CF). We lost both 160-m amps and the xcvr, in that order—wait 'til next year! (K1NG). Every time I operate on 160, I feel the legacy of T.O.M. waiting to wail on me with the Wouff Hong for rotten operating. Scary stuff! (WB1GQR). JA7NI, JA3ONB and others were 569 both days, but no luck getting them to hear the East Coast (K1ZM). Sure had a fun time. Too bad I didn't get my antenna up until after dark Saturday night. "Up" amounted to a droopy wire that zigged and zagged at 20 feet! (KR2Q). Whoopie! (K2VX). Very poor condx the first night; fair the second. Next year, let's send a DXpedition to VE4,6,8 (AA1K). I need better antennas (K3SWZ). This was a fun contest. I only managed to work a few hours, but band conditions were good (AA4H). Courtesy in the DX Window seemed to be greatly improved over previous contests on Top

Division Leaders

Single Op		*Division*	*Multiop*	
W3GM	154,968	Atlantic	AA1K	202,500
VE3MFA	59,430	Canada	VE2OJ	16,884
KF9D	93,600	Central	N9MM	172,452
WØJX	100,548	Dakota	KØSR	74,106
W5XX	66,674	Delta	—	—
WB8JBM	135,372	Great Lakes	W8JI	181,170
K5NA	202,800	Hudson	WA2JQK	17,587
K4VX/Ø	140,630	Midwest	NIØU	54,015
W1CF	161,100	New England	K1TZQ	72,744
N6TR/7	76,020	Northwestern	W7RM	104,100
K6XV	53,466	Pacific	WA6EUZ	67,804
AA4S	135,450	Roanoke	WB4UUE	19,100
WØKEA	85,008	Rocky Mountain	—	—
N4PN	179,124	Southeastern	WS4Y	68,379
N6ND	85,875	Southwestern	W6VLD	41,654
N5DU	162,012	West Gulf	W7FG	142,641
HK1AMW	41,000	DX	JA7YFB	3,780

One of the rare ones in the 16th 160 was Alan, W7IWU (Idaho).

Band (KX4V). As close as one can get to a "civilized" contest with most ops showing good manners and procedure (WB4J). Very little propagation to the East Coast the first night (WD5T/N7AIH). Still need KH6 and KL7 for WAS on Top Band (W5QF). Good band conditions. Many JA signals were 599 here! (K6XK). On Saturday I could only hear dupes from Friday night (KC7PA). Having changed QTH, my biggest thrill was the total absence of any contest stations within 150 miles (W7TJ). First single-op full weekend contest for me in years. Couldn't make it through the second night (KW8N, opr WB8JBM). Who said 160 was a nighttime band? We had over 130 QSOs between 8 AM and 4 PM CST the first day (WØAIH/9). A very friendly contest without the poor operating habits of the DX contest (KØIYF). Someday I'll find an antenna for my 50- by 100-ft lot! I could hear lots of stations 57+ but they couldn't hear me (VE3NBE). Frustration after making only 4 QSOs on Saturday was offset by the Sunday morning opening. A fine contest! C U ARRL DX Test in February (DL4AAE).

Number 3 single op and Southeastern Division leader N4PN.

Scores

Scores list call sign, final score, total QSOs, total multipliers and hours operated. Example: EI9J scored 84 points, with 7 QSOs and 6 multipliers in 1 hour of operation.

DX

Federal Republic of Germany

DL1YD 11,250- 75- 30-
DL8IU (DL4AAA, DL4AAE, oprs) 1,178- 31- 19-

Ireland

EI9J 84- 7- 6- 1

France

FWYZ 450- 10- 9-

England

G3SZA 19,760- 104- 38-

Dominican Republic

HI8LC 9,425- 66- 29- 6

Colombia

HK1AMW 41,000- 164- 50-
WB2PSD/HK1 5,184- 81- 32-

Italy

I2UBI 800- 16- 10-

Japan

JA7NI 7,930- 61- 26-
JF1NZW 4,080- 48- 17-
JA7YAB (JJ1NNJ, opr) 2,550- 34- 15-
JA7YCQ 1,265- 23- 11-
JA9RPU 600- 15- 8-
JA4YPE (JF3MOK, opr) 20- 2- 2- 1
JA7OVC 20- 2- 2-
JH6NBW/1 2- 1- 1- 1
JA7YFB (JN1RON, JE7JWB, JF7s AAD, TDN, JH7XMO, JR7s GYC, JVO, RLB, WFH, JH8QNT, oprs) 3,780- 42- 18-
JA2YKA (JJ1BTC, JE2VYM, JF2s DQJ, UTL, JG2s MTC, VDT, JJ2NFJ, JR2GMC, oprs) 3,375- 45- 15-14
JA7YAA (JG3JRM, JE4KZZ, JH8ORW, oprs) 2,100- 50- 21-
JA9YBA (JA9VDA, +2 oprs) 2,030- 28- 14-
JA7YAF (JG7BBY, JE7s IDA, MHM, PPC, RJZ, oprs) 850- 18- 10-

Hawaii

KH6IJ 231- 11- 11- 3

Alaska

KL7Y 9,396- 120- 27-

Czechoslovakia

OK1ATP 4,872- 47- 21- 8
OK1JDX 546- 21- 13-
OK3IAG 374- 17- 11-

Poland

SP5INQ 850- 17- 10-

European Russian RSFSR

RA3DX 18- 3- 3- 3
UZ6LWZ (UA150s -1140, -1336, oprs) 84- 7- 6-

Asiatic RSFSR

UA0ZBP 2018- 42- 24-

Kaliningrad

UA2FF 30- 5- 3- 2

Ukraine

UB5ZAL 60- 6- 5-
UB5ZFE 2- 1- 1-

Latvia

UQ2GKL 30- 5- 3-

Estonia

UR1RWX (UR2s RK, RNJ, RRR, oprs) 288- 16- 9- 4

Montserrat

VP2MR 31,200- 130- 48- 8

W

1

Connecticut

W1BIH 59,092- 421- 68-11
W1WEF 48,438- 444- 54-13
N1CC 32,634- 330- 49-12
K1DW 21,280- 266- 40-11
K1DM 19,834- 211- 47-13
W1WY 16,356- 174- 47-11
KB9NM/1 13,860- 198- 35-14
W1XX 12,556- 146- 43- 3
K1KI 10,764- 138- 39- 2
N1JW 9,520- 136- 35- 3
K1NYK 6,848- 107- 32- 3
W1OR 5,808- 88- 33-10
W1QV 2,728- 62- 22-

Eastern Massachusetts

W1CF (WA2SPL,opr) 161,100- 806- 90-32
KA1DWX 11,396- 154- 37- 6
W1IHN 9,640- 119- 40- 3
K1VUT 8,840- 130- 34- 4
KQ1F 8,151- 103- 39- 4
K5MA/1 6,528- 102- 32- 4
W1FJ 6,200- 100- 31- 4
K2LP 5,800- 100- 29-
W1FM 4,292- 74- 29- 3
K5ZD/1 2,070- 69- 30- 2
K1XM 1,386- 33- 21- 1
KT1O 1,008- 28- 18- 1
W1HWU 900- 25- 18- 2
KQ1V 546- 21- 13- 2
W1OPJ 462- 21- 11- 2
WA1PHY (KB1JY, KB1PZ, WA1OSJ, oprs) 17,724- 211- 42-

Maine

N1BUG 41,202- 309- 63-
W1HRQ 23,490- 261- 45-
AD1G 21,024- 210- 48-
K1BZ 2,760- 60- 23- 3

New Hampshire

KM1H 52,668- 387- 68-15
N1AGH 33,264- 252- 63-11
W1UCI 6,664- 98- 34- 8
AK1L (+KA1X) 21,074- 257- 41-15

Rhode Island

K1IU 44,486- 371- 59- 9
K2MN 9,438- 143- 33-10
KZ1A 2,112- 48- 22- 5
K1TZQ (+WA1ABI) 72,744- 645- 56-24
K1NG (+KI1G) 52,258- 449- 58-14
N1RI (+KA1AIR, N1s BVY, CED, DM, XW, WB1DEU) 28,198- 302- 46-

Vermont

WB1GQR 97,980- 657- 71-23
W1KRV 21,984- 224- 48-14
W3SOH 6,386- 103- 31-

Western Massachusetts

WB1HIH 26,124- 311- 42-15
KZ1M 12,728- 172- 37-11
WA1ZAM 12,640- 158- 40-10

2

Eastern New York

K5NA 202,800- 918-100-37
K1ZM 192,200- 847-100-36
NA2M 12,986- 151- 43-
W2KHQ 12,915- 152- 45-21
W2DW 10,168- 124- 41- 4
W2SSS 3,942- 73- 27-
WB2PUH 616- 22- 14- 1
WA2JQK (+WA2UKP) 17,587- 203- 43-21

New York City & Long Island

W2KTF 1,520- 40- 19-
WB2DLA 1,334- 42- 16- 9
NJ2T 300- 15- 10-

Northern New Jersey

WB2ULI 35,880- 278- 60-
KR2Q 26,743- 280- 47-11
W2CVW 17,760- 182- 48-
KØDI 17,302- 211- 41-19
W2FCR 16,074- 171- 47-12
N3AOT/2 9,112- 134- 34-
W2TO 8,500- 125- 34-
W2HN 7,616- 119- 32- 8
N2COH 6,272- 98- 32-
WA2ASQ 5,278- 91- 29- 7
KY2P 4,144- 74- 28- 3
WB2FCZ 3,380- 65- 26- 5
K2VX 750- 25- 15-
W2LPV 644- 23- 14-

Southern New Jersey

N2MM 114,426- 703- 78-
NC2V 38,472- 336- 56-
K2FL 12,180- 137- 42-10

Western New York

K2IGW 84,535- 519- 73-19
W2TZ 25,004- 266- 47- 5
N2NW 16,632- 189- 44-11
KW2J 15,488- 176- 44-11
NA2Q 11,644- 142- 41- 8
KK2B 7,030- 95- 37- 5
K2XR (AK2F, KT2B, NV8O, W2HWG, WA2VUN, WB2s EGI, TSY, WIK, oprs) 114,885- 819- 69-

3

Delaware

AA1K (+NET) 202,500- 933-100-38

Eastern Pennsylvania

W3GM (KM3T, opr) 154,988- 837- 88-38
W3TS 72,774- 550- 78-23
W3UM 65,688- 468- 68-13
W3BGN 36,211- 245- 49-
WB3CAC 34,560- 360- 48-16
W3BUR 31,075- 369- 55-
N3BNA 18,942- 226- 42-10
W3AJS 13,360- 167- 40-18
K3SWZ 10,032- 132- 38-
AK3M 6,180- 103- 30-
K3TX 4,200- 75- 28-

Maryland-DC

W3HVQ 43,470- 395- 54-
N3CO 34,731- 336- 51-
W3GN 5,742- 87- 33-
W3FQE 480- 20- 12- 2
K3AA (K3NNI, KC3NS, KX3U, N3TE, oprs) 71,431- 581- 61-35
K3ZNV (+N3DYP, N7IR) 51,414- 448- 57-34

Western Pennsylvania

W3QM 58,499- 469- 61-28
W3CV 39,186- 311- 63-
W3HDH 17,864- 203- 44-
AF3V 3,120- 60- 26- 3

4

Alabama

N4KG 118,766- 641- 86-17
N4JF 65,754- 408- 78-11
K2AS 5,376- 84- 32-

Georgia

N4PN 179,124- 915- 92-
K4BAI 39,600- 330- 60-14
N4NX 37,944- 267- 68- 8
N4UZ 26,728- 252- 57-
WI4R 15,351- 149- 51- 6
KC4GR 6,162- 79- 39- 6
W1UA 4,191- 61- 33-

Kentucky

K4FU 110,600- 682- 79-25
WA4EBN 12,848- 146- 44-25
KB4JSW 8,658- 117- 37- 7
W4XT 4,992- 78- 32- 7
WM4T (+KI4GO, N4DBR, NV4H, KU8E) 135,756- 805- 81-
N4XM (+KD4U, KI4DC, KK4Q, NO4R) 104,027- 662- 77-40

North Carolina

AA4S 135,450- 738- 86-26
WA8MAZ 120,666- 745- 78-30
W4TMR 51,912- 403- 63-27
KF4R 39,788- 337- 58- 6
K4PB 26,316- 258- 51-

Northern Florida

W4WKQ 20,196- 198- 51-18
W4KET 816- 24- 17-
WS4Y (+KB4s LRX, LTQ, WB4ORK, WA6VVA) 68,379- 488- 69-35

South Carolina

K4GNW 64,584- 456- 69-16
W4UKU 13,770- 153- 45-13
N4EE 2,382- 53- 27- 5

Southern Florida

N4IN 42,075- 253- 75- 9
W4BAA 41,400- 288- 69-
K8UNP 13,004- 113- 52-

Tennessee

AA4H 24,200- 220- 55-
KV4B 17,172- 182- 53-11
K4CXY 12,960- 132- 48- 6
K4ON 10,824- 132- 41-
K4XO 7,740- 80- 60- 5
W4FLW 7,520- 94- 40-
WM4Z 6,192- 88- 36- 4

Virginia

NJ4F 82,280- 593- 68-14
K4XL 74,408- 515- 71-
W4DHZ 46,200- 344- 66-31
KE9A 37,550- 374- 50-
W4XD 35,700- 350- 51-12
KX4V 28,808- 222- 64- 8
WB4J 21,580- 220- 49-15
K4OD 14,852- 158- 47- 6
N3OS 14,620- 170- 43-10
K4FPF 9,852- 127- 38- 4
NJ8Z 9,184- 112- 41- 7
N3RC 4,592- 82- 28- 4
N4MM 900- 25- 18- 1
N4XD 750- 25- 15- 2
WB4UUE (+W4JVN) 19,100- 188- 50-14

5

Arkansas

W5SUS 43,098- 325- 66-18

Louisiana

K5KLA 50,952- 380- 66-15
NZ5N 8,906- 127- 39-

Mississippi

W5XX 66,674- 437- 74-
NF5Y 50,651- 435- 69-19
W5AQ 18,180- 150- 60-26
N5FDF 13,200- 136- 48-16
AE5H 11,868- 129- 46- 7
W5GWD 2,600- 50- 26-10

New Mexico

W5DO 21,452- 170- 62-
N5DVY 18,900- 175- 54-17
N7AIH/5 10,251- 99- 51-12
AI9X 7,600- 95- 40-
W6SX 50- 5- 5- 1

Northern Texas

KC5DX 109,575- 717- 75-22
N5JB 96,558- 597- 77-24
K5WXZ 53,613- 384- 69-
K5RR (K5MR, opr) 51,000- 372- 68- 5
KB5UL 35,464- 286- 62-18
N5UA 30,756- 227- 66-18
W5FIX 23,016- 201- 56-21
W4YOK 19,152- 171- 56- 4
W5QF 16,775- 154- 55-11
NN5E 13,550- 130- 50-11
K5IS 12,376- 119- 52- 8

Oklahoma

W7FG (+K5SM, KM5H, NA5B, W5s LFS, VHP) 142,641- 854- 81-23

Southern Texas

N5DU 162,012- 787- 92-30
WA5POK 8,480- 108- 40- 8
N5AFV 3,480- 60- 29- 5
KD5VU 2,024- 44- 23-
W5IRP 864- 27- 16-
K5LZO (+ NM5U) 119,764- 745- 78-25
W5NTJ (+ KC5ZT, KD5AK, WA5IEX) 39,096- 338- 54-
WN5TEN (+ K5DL) 23,187- 195- 59-

6

East Bay

K6XV 53,466- 381- 67-
W7MAP 51,156- 369- 63-
K6HIH 39,680- 320- 62-
K6RK 20,400- 173- 51-
AD6D 18,666- 162- 51-15
K6TS 13,635- 147- 45-12
KN6S 5,800- 100- 29-

Los Angeles

N6AW 49,455- 337- 63-
W6PFE 5,208- 84- 31-
NE6I 1,260- 35- 17-

Orange

KZ6E 50,463- 378- 63-
W8BA 20,250- 174- 54-
W6VLD (K6TXA, N6KN, WA6s DPQ, HJK, oprs) 41,654- 341- 59-28

Santa Barbara

WA6FGV 9,660- 161- 30-15
W6JTA 6,055- 85- 35- 4
K6MXO 3,484- 87- 26-15
W6JEO 1,900- 50- 19- 7

Santa Clara Valley

N6RZ 51,450- 339- 70-13
W6NA 32,886- 262- 63-21
KD6PY 24,738- 211- 57-
W6ISQ 10,560- 120- 44-
W6SZN 8,828- 103- 38- 4
W6OKK 2,128- 58- 19- 2
W6PRI 72- 6- 6- 1

San Diego

N6ND 85,875- 526- 75-
AA4M/6 17,550- 174- 50- 9
AA6EE 1,358- 36- 19- 2

San Francisco

N6CT 32,037- 269- 59-
N6OJ 19,750- 195- 50-
W6PM 18,963- 143- 63-
K6LRN 7,480- 110- 34-
WB6EGE (KA6OPN, N6QC, N6QM, WB6WPO, WB7DEG, oprs) 24,856- 230- 52-37

San Joaquin Valley

K6MO 33,360- 239- 60-19
N6BJQ/6 12,986- 151- 43-
K6XK 12,788- 121- 46-10
W6MUV 4,712- 76- 31- 9

Sacramento Valley

KI6O 30,793- 284- 53-
AA6DX 3,648- 76- 24- 7
N6JM 3,192- 57- 28-
WA6EUZ (+ WB6OVV) 67,804- 449- 67-35

7

Arizona

AA7A 73,872- 459- 72-14
WB7FDQ 18,312- 132- 56-10
K1SC 1,804- 41- 22- 4
N7CEE 1,530- 45- 17- 5

Idaho

KA7T 27,170- 238- 55-21
N7HJM 10,868- 143- 38-
W7IWU 2,750- 55- 26-

Montana

K8PP/7 47,600- 350- 68-19
KS7T 36,356- 298- 61-

Nevada

W7TVF 26,160- 218- 60-18
W7ABX 2,200- 55- 20- 5
NC7K 2,000- 50- 20- 2

Oregon

N6TR/7 76,020- 471- 70-27
K5MM/7 73,499- 471- 67-
W7TC 7,784- 139- 28-26
K7KJM 4,032- 84- 24- 4
KA7FEF 2,592- 54- 24-
AI7B (+ W7EJ) 74,772- 477- 67-35

Utah

N5CT 42,904- 346- 62-18
N7RU 16,268- 166- 49-10
KC7PA 14,104- 172- 41- 9
K7CU 6,930- 99- 35- 7
WA7MEL 3,302- 126- 27- 7

Washington

W7AWA 47,838- 345- 67-
W7TJ 24,080- 182- 60-18
W7BYK 10,944- 144- 38-12
K7UU 6,720- 96- 35- 6
K7WA 4,644- 86- 27- 6
K7LXC 3,402- 60- 27- 2
W7RM (W7WA, + NET) 104,100- 574- 75-24
K7SS (+ K7IM, K7XX, WB7FFF) 76,812- 465- 74-33
W7XR (K6OQ, KD7P, W7s KJI, XR, oprs) 54,808- 364- 68-36
KG7D (+ K7CW, KK5I, KT7G) 49,848- 336- 67-30
K7QQ (+ N7CKD) 48,512- 398- 64-

Wyoming

KB8KW/7 82,260- 135- 36- 8
K7MM 2,550- 51- 25-

8

Michigan

W8TU 110,495- 704- 77-28
N8EA 88,330- 593- 73-26
W8UVZ 83,625- 538- 75-21
N8CXX 18,480- 210- 44-
WA8RXI 14,744- 194- 38-
K8CV 11,280- 141- 40- 7
W8WVU 8,400- 120- 35-
K8AQM (+ NI8L, WD9INF) 93,063- 690- 67-35
W8MNL (+ K8JM, KT8Y) 79,084- 577- 68-30
WA8BSF (+ K8DD, N8CQA) 13,156- 283- 52-17

Ohio

WB8JBM (KW8N, opr) 135,372- 733- 87-28
W8FN 105,145- 584- 85-30
NE8V 59,346- 468- 63-20
W8IMZ 55,120- 422- 65-25
W8DN 26,182- 244- 53-13
K8SVT 18,380- 182- 45-28
W8IDM 9,890- 115- 43- 5
NC8V 9,516- 122- 39- 9
KF8K 5,382- 69- 39-
KA8D 4,814- 83- 29- 8
K8HF 1,584- 34- 23- 1
W8JI (+ KV8M, WB8TSO) 161,170- 869- 99-35
KS8S (+ AD8P) 172,304- 926- 89-41
W8LT (K1LT, K8ND, KD8KY, WB8WKB, oprs) 141,993- 854- 81-40
N8ET (+ W8ZD) 96,140- 616- 78-36
K3JT (+ NZ4K, KD8NS, WD8s IXE, LXX) 91,956- 581- 79-28

West Virginia

K8OQL 36,651- 320- 57-15

9

Illinois

KF9D 93,600- 612- 75-26
KV9S 79,084- 577- 68-32
K9AB 52,585- 403- 65-17
NA9J 30,456- 282- 54-
KG9D 12,600- 150- 42-
W9LNQ 11,524- 134- 43- 6
K9PPW 2,048- 64- 32- 3
NE9A 1,702- 37- 23- 6
K9RS (+ K9s KM, VV, NA9D) 134,596- 872- 76-42
W9AZ (AK9F, K9s IFO, NR, KA9PWW, N9EOO, WB9s HAD, STR, WD9CSA, oprs) 120,659- 767- 77-

Indiana

WB9YOW 7,372- 97- 38- 7
N9MM (KM9D, N9NC, W8ZRX, WB9POH, oprs) 172,452- 989- 84-39
W9RE (+ WA8YVR) 171,780- 994- 84-38

Wisconsin

WA1UJU 62,372- 503- 62-24
W9WQ 35,380- 305- 58-17
W9WAQ 35,105- 296- 59-21
K9CAN 29,700- 246- 60-15
NI9C 27,054- 260- 54-14
WA9TZE 25,110- 264- 45-11
WA9YSD 15,744- 192- 41-22
WB9MRO 13,950- 155- 45- 6
W9GIL 13,432- 148- 46-13
K9AM 12,870- 143- 45-12
N9KS 9,792- 136- 36- 8
W9KHH 5,346- 81- 33-
WØAIH/9 (+ KØFVF, KMØO) 140,250- 928- 75-42

0

Colorado

WØKEA 85,008- 507- 77-30
WØUO 51,724- 383- 67-
KØFRP 20,384- 196- 52- 8
KØIYF 7,372- 97- 38- 6
KØZX 6,720- 78- 40-
KIØG 6,850- 92- 35- 6
NØEKK 840- 35- 24- 5

Iowa

NØSM 93,862- 655- 71-32
NØBB 33,475- 256- 65-19
WDØGVY 23,296- 224- 52-
KØSRL 17,292- 173- 52-10
WBØCHS 1,976- 38- 26- 4
WBØBHF 18- 3- 3- 1

Kansas

KØWA 29,696- 256- 58-10
WØUY 24,120- 201- 60-23
WØLNZ 18,696- 164- 57-11
NØFMR 4,212- 81- 26- 7
NIØS 2,112- 44- 24- 6
NIØU (+ W7BNK) 54,015- 411- 65-

Minnesota

KØPK 82,563- 561- 73-20
KØKX 81,489- 589- 69-22
KØTT 59,004- 447- 68-21
WØHW 50,310- 387- 65-14
WØRXL 29,040- 242- 60-24
KØAD 20,776- 196- 53-
KNØV 10,206- 139- 37- 6
NØAT 7,400- 100- 37- 5
WØYHE 2,208- 46- 24- 2
KØSR (+ ABØP, WBØHCH) 74,106- 537- 69-

Missouri

K4VX/Ø (KM9P, opr) 140,630- 828- 82-
WØHBH 34,925- 313- 55-
KK5K 27,280- 249- 55-16

Nebraska

KVØI 8,976- 136- 33-11

South Dakota

WØJX 100,548- 654- 76-30

VE

Quebec

VE2YU 11,592- 138- 42-
VE2UM 3,744- 72- 26- 7
VE2OJ (VE2s FLD, SD, VE3s BDK, NJ, UD, oprs) 16,884- 201- 42-15

Ontario

VE3MFA 59,430- 414- 70-
VE3KP 57,362- 487- 58-
VE3ST 10,234- 139- 43-
VE3JKZ 8,814- 113- 39-
VE3CUI 4,980- 83- 30- 4
VE3NBE 4,698- 81- 29-10
VE3OSZ 4,350- 75- 29- 4

Saskatchewan

VG5RA 52,496- 383- 68-

British Columbia

VE7AAQ 16,854- 159- 53-15
VE7BS 4,669- 73- 29-
VE7FPT 2,332- 53- 22- 5

Checklogs

OK1DWJ, PY2RRG, KA1BSZ, K4LTA, K5PG, KE7KF, W8MJG, KB8AC/9, RB5WW, VE4AAU

Hamfest Calendar

(continued from page 68)

Oklahoma (Lawton)—Apr 12: The Lawton Fort Sill ARC will hold their 39th year Hamfest at the County Fairgrounds, 8 AM-6 PM. This year the theme is an Old Fashioned Swapfest. No preregistration necessary except for table space. For more info, write to Don Hagler, 912 Bell, Lawton, OK 73505.

Oklahoma (Mooreland)—Apr 13: The Great Plains ARC 5th Annual Northwest Oklahoma Eyeball and Swapmeet will be held at 9 AM. Admission $2 at door. Covered-dish dinner at noon. Local airport. Dealer and swap tables free. Talk-in on 72/12, 13/73 and 52. VE tests given on Sat, Apr 12. Campsites available. Directions are: north on Main or Elm St, across the tracks and west. For further information, call 405-994-5394 or write to Gordon Richmond, NR5L, Rte 1, Box 12, Mooreland, OK 73852; or call 405-994-5453, or write to N5CCV, Gerald Bowman, Box 356, Mooreland, OK 73852.

Oregon (Milton-Freewater)—Apr 6: The Walla Walla Valley ARC will hold its annual indoor swap-meet at the Milton-Freewater, Community Bldg. Doors open for all at 8 AM-5 PM. Tables $5. Free admission. Food and drink available. Talk-in on 52, 20/80. For more information, call 509-529-9879 or write to Bernard Frazier, WA7CBX, 610 S First, Walla Walla, WA 99862.

Pennsylvania (Bedford)—Apr 13: The Southern Alleghenies hamfest will be held at the Bedford Fairgrounds 7 AM-3 PM. Admission $3. Activities include major new dealers, ARRL, 3rd Region QSL Bureau auction and Tail-gating. Talk-in on 145.49/89, 444.2 (+ 5 MHz) and 52. For more information, contact Gay Rembold, W3DFW, 949 Winifred Rd, Cumberland, MD 21502, tel 301-724-0674.

Tennessee (Clarksville)—Apr 6: The Clarksville Amateur Transmitting Society is having a swapfest from 9 AM to whenever everyone leaves. The fest will be at the National Guard Armory on Hwy 41A in the northern part of Clarksville. Social activities include indoor flea market and amateur licensing exams. Coffee and doughnuts available. Single tables $5; double $7.50. Free admission. Talk-in on 205/805 or 147.43. To reserve an exam and to get more information, please write to CATS, 1550 Armistead Dr Clarksville, TN 37042, or call 615-648-3657.

Texas (Kerrville)—May 2-4: The annual 7290 Traffic Net Picnic will be held this year at the Kerrville State Recreation Area. Members of the Texas Traffic Net, Texas CW Net, Texas Slow Speed Net and the Fifth Region Daytime net will participate in the many activities planned for the OMs and YLs at this biggest and best-ever annual picnic. Those desiring to participate in the barbeque supper on Sat eve will need to register with W5TYS prior to the picnic. Several motels and hotels are available in the area; however, advance reservations are recommended. Overnight camping, shelters and RV hookups are available; reservations may be obtained by writing to the Kerrville State Recreation Area, 2385 Bandera Hwy, Kerrville, TX 78028, or by calling 512-257-5392. The Net has six shelters leased that may be rented by contacting W5TYS in Dallas. Talk-in on 7290 Hz, 37/97 and 52. For more information, write to the 7290 Traffic Net, PO Box 126, New Braunfels, TX 78130, or call 512-625-8142.

Washington (Spokane)—Apr 26: The Inland Empire Radio Amateurs is sponsoring Swapfest '86 to be held at the Spokane Interstate Fair Grounds. Included will be both commercial and noncommercial displays and sales booths. There will be an auction, swap tables, a snack bar, and much more. This event will draw amateurs from Idaho, Washington, Oregon, Montana and Canada. For more information, contact Brian Orr, PO Box 2552, Spokane, WA 99220, tel 208-437-4242, or Noreen at 509-926-7155.

Wisconsin (Cedarburg)—May 3: The Ozaukee Radio Club will sponsor its 8th annual Cedarburg Swapfest 8 AM-1 PM at the Circle B Recreation Center, Hwy 60 and County I, located 20 miles north of Milwaukee. Admission $2 in advance, $3 at the door. Four-ft tables $3. Food and refreshments available. Sellers admitted at 7 AM for table setup. For admission tickets, table reservations, maps or more information, send a business-size SASE to 1986 ORC SWAPFEST, 101 E Clay St, Saukville, WI 53080.

†Wisconsin (Madison)—Apr 6: The Madison Area Repeater Assn is pleased to announce its 14th annual Madison Swapfest, to be held at the Dane County Exposition Center Forum Bldg. Doors open 7:30 AM for flea-market sellers and at 8 AM for the general public. Special arrangements for early setup are available for commercial exhibitors and purchasers of 6 or more flea-market tables. Hotel accommodations; parking within walking distance of the Swapfest. An all-you-can-eat pancake breakfast and various luncheon items will be available. Talk-in on 16/76. Radio upgrade examinations will be offered. Preregistration is encouraged, but walk-ins will be accepted. Admission $2.50 in advance, $3 at the door; under 12 free. Flea-market tables are $5 in advance, $6 at the door plus admission. Be sure to reserve early, as tables were sold out last year. The deadline for mail orders of admission tickets and table reservations is Mar 31. For admission tickets, table reservations or information on commercial exhibit space write, to MARA, PO Box 3403, Madison, WI 53704, or call 608-222-4744. For information on examinations, contact Garrison Lincoln, W9UDY, 6215 Winnequah Rd, Madison, WI 53716.

[*Note:* Sponsors of large gatherings should check with League HQ 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.]

Rules, First IARU HF Championship

When the rules outline for the IARU Radiosport Championship first appeared in March 1977 *QST*, it was pointed out that for an international contest to be successful, several considerations had to be weighed carefully before a final set of rules could be arrived at. With the success Radiosport enjoyed, it became immediately obvious the "rulemakers" had done their homework.

When the IARU Administrative Council met in Melbourne/Auckland in November 1985, it was decided that the time had come for some changes to further enhance the international flavor of the event. In all, three basic changes have been made:

1) The contest period is now 24 hours. Operating time for both single- and multioperator stations is 24 hours.

2) Operation may take place on 1.8-30 MHz. The 10, 18 and 24-MHz bands may *not* be used for contest QSOs.

3) IARU member-society headquarters stations count as additional multipliers. These stations will be recognizable by the unique exchange they will transmit (see below).

For those not familiar with ITU zones around the world, and a listing of countries and their corresponding ITU zones is included in this announcement. Send an SASE or 1 IRC for the proper forms (including the map) early so you'll have them in time for the contest. Good luck!

Rules

1) **Eligibility:** All licensed amateurs worldwide.

2) **Object:** To contact as many other amateurs, especially IARU member-society HQ stations, around the world as possible using 1.8 through 30 MHz. (The 10, 18 and 24-MHz bands may not be used for contest QSOs.)

3) **Date:** Second full weekend of July (Jul 12-13, 1986).

4) **Contest Period:** 1200 UTC Sat until 1200 UTC Sun. Both single- and multioperator stations may operate for the entire 24-hour period.

5) **Categories:**

A) *Single operator*—phone-only, CW-only and mixed-mode. One person performs all operating and logging functions. Use of spotting nets is not permitted. All operators must observe the limits of their operators' licenses at all times. Single-operator stations are allowed only one transmitted signal at any given time.

B) *Multioperator*—single transmitter, mixed-mode only. Must remain on a band for at least 10 minutes at a time. Only one transmitted signal allowed at any given time. (Exception: *Only* IARU member-society HQ stations may operate simultaneously on more than one band, with one transmitter on each band/mode. Only one HQ station call sign per member-society per frequency band is permitted.) All operators must observe the limits of their operators' licenses at all times.

6) **Contest Exchange:** IARU member-society HQ stations send signal report and official IARU member-society abbreviation. All others send signal report and ITU zone. A complete exchange must be logged for each valid QSO.

7) **Valid contact:** The same station may be worked once per band/mode. Mixed-mode entries may work a station once per mode (but only in the generally accepted portions of that band for that mode. Note: Reworking a station in the phone portion of the band on CW is not permitted). Example: On any band, a station may be worked once on phone and once on CW (in the CW segment) for additional QSO credit. However, this counts as only one multiplier. Cross-mode, crossband and repeater QSOs do not count. Where contest-preferred segments are incorporated in regional band plans, participants are requested to observe them.

8) **QSO Points:**

A) Contacts within your ITU zone, as well as QSOs with *all* IARU HQ member-society stations, count one point.

B) Contacts within your continent (but different ITU zone) count three points.

C) Contacts with a different continent count five points.

9) **Multipliers:** Total number of ITU zones plus IARU member-society HQ stations worked on each frequency band. (Note: HQ stations do not count for zone multipliers.)

10) **Scoring:** Multiplier times total number of QSO points.

11) **Reporting:**

A) All entrants are encouraged to use forms available from ARRL/IARU Secretariat for an SASE or 1 IRC.

B) Logs must indicate times in UTC, bands, modes, calls and complete exchange. Multipliers should be marked clearly in the log. Cross check sheets (dupe sheets) are required if more than 500 total QSOs are made.

C) Entries *must* be postmarked within 30 days after the contest (by Aug 13, 1986). Any entry received after mid-Oct 1986 may not be received in time to be included in the printed results.

12) **Awards:** A certificate will be awarded to the high-scoring CW-only, phone-only, mixed-mode and multioperator entrant in each State, each ITU Zone and each DXCC Country. In addition, achievement-level awards will be issued to those making at least 250 QSOs or having a multiplier total of 50 or more. Additional awards may be made at the discretion of each country's IARU member-society.

13) **Conditions of Entry:**

A) Each entrant agrees to be bound by the provisions of this announcement, by the regulations of his/her licensing authority and by the decisions of the ARRL Awards Committee, acting for the IARU International Secretariat.

B) Disqualifications: An entry may be disqualified if the overall score is reduced by more than 2%. Score reduction does not include correction of arithmetic errors. An entry may be disqualified if more than 2% of duplicates are left in the log. A three-QSO reduction will be assessed for each duplicate QSO found during log checking or for each miscopied call sign. See Jan 1986 *QST*, page 94, for complete details.

Prefix, Continent and ITU Zone

A2	AF	57
A3	OC	62
A4	AS	39
A5	AS	41
A6	AS	39
A7	AS	39
A9	AS	39
AP	AS	41
BV	AS	44
BY	AS	33,42, 43,44
C2	OC	65
C3	EU	27
C5	AF	46
C6	NA	11
C9	AF	53
CE	SA	14,16
CE0A	SA	63
CE0X	SA	14
CE0Z	SA	14
CM,CO	NA	11
CN	AF	37
CP	SA	12,14
CT	EU	37
CT3	AF	36
CU2	EU	36
CX	SA	14
D2,3	AF	52
D4	AF	46
D6	AF	53
DA-DP	EU	28
DU	OC	50
EA	EU	37
EA6	EU	37
EA8	AF	36
EA9	AF	37
EI	EU	27
EL	AF	46
EP	AS	40
ET	AF	48
F	EU	27
FT8W	AF	68
FT8X	AF	68
FT8Z	AF	68
FG	NA	11
FG,FS	NA	11
FH	AF	53
FK	OC	56
FM	NA	11
FO(Clip)	NA	10
FO	OC	63
FP	NA	09
FR	AF	53
FW	OC	62
FY	SA	12
G-GW	EU	27
H4	OC	51
HA,HG	EU	28
HB	EU	28
HC	SA	12
HH	NA	11
HI	NA	11
HK	SA	12
HKØ(M)	NA	12
HKØ	NA	11
HL,HM	AS	44
HP	NA	11
HR	NA	11
HS	AS	49
HV	EU	28
HZ,7Z	AS	39
I,ISØ	EU	28
J2	AF	48
J3	NA	11
J5	AF	46
J6-8	NA	11
JA	AS	45
JD,AS	OC	45
JT	AS	32,33
JW	EU	18
JX	EU	18
JY	AS	39
W,K	NA	6,7,8
KC6	OC	64,65
KG4	NA	11
KH1	OC	61,62
KH2	OC	64
KH3-7	OC	61
KH8	OC	62
KH9	OC	65
KHØ	OC	64
KL7	NA	1,2
KP1-5	NA	11
KX6	OC	65
LA	EU	18
LU	SA	14,16
LX	EU	27
LZ	EU	28
OA	SA	12
OD	AS	39
OE	EU	28
OF-OH	EU	18
OK	EU	28
ON	EU	27
OX,XP	NA	5,75
OY	EU	18
OZ	EU	18
P2	OC	51
PA	EU	27
PJ2,3,4,9	SA	11
PJ5,6,7,8	NA	11
PY	SA	12,13,15
PYØ	SA	13
PYØ (T)	SA	15
PZ	SA	12
S2	AS	41
S7	AF	53
S9	AF	47
SJ-SM	EU	18
SP	EU	28
ST	AF	48
SU	AF	38
SV	EU	28
T2	OC	65
T30	OC	65
T31	OC	62
T32	OC	61,63
T5	AF	48
T7	EU	28
TA,EU	AS	39
TF	EU	17
TG	NA	11
TI	NA	11
TJ	AF	47
TK	EU	28
TL	AF	47
TN	AF	52
TR	AF	52
TT	AF	47
TU	AF	46
TY	AF	46
TZ	AF	46
UA1,3,4,6	EU	19,20, 29,30
UA1 (FJL)	EU	75
UA-UZ2	EU	29
UA9-UZØ	AS	20-26 30,35,75
UB	EU	29
UC	EU	29
UD	AS	29
UF	AS	29
UG	AS	29
UH	AS	30
UI	AS	30
UJ	AS	30
UL	AS	30
UM	AS	31
UO	EU	29
UP	EU	29
UQ	EU	29
UR	EU	29
V2-4	NA	11
V8	OC	54
VE,VY	NA	2,3, 4,9,75
VK	OC	55,58,59
VK(LHI)	OC	60
VK9(W)	OC	60
VK9(X)	OC	54
VK9(C,K)	OC	54
VK9(M)	OC	58
VK9(N)	OC	60
VKØ(H)	AF	68
VKØ(M)	OC	60
VP2	NA	11
VP5	NA	11
VP8(F)	SA	16
VP8	SA	73
VP9	NA	11
VQ9	AF	41
VR6	OC	63
VS6	AS	44
VU	AS	41
VU7	AS	41,49
XE	NA	10
XE4	NA	10
XT	AF	46
XU	AS	49
XW	AS	49
XX9,CR9	AS	44
XZ	AS	49
Y2-9	EU	28
YA	AS	40
YB	OC	51,54
YI	AS	39
YJ	OC	56
YK	AS	39
YN,HT	NA	11
YO	EU	28
YS	NA	11
YU	EU	28
YV	SA	12
YVØ	NA	11
Z2	AF	53
ZA	EU	28
ZB	EU	37
ZC4	AS	39
ZD7-9	AF	66
ZF	NA	11
ZK1-3	OC	62
ZL	OC	60
ZP	SA	14
ZS	AF	57
1AØ	EU	28
1S	AS	50
3A	EU	27
3B6-9	AF	53
3C	AF	47
3CØ	AF	52
3D2	OC	56
3D6	AF	57
3V	AF	37
3W	AS	49
3X	AF	46
3Y	AF	67
4S	AS	41
4U(ITU)	EU	28
4U(UN)	NA	08
4W	AS	39
4X	AS	39
5A	AF	38
5B	AS	39
5H	AF	53
5N	AF	46
5R	AF	53
5T	AF	46
5U	AF	46
5V	AF	46
5W	OC	62
5X	AF	48
5Z	AF	48
6W	AF	46
6Y	NA	11
7O	AS	39
7P	AF	57
7Q	AF	53
7X	AF	37
8P	NA	11
8Q	AS, AF	41
8R	SA	12
9G	AF	46
9H	EU	28
9J	AF	53
9K	AS	39
9L	AF	46
9M2	AS	54
9M6,8	OC	54
9N	AS	42
9Q	AF	52
9U	AF	52
9V	AS	54
9X	AF	52
9Y	SA	11
J2,A	AS	39

Contest Corral

Conducted By Billy Lunt, KR1R
Assistant Contest Manager, ARRL

APRIL

1

West Coast Qualifying Run, 10-35 WPM, at 0500Z Apr 2 (9 PM PST Apr 1). W6OWP prime, W6ZRJ alternate. Frequencies are approximately 3.590/7.090 MHz. Underline one minute of the highest speed you copied, certify that your copy was made without aid and send it to ARRL for grading. Please include your full name, call sign (if any) and complete mailing address. A large SASE will help expedite your award or endorsement.

5-6

GARTG SSTV Contest, Part 1, Mar *QST*, p 95.

Connecticut QSO Party, Mar *QST*, p 95.

The SP-DX Contest, phone, sponsored by the Polski Zwiazek Krotkofalowcow, from 1500Z Apr 5 until 2400Z Apr 6. Suggested frequencies are 160-10 meters. Non-Polish stations transmit a 5-digit number consisting of RS plus QSO number. Polish stations send a signal report plus 2 letters denoting the province. Count 3 points for each SP-station QSO. Each different province counts as a multiplier (49 max). Categories: single op, multiband; single op, single band; multiop, single transmitter (all bands); SWL. Include complete logs, summary sheet and multiplier check list. Certificates. Mail entries by Apr 30 to Polski Zwiazek Krotofalowcow, SP-DX Contest Committee, PO Box 320, 00-950 Warsaw, Poland.

9-10

NA-YL to DX-YL, CW (see YL News, this issue).

12-13

GARTG RTTY Contest, Part 2, Mar *QST*, p 95.

North American QSO Party, CW, sponsored by the *National Contest Journal* from 1800Z Apr 12 until 0600Z Apr 13 (phone—1800Z Apr 19 until 0600Z Apr 20). Contests are separate. Single-operator and multioperator. Multiop may be multitransmitter but only one signal per band. No spotting nets for single op. Single ops may operate any 10 hours. Rest periods must be at least 30 minutes long and noted in log. Mutiops may work the entire contest. Use only one call sign per contest. Exchange name and state/province/country. 160-10 (no WARC bands). Work stations once per band. Suggested CW frequencies are 35 kHz above band edge; phone—1.865 3.850 7.225 14.250 21.300 28.600. Try 10 m at 1900Z and 2000Z, 160 m at 0430Z and 0530Z. A valid QSO is two-way logged exchange between a North American station (as defined by CQ WW DX Contest plus KH6) and another station. Multipliers are states (including KH6 and KL7), VE call areas (VE1-VE8, VO1, VO2, VY1) and other NA countries (do not count USA, VE, KH6 or KL7 as countries). Score 1 point per QSO. Multipliers times QSO points for final score. Awards. Send logs, summary sheet and dupe sheets before 30 days after the contest to Dave Pruett, K8CC, 2727 N Harris Rd, Ypsilanti, MI 48198.

13

W1AW Qualifying Run, 10-35 WPM at 0300Z Apr 14 (10 PM EST Apr 13). Transmitted simultaneously on 1.818 3.58 7.08 14.07 21.08 28.08 50.08 147.555 MHz. See Apr 1 listing for more details.

14

ARRL VHF/UHF Spring Sprint, 144 MHz, Mar *QST*, p 95.

16-17

NA-YL to DX-YL, phone (see YL News, this issue).

19-20

North American QSO Party, phone (see Apr 12-13 listing).

QRP ARCI Spring CW Contest, sponsored by the QRP ARC International, from 1200Z Apr 19 until 2400Z Apr 20. CW only. Operate a maximum of 24 hours. Exchange for members is RST, state/province/country and QRP ARCI membership number. Nonmembers exchange RST, state/province/country and power output. Work each station once per band for QSO points. Each member contact counts 5 points, each nonmember US or Canadian contact, 2 pts. Count 4 points for nonmember contacts on a different continent. QSO points (total all bands) times total number of states/provinces/countries (an s/p/c may be worked on more than one band) times power-multiplier times bonus-multiplier equals claimed score. Multipliers are 4-5 W output ×2, 3-4 W output ×4, 2-3 W output ×6, 1-2 W output ×8, less than 1 W output ×10. Over 5-W output counts as checklog. Bonus multipliers: If 100% natural power, ×2; if battery power, ×1.5. Suggested frequencies: 1.810 3.560 7.040 14.060 21.060 28.060 50.360 MHz; Novices and Technicians—10 kHz from the bottom of each band. No 10-MHz or 24-MHz operation. Use separate logs per band. Certificates. Logs must be received by May 20. Send to QRP ARCI Contest Chairman, Eugene C. Smith, KA5NLY, PO Box 55010, Little Rock, AR 72225.

22

ARRL Spring Sprints, 220 MHz, Mar *QST*, p 95.

26-27

Helvetia Contest, sponsored by the USKA (Switzerland), from 1300Z Apr 26 until 1300Z Apr 27. CW and phone (mixed mode only). Categories: single op, multiop, SWL. CW—160-10 meters; phone—80-10 meters; no WARC band operation. Work stations once per band, regardless of mode. Exchange RS(T) and 3-digit serial number. Swiss stations will also send one of the following abbreviations to indicate their canton: AG AI AR BE BL BS FR GE GL GR JU LU NE NW OW SG SH SO SZ TG TI UR VD VS ZG ZH. Count 3 points per QSO with Swiss (HB) stations. HB stations

W1AW Schedule

April 27 — October 26, 1986 **MTWThFSSn = Days of Week** **Dy = Daily**

W1AW code practice and bulletin transmissions are sent on the following schedule:

UTC	Slow Code Practice	MWF: 0200, 1300; 2300; TThSSn: 2000; Sn: 0200
	Fast Code Practice	MWF: 2000, TTh: 0200, 1300; TThSSn: 2300, S: 0200
	CW Bulletins	Dy: 0000, 0300, 2100; MTWThF: 1400
	Teleprinter Bulletins	Dy: 0100, 0400, 2200; MTWThF: 1500
	Voice Bulletins	Dy: 0130, 0430
EDT	Slow Code Practice	MWF: 9 AM, 7 PM; TThSSn: 4 PM; 10 PM
	Fast Code Practice	MWF: 4 PM, 10 PM; TTh: 9 AM; TThSSn: 7 PM
	CW Bulletins	Dy: 5 PM, 8 PM, 11 PM; MTWThF: 10 AM
	Teleprinter Bulletins	Dy: 6 PM, 9 PM, 12 PM; MTWThF: 11 AM
	Voice Bulletins	Dy: 9:30 PM, 12:30 AM
CDT	Slow Code Practice	MWF: 8 AM, 6 PM; TThSSn: 3 PM; 9 PM
	Fast Code Practice	MWF: 3 PM, 9 PM; TTh: 8 AM; TThSSn: 6 PM
	CW Bulletins	Dy: 4 PM, 7 PM, 10 PM; MTWThF: 9 AM
	Teleprinter Bulletins	Dy: 5 PM, 8 PM, 11 PM; MTWThF: 10 AM
	Voice Bulletins	Dy: 8:30 PM, 11:30 PM
MDT	Slow Code Practice	MWF: 7 AM, 5 PM; TThSSn: 2 PM, 8 PM
	Fast Code Practice	MWF: 2 PM, 8 PM; TTh: 7 AM; TThSSn: 5 PM
	CW Bulletins	Dy: 3 PM, 6 PM, 9 PM; MTWThF: 8 AM
	Teleprinter Bulletins	Dy: 4 PM, 7 PM, 10 PM; MTWThF: 9 AM
	Voice Bulletins	Dy: 7:30 PM, 10:30 PM
PDT	Slow Code Practice	MWF: 6 AM, 4 PM; TThSSn: 1 PM; 7 PM
	Fast Code Practice	MWF: 1 PM, 7 PM; TTh: 6 AM; TThSSn: 4 PM
	CW Bulletins	Dy: 2 PM, 5 PM, 8 PM; MTWThF: 7 AM
	Teleprinter Bulletins	Dy: 3 PM, 6 PM, 9 PM; MTWThF: 8 AM
	Voice Bulletins	Dy: 6:30 PM, 9:30 PM

Code practice, Qualifying Run and CW bulletin frequencies: 1.818, 3.58, 7.08, 14.07, 21.08, 28.08, 50.08, 147.555 MHz.

Teleprinter bulletin frequencies: 3.625, 7.095, 14.095, 21.095, 28.095, 147.555 MHz.
Voice bulletin frequencies: 1.89, 3.99, 7.29, 14.29, 21.39, 28.59, 50.19, 147.555 MHz.

Slow code practice is at 5, 7½, 10, 13 and 15 WPM.
Fast code practice is at 35, 30, 25, 20, 15, 13 and 10 WPM.

On Monday, Wednesday and Friday, 1300 through 2100 UTC, transmissions are beamed to Europe on 14, 21 and 28 MHz; on Wednesday at 2200 UTC they are beamed south.

Code practice texts are from *QST*, and the source of each practice is given at the beginning of each practice and at the beginning of alternate speeds. For example, "Text is from February 1986 *QST*, pages 9 and 85" indicates that the main text is from the article on page 9 and the mixed number/letter groups at the end of each speed are from the contest scores on page 85.

On Fridays, UTC, a DX bulletin replaces the regular bulletin transmissions.

On Wednesdays at 2230 UTC, an IARU Region 2 bulletin in English and Spanish on 45.45-baud Baudot is sent on the regular teleprinter frequencies, beamed to Central and South America.

On alternate Saturdays at 2230 UTC, Keplerian Elements for active amateur satellites will be send on 45.45-baud Baudot on the regular Teleprinter frequencies. The next date for transmission will be given in regular satellite bulletins.

W1AW CW and voice bulletins are sent on OSCAR 10, Mode B, when the satellite is within range. Look for CW on 145.840 MHz and SSB on 145.962 MHz.

Teleprinter bulletins are 45.45-baud Baudot, 110-baud ASCII and 100-baud AMTOR, FEC mode. Baudot, ASCII and AMTOR (in that order) are sent during all 1500 UTC transmissions, and 2200 UTC on TThFSSn. During other transmission times, AMTOR is sent only as time permits.

CW bulletins are sent at 18 WPM.

W1AW is open for visitors Monday through Friday from 8 AM to 1 AM EDT and on Saturday and Sunday from 3:30 PM to 1 AM EDT. If you desire to operate W1AW, be sure to bring a copy of your license with you. W1AW is available for operation by visitors between 1 and 4 PM Monday through Friday.

In a communications emergency, monitor W1AW for special bulletins as follows: voice on the hour, teleprinter at 15 minutes past the hour, and CW on the half hour.

W1AW will be closed on May 26, July 4 and September 1.

also work each other. Multiply by number of Swiss cantons worked (max 26 per band). Awards. Separate logs per band. Mail entry by May 31 to Walter Schmutz, Gantrischweg 1, CH-3114 Oberwichtrach, Switzerland.

27

W1AW Qualifying Run, 10-35 WPM, at 2300Z Apr 27 (7 PM EDT). See Apr 1 and 13 listings for more details.

30

ARRL Spring Sprints, 432 MHz, Mar *QST*, p 95.

MAY

3-4

Florida QSO Party, sponsored by *Florida Skip* Magazine, 1400Z-1900Z May 3 and 0001Z-0500Z and 1500Z-2300Z May 4. 160-2 meters. Suggested frequencies: CW—3.555 7.055 14.055 21.055 28.055 MHz; phone—3.945 7.279 14.279 21.379 28.579 MHz. Phone and CW are separate contests. Use separate logs. Work each station once per band and mode. No crossband, crossmode or repeater contacts. FL classes are: A—those operating portable on emergency power and running 100 W or less output inside FL but outside their home counties; B—all other stations operating in FL. Indicate single-op or multiop. For exchange, FL stations send signal report and county. Others send signal report and state, province or country. FL stations count 1 point per QSO. Multiplier is the total states (49 max), provinces (12 max) and DX countries (27 max). All others count 2 points for each FL QSO. Multiply by total of FL counties worked (67 max). FL class A stations multiply final score by 1.5. Certificates and plaques. Include a summary sheet and a dupe sheet with logs. Mail by June 6 to Florida Skip Contest Committee, c/o North Florida ARS, PO Box 9673, Jacksonville, FL 32208.

County Hunters SSB Contest, sponsored by MARAC, from 0001Z May 3 until 2400Z May 4 (0800Z-1200Z each day is a mandatory rest period). Work mobile and portable stations each time they change band or county. Fixed stations may work other fixed stations only once, regardless of band change. No contacts on net frequencies. Exchange signal report and QTH (county for US; country for DX). Suggested frequencies: 3.870-3.890 7.225-7.250 14.250-14.285 21.360-21.380 28.570-28.600 MHz. There will be a mobile window at 3.870-3.880 7.235-7.245 14.265-14.275 where low power mobiles will operate. Fixed stations are asked to work the mobiles and move out of the window. Point value of contacts: mobile—15; mobile team—30; portable—5; DX (incl KH6/KL7)—5; fixed US station—1. Final score equals the total of US counties plus Canadian stations times the total number of QSO points. Awards and certificates. Send your logs by June 4 (or an SASE for more information) to Barry Brewer, WA5DTK, PO Box 65, Randolph AFB, TX 78148.

Great Armadillo Run, this issue, p 73.

7

West Coast Qualifying Run, 10-35 WPM, at 0400Z May 8 (9 PM PDT May 7). See Apr 1 listing for more details.

8

ARRL Spring Sprint, 1296 MHz, Mar *QST*, p 95.

10-11

CQ-M Contest (Peace to the World), sponsored by the Krenkel Central Radio Club of the USSR, from 2100Z May 10 until 2100Z May 11. CW and phone, 3.5 through 28 MHz. Amateur satellites count as a separate band if a 144- to 28-MHz mode is used. Work stations once per band, regardless of mode. No crossmode QSOs. Categories: single op, single band; single op, all band; multioperator, single transmitter (all bands); SWL. Non-USSR stations send signal report and serial number. USSR stations send signal report and oblast number. Avoid lower 5 kHz of 80/40 meters and lower 10 kHz of 20/15 meters. Count one point per QSO within your continent, 3 points for other continents. QSOs with your own country count for multiplier credit, but have no point value. Multiply total QSO points by the sum of different countries (R-150-S country list) worked per band. The R-150 list is basically the same as the ARRL countries list except for USSR countries. Serious competitors should review the R-150 list. Awards. Mail logs by July 1 to CQ-M Contest Committee, PO Box 88, Moscow, USSR.

A. Volta RTTY DX Contest, sponsored by the SSB and RTTY Club of Como and the Associazione Radioamatori Italiani, from 1200Z May 10 until 1200Z May 11. 80-10 meters. Entry classes: single op; multiop, single transmitter; SWL. Work stations once per band. Exchange signal report, serial number and zone number. Multipliers are DXCC countries and call areas in W/K, VE and VK. QSOs within the same country do not count (W2 cannot work W2, but can work W1, W3, W4, etc). Points for other QSOs are determined from exchange table available from sponsor. QSOs with different continents on 3.5 and 28 MHz are worth double. Multiply QSO points by sum of DXCC countries and W/VE/VK call areas worked per band. Count one additional multiplier for working the same "country" on at least four bands. Mail logs to be received by July 16 to Francesco Di Michele, 12DMI, PO Box 55, 22063 Cantu, Italy.

Southern California 6 Meter Club QSO Party, sponsored by the Southern California 6 Meter Club, from 1900Z May 10 until 1900Z May 11. All modes. Work station once per mode. Scoring count 1 point per QSO times grid squares worked equals total score. Send logs to Southern CA 6 Meter Club, PO Box 448, Cypress, CA 90630.

12

W1AW Qualifying Run, 10-35 WPM, at 0200Z May 13 (10 PM EDT May 12). See above listings for more details.

17

ARRL Spring Sprint, 50 MHz, Mar *QST*, p 95.

Armed Forces Day

17-18

Michigan QSO Party

ARI Italian International Contest

24

W1AW Qualifying Run

24-25

CQ WW WPX Contest, CW.

27-28

Clara AC/DC "Mystery" Contest

31-Jun 1

National 6 Meter Invitational Net Activity Day Contest (SIN)

Special Events

Conducted By Billy Lunt, KR1R
Assistant Contest Manager, ARRL

Homestead, Florida: The Everglades ARC will operate Ham Day **Apr 6** from the City Chamber of Commerce. All contacts will receive a certificate. If you are nearby, drop in and say hello. Send QSL for certificate to Fred Albart, KB4PJI, 1791 SW 3rd St, Homestead, FL 33030.

Berwick, Pennsylvania: The Columbia-Montour ARC will operate KC3TX 1700Z-2400Z **Apr 12** to commemorate the bicentennial of the city of Berwick. Operation will be 40 and 20 General phone bands. Send QSL for nice certificate to CMARC, PO Box 930, Berwick, PA 18603.

Shreveport, Louisiana: The Holiday-in-Dixie QSO Party will be held 1800Z-2300Z **Apr 12** in conjunction with the Holiday-in-Dixie Celibration, commemorating the Louisiana Purchase. Suggested frequencies: phone—7.230 14.280 21.375 28.585; CW—40- and 15-meter Novice bands. A certificate for a contact. Send to HID QSO Party, PO Box 4842, Shreveport, LA 71134-4842.

Astoria, Oregon: The Sunset Empire ARC will operate W7BU 1600Z-2400Z **Apr 12** from the USCG lightship *Columbia*. Suggested frequencies: 3.945 7.280 14.250 21.350 28.500. For a certificate, send QSL and 9- × 12-in SASE to W7BU, Rt 3 Box 75, Astoria, OR 97103.

Lolo Pass, Idaho: The Hellgate ARC will operate WB7SFL 1700Z-2400Z **Apr 12-13** to commemorate the crossing of the Bitterroot Mountains by Lewis and Clark. Operation will be in the lower 20 kHz of the 20, 15 and 10-meter General phone bands. Send large SASE for commemorative certificate to Hellgate ARC, Box 3811, Missoula, MT 59806.

Philadelphia, Pennsylvania: The Olympia RAC will operate special-event stations from the *USS Becuna* and the *USS Olympia* from 1300Z **Apr 12** until 2000Z **Apr 13** to celebrate the anniversary of the US Submarine Service. Frequencies: phone—3.890 7.240 21.360 28.600; CW—3.590 7.050 14.050 21.090 28.150; 2 meters; Novice bands. For a beautiful certificate send large SASE or 1 IRC to Olympia RAC, PO Box 928, Philadelphia, PA 19105.

Atlanta, Georgia: The Metro Atlanta Telephone Pioneers ARC will operate W4OTA 1500Z **Apr 18** until 0300Z **Apr 19**, 1500Z **Apr 19** until 0300Z **Apr 20** and 1700Z-2300Z **Apr 20** as part of A Taste of Atlanta 1986. Suggested frequencies: phone—7.285 14.285; CW—7.055 14.055; FM—144.81/144.41 449.150/444.150. For special-event QSL send an SASE to MATPARC/Taste of Atlanta, John C Parker, PO Box 54017, Atlanta, GA 30308.

West Columbia, Texas: The Brazosport ARC will operate W5PWG 1500Z-2300Z **Apr 19** to commemorate San Jacinto Day and the Texas Sesquecentennial. Operation will be 20 kHz from bottom edge of 80-10 General phone and CW bands. Commemorative QSL via David Garver, NV5L, 105 Anyway No. 28, Lake Jackson, TX 77566.

Smithfield, North Carolina: The Johnson ARS will operate KA4HAM 1400Z-2400Z **Apr 19-20** to celebrate the 2nd annual Smithfield Ham and Yam Festival. Frequencies: phone—3.855 7.230 14.255; CW— 3.708 7.110. For a special QSL and certificate send a large SASE to Mark Gibson, N4MQU, PO Box 2084, Smithfield, NC 27577.

Groton, Connecticut: The ARS of Norwich (RASON) will operate KA1IFG 1700Z **Apr 19** until 1700Z **Apr 20** aboard the submarine USS Croaker to commemorate the 42nd anniversary of its commissioning. Suggested frequencies: SSB—3.890 21.290; CW—3.730 7.130 21.130. Send QSL and SASE to RASON, PO Box 903, Norwich, CT 06360.

Camdenton, Missouri: The Lake of the Ozarks ARC will operate NIØV 1400Z-2200Z **Apr 26** during the 36th annual Dogwood Festival. Suggested frequencies: CW—7.125; phone—14.255-14.285; packet—20 meters. For certificate, send business size SASE to LOARC, Rt 2 Box 399, Sunrise, MO 65079.

Nebraska City, Nebraska: The Nebraska City ARC will operate several special-event stations during the Arbor Day Celebration from 0000Z **Apr 21** until 0600Z **Apr 27** to commemorate J. Sterling Morton, the founder of Arbor Day. Operation will be 80-10 General bands both phone and CW. Certificate for contact or SWL. Send QSL card and large SASE to Nebraska City ARC, PO Box 278, Nebraska City, NE 68410.

Boston, Massachusetts: The Council of EMA AR Clubs will operate KA1SM 1500Z-2100Z **Apr 26** and 1400Z-2000Z **Apr 27** from a special Amateur Radio exhibit at Boston's Museum of Science. Operation will be up 10 kHz from lower edges of 80-10 General phone and CW bands. Also, RTTY, packet and OSCAR 10 (145.910 MHz) are planned. If you are nearby, drop by the booth. QSL to Richard Clancey, KA1SM, 25 Rolling La, Dover, MA 02030.

New Deadline: The deadline for receipt of items for this column is the 1st of the second month preceding the publication date. For example, your information would have to reach HQ by Apr 1 to make the June issue. Please include the name of the sponsoring organization, the location, dates, times(Z), frequencies and call sign of the special-event station. Requests for donations will not be published.

Mini Directory

As a convenience to our readers, here is a list of items of particular interest and when they most recently appeared in *QST*.

Club Contest Rules	Jan 1986, p 94
Frequency/Mode Allocations	Jan 1986, p 62
Hamfest Calendar Rules	Feb 1986, p 72
License Renewal Information	Jan 1986, p 62
Major ARRL Operating Events and Conventions—1986	Jan 1986, p 61
MARS Information	Jul 1985, p 46
QSL Bureaus	
Incoming	Dec 1985, p 73
Outgoing	Mar 1986, p 71
902-MHz Interim Band Plan	Jan 1986, p 74

Section News

Administered by Steven Ewald, WA4CMS

The ARRL Field Organization Forum

CANADA

BRITISH COLUMBIA: SM, H. Ernie Savage, VE7FB—British Columbia Public Service Corp Net, NM Ford VE7DDF High 178 Low 74 Total 4148. British Columbia Emergency net, NM Geddes, VE7DIR, reports early session has helped with the poor band condition at 0300Z regular time. VE7AIO Steve and couple of others have had the good fortune of collecting on Povincial sweeps the past couple of months. Nice to hear John after twenty years (old call was VE7JB-the new VE7JHB) back on the air. VE7AMW, new Transcvr new tower and beam and now should be heard. Received nice club paper from Burnaby A.R.C. Traffic: VE7BNI 278, VE7DIR 59, VE7EJW 45, VE7FB 31, VE7CDF 23, VE7CCJ 22, VE7FME 21, VE7XA 18, VE7EIR 4, VE7BZI 3, VE7EJU 6.

MANITOBA: SM, Jack Adams, VE4AJE—New year, new people with many changes including CRRL which took over from ARRL in handling Canadian affairs and membership. We as Canadian amateurs require your support and membership to be effective. For particulars contact yours truly or other CRRL members including CRRL Hq. in London Ont. at PO Box 7009 Station E (N5Y 4J9). Please note that individual traffic with a count less than 25 will not be listed in this report due to space limitations. Both the CRRL Evening phone net and Manitoba WX net has moved freq. due to heavy U.S. QRM to 3.743 MHz net times have not changed. Net reports: CRRL Evening phone net-30 sessions 949 QNI, 4 QTC-MWX net-sessions 31, 828 QNI, 36 QTC. MTN CW net-30 sessions, 222 QNI, 36 QTC. WRS 2 meter net which links with Western MB through MAN and NEP 9 sessions, 460 QNI. Traffic: VE4RO 42, VE4AFO 37, VE4AJE 33, VE4IX 33, VE4TE 32, VE4AAD 27.

MARITIME—NEWFOUNDLAND: ASM, Aaron Soloman, VE1OC— VE1KK now residing in VE-7 land. VE1VN active on 75 and 2 meters after long absence. Vacating South-VE1ABV, VE1LZ, VE1SH, VO1EI, VE0MJX. New Executive— Dartmouth ARC: President, VE1CBK; Secretary, VE1AKQ. New 2 Meter Repeater—Musquodobolt Harbour-Freq. 146.430/147.030. Hospitalization-VE1AG. Silent Key-VE1AND. Annual Halifax-Dartmouth Flea Market/Dinner Dance 30th-31st. May/86. Make reservation now.

ONTARIO: SM, Larry Thivierge, VE3GT—BM: VE3LST. PGL: VE3AR. SEC: VE3GV. STM: VE3BDM. TC: VE3EGO. Packet radio is really taking off in the nation's capital-because they feel that packet radio represents a major innovation in amateur radio and that it will come to have great importance in the relatively near future, the Ottawa ARC's Board of Directors has proposed that a packet radio chairperson be appointed as a member of the Board of the Club. VE3JBO is the chairperson of the new packet radio group of the OARC and points out that the packet repeater VE3PAK is the second most used in the Ottawa area. There is now a packet bullentin board in London 145.01 MHz, 1200 bauds, NBFM using the AX.25L 2V2 packet protocol. Access is by connecting to VE3GYO and then following the command prompts. Congratulations to the Scarborough ARC who celebrate their 40th anniversary this month and to the Windsor ARC on their 30th anniversary later this year. New Section appointments are VE3DBB EC for Chatham and VE3GSQ as an ORS. DOC Notice No. TRS-026-85 Amateur Service is the latest update of banned countries, 3rd party traffic agreements and list of countries to permit licensed amateur radio operators to operate radio stations while temporarily in the other country. Using horizontal polarization rather than vertical, VE3WV and VE3MLA completed their 600th QSO using straight cw on the low end of the 2 metre band, on 144.055 MHz. Repeater VE3SOT in McGregor has added RTTY capabilities and is being used extensively. Some of the users are VE3EZJ VE3FWV VE3NGR VE3NGZ. Looks like there maybe a new digipeater in Chatham in the near future. The Nortown ARC is continuing the refurbishing of the HMCS Haida's wireless at Ontario Place. Club call is VE3NAR and it should be operational in the spring. VE3ORP has his advanced. A number of clubs within the Section are holding meetings to discuss DOC's proposals for restructuring the Amateur Service. Make sure you get your comments in and a copy to CRRL Hq. would be appreciated. Traffic: VE3FAS 305, VE3GSQ 278, VE3DGX 127, VE3DPO 93, VE3BCZ 89, VE3GT 84, VE3BDM 68, VE3GNW 50, VE3WM 50, VE3AJN 40, VE3FGU 38, VE3AWE 35, VE3KCZ 25, VE3EAM 24, VE3EWD 18, VE3BUO 17, VE3BAJ 15, VE3WG 14, VE3WV 14, VE3IFP 8, (Dec.) VE3GNW 272, VE3FOI 150, VE3CYR 111, VE3AJN 71, VE3GOL 70, VE3PJC 21, VE3IFP 14.

QUEBEC: SM, Harold Moreau, VE2BP—STM: VE2EDO. BM: VE2ALE. TC: VE2ED. A/TC: VE2CP. NM: VE2EDO. In Quebec, we are 462 members, 43 life members and 7 blind members for a total of 512 members of CRRL. Quebec provincial Hamfest will be held on Sunday May 25, 1986 at the Tracy Curling Club, more details in Hamfest Calender. Le club, VE2UMS, est tres actif lors des 'contests' et sa presence sera remarquee lors du prochain Field Day. VE2GZB semble tres heureux de son acquisition, un nouveau chien-guide. Traffic: VE2SD 55, VE2BP 54, VE2EKC 35.

SASKATCHEWAN: SM, W.C. Munday, VE5WM—SEC: VE5CU. EC: VE5AQ, VE5FF, VE5HG, VE5WM. STM: VE5HG. NM: VE5EE, VE5EX, VE5HG, VE5AEM, VE5BAF. TC: VE5GF. ATC: VE5XZ. BM: VE5WM. OBS: VE5CU, VE5JA. One of the duties of the SM is to write a monthly Section News column in QST. I invite SK amateurs to pass along any news they may want to see in print. Along with a number of amateurs who have changed their 3-letter calls for 2- letter is the Regina 2-meter NM VE5AEJ who now signs VE5EE. Keep the SK call book handy for updates. Ham classes are winding down and a tip of the hat is extended to those amateurs who instructed or helped in any way with this important program. Traffic: VE5BAF 19, VE5AGM 5.

ATLANTIC DIVISION

DELAWARE: SM, Harold K. Low, WA3WIY—STM: W3DKX. SEC: K3PFW. PIO: WB3DPJ. SGL: AF3R. PSHR: K3JL. We are getting an emergency team to cover the state, they are: KC3JM Sussex; KA3LNK Kent Co.; KC3TI New Castle Co.; and K3PFW serving all over. Many net members checking in from Fla. and many times heard better than locals. Attended Jan. First State ARC meeting. They had a very informative demonstration of Packet Radio. Good news for Wilm. hams: antenna ordinance withdrawn. Newark taking second look at one they were about to put in place. Nanticoke ARC has goals in 86 of Field Day station, also a membership increase of 50%. DTN QNI: 454, QTC 34 in 34 sessions. DEPN QNI: 63, QTC: 9 in 4 sessions. Traffic: W3QQ 69, WA3WIY 39, KA3IXV 29, K3JL 26, WB3DUG 21, W3DKX 20, W3FEG 19, KC3JM 7, K3ZXP 7, N3AXH 6, KC3FW 4.

EASTERN PENNSYLVANIA: SM, James B. Post, KA3A—ASMS: KC3LM, KA3GJT, K3ZFD. ACC: KB3UE. STM: KB3UD. PIO: W3AMQ. SEC: WA3PZO. TC: W3FAF. RFI/OO: N3CWD. DEC: AA3C, W3EEK, KB3UD, N3BFL, K3MWA, KB3LR, WA3JRL, N3AIA.

EPA NETS

NAME	FREQ.	TIME	QNI	QTC	SESS.
EPA	3610	0000/0300Z	469	155	59
EPAEPTN	3917	2300Z	525	201	30
PTTN	3610	2330Z	329	124	30
LOCAL NETS					
D2ARES	145.45	2000R Th	60	2	4
D3ARES	145.37	1930R M	91	4	4
D5ARES	146.865	2100R S	81	7	5
D5TRICNT	146.655	2100R 1W	19	0	1
D6FSN	147.00	2000R Tu/Th	87	32	7
D8ARES	147.300	1900R Tu	40	0	4
PWA/ARES	146.715	2000R Su	69	0	4
MARC/ARES	147.060	2030R Su	85	3	4
MARCTN	147.060	2030R MWF	190	56	13

Net notes D3ARES has a new net manager, Gary, KA3FUL, who has taken over the helm. After some hiatus, Gary has returned and we look forward to his renewed participation. Reading Radio Club new officers: President KC2QB, VPres W3WJC, Sec W3UAC, Treas WB3AAK, Directors W3FPL WA3SPJ WA3TIU W3UQH. Congrats to the Del-Lehigh ARC as the first winners of the Section Managers trophy. Their top five ops gamed a score of 533,279 to take the initial trophy. Operators were K3ZUF, KJ3R, W3LR, K3OO, W3OK. KC3LM will be filling in for KA3A as Section Manager until the next election. Please direct all correspondence for EPA Section News to Kay Cragle, 128 Berkly Drive, Devon, PA 19333. Traffic: Station summary N3AZW 420, N3COY 280, KA3DLY 173, N3AIW 157, N3CD 118, WA3CLX 100, W3JKX 92, KU3R 72, KB3FW 70, W4UQ 63, W3KAG 58, KA3IME 48, KA3JOI 43, KB3UD 41, W3DP 38, K3TX 37, W3AQN 32, WA3CKA 30, W3TWV 23, W3FAF 19, N3EFW 13, W3CL 12, WA3WQP 9, W3ADE 8.

MARYLAND-DC: SM, John A. Barolet, KJ3E. This column is a forum for MDC ARRL members but I seldom receive ideas for the general improvement or benefit of MDC. Consequently, the ideas offered here are mostly mine. Send yours for inclusions here. FCC Rules and Regulations, 97.1 " . . . provide an Amateur Radio Service having a fundamental purpose . . . (a) . . . particularly with respect to providing emergency communications." With no commercial electrical power and no telephone, could you provide radio communications as needed. Take a test! On some weekend disconnect your rig from the power line and operate 12 or more hours in QSOs, contests, traffic handling, or whatever. Then contact your EC, SEC K3RXK, or SM KJ3E; report your success and sign up with the ARES in MDC. Your welcome assured! I have just returned from a conference of ARRL, EPA and MDC ARES folks in which the National Disaster Medical System 1985 exercise in MDC and that in the Philadelphia area were reviewed. As in our area, the EPA ham effort was applauded by civilian and military agencies taking part in the exercise. Standby—another NDMS outing is presently scheduled for Washington this July. Traffic men are infiltrating packet radio and planning ways to integrate packet radio networks into the National Traffic System. WA2WDT in Potomac has completed and distributed an Amateur Radio Resource Manual of public service groups, clubs, ARRL leaders and existing emergency plans in MDC and NVA. Congratulations, Ross, on this accomplishment. Please, everyone, send WA2WDT updates and appropriate additions whenever available. SEC K3RXK reports a total of 338 ARES members in MDC, increased 126 in two months. A veteran EC, KA3HUT, steps down temporarily in Wicomico County; thanks for the fine service. The Mountain ARC held another examination; K3OMN reports WA3JTY, KA8YOY, WB3KYM, KA8YFN, KA8YLO upgraded. KA3T with a new BSEE degree now has more time for ham radio. New officers at St. Mary's ARA: N3EGF Pres., WA4EIO VP, KA3MZC Sec., WA3ELE, Treas. Newsletters from IBM ARC, Laurel ARC, Baltimore ARC, Rock Creek ARA and FAR were much appreciated. Appointments: N5EV EC Military District of Washington DC, WA1QAA EC Howard County, WA3VPL ORS/OES, N3EGE ORS, KC3TA ORS, KB3QV ORS. With the nets: Net/Manager Sessions/traffic/average checkins: MDD/W3FA 62/203/10; MEPN/WA3ERT 31/148/28; MSN/KC3Y 31/54/14; PON/WB3BFK 22/18/13; FREDCARES/K3RXK 4/9/16; MDCPON/W3OYY 5/6/15; WC2MN/KC3DW 4/0/22. PSHR: KK3F 142, WA2ERT 109, W3FA 102, KJ3E 92, KC3Y 81, N3EGF 76, W3YVQ 75, K3RXK 71, K3NNI 65. Traffic: KK3F 437, KC3DW 158, KC3Y 137, KJ3E 136, WA3ERT 96, W3FA 93, N3EGF 62, K3NNI 61, N3DE 55, KX3U 40, K3RXK 39, KC3AV 32, KC3NS 29, N3RO 25, W3LDD 24, W3YVQ 22, WB3BFK 21, W3DQI 17, KA3IID 17, N3EGE 17, W3FZV 16, WA2WDT 7, W3ZNW 7, K3ORW 6.

SOUTHERN NEW JERSEY: SM, Richard Baier, WA2HEB—SEC: K2QIJ. STM: WB2UVB. ACC: K2IXE. TC: VACANT. PIO: VACANT. SGL: KA2KMU. BM: WB2UVB. OOC: WA2HEB. ATCs: N2BQT and K2JF. From our SEC K2QIJ comes the following: "The WestLink Radio News can be heard as part of the Metroplex News Network on 147.15 (+600) MHz from Mt. Holly and 145.47 (-600) MHz from Chatsworth, the two Burlington County ARES repeaters and on 444.2 from Bensalem, PA. This network link-up is held at 8 PM on Monday evenings. A partial replay with ARRL bulletins added can be heard on the Burlington County repeaters over most of the SNJ section following the Burlington Emergency Net at 7 PM each Wednesday evening. You are invited to keep informed! I will be glad to air any section announcements you may have on our sessions on Mondays or Wednesdays." Those of you who are on packet and would like to communicate with me, please feel free to leave your comments, concerns, etc. addressed to me on the WB2MNF PBBS on 145.01 MHz. Of course, don't hesitate to drop me a line or give me a phone call if there's something on your mind. Help me by communicating with me. Tnx es 73. Traffic: WB2UVB 356, NG2T 46, N2FIZ 30, WA2MGV 24, KA2CQX 16, WA2HEB 3. (Dec.) WB2UVB 487, WA2MGV 50, KA2CQX 37.

WESTERN NEW YORK: SM, William W. Thompson, W2MTA—ACC: N2EH. BM: W2GLH. OOC: W2AET. PIO: WA2PUU. SGL: KO2X. STM: W2MTA (A). TC: K2QR. Among the Silent Keys this month were radio pioneer W2ORI and former EC WA2GJI: they shall be missed. Public Service Honor roll: KG2D N2EVG WA2FJJ VE2FMQ N2FQP NN2H WB2IDS WA2KOJ W2MTA WB2OWO ND2S KA2UBX K2YAI. QCWA Officers: Niagara Frontier W2SD W2RPO K2FJ W2KKZ; Central NY W2UBU W2RQH K2YYF W2UWD. Club Officers: Oneonta KA2HHY KD2AO KY2K WB2VNB; Skyline WA2VAM WA2TOL KD2IG WA2QQU N2DGJ: Squaw Island KZ2U KA2UDH KA2UQD WA2VUB KA2TYU KA2USY. Appointments: (EC) WB3CUF Schoharie, W2FEY Genesee, WA2VAM Cortland KA2MYD Chenango, KC2YF Tompkins, WA2UKX Yates, KB2DP Oneida, KA2OVL Cattaraugus, W2BYO Allegany, WB2QZL Niagara; (NM) N3DPE. OBS Reports WB2DSH WA2ZPE.

NYS/M*3677	368-155-31	NYS/E*3677	408-185-31
WDN/M*04/64	427-099-31	JCARC 10/70	411-006-31
Mike Farad	327-127-31	LewisCoARES	049-000-04
NYPON*3913	679-314-31	OARCN 25/85	059-002-05
NYSPTEN 3925	615-064-31	BRVSN 55/655	423/009/31
ESS CW3590	407-050-31	CNYTN*90/30	243/042/31
OCTEN/E*/84	694/096/31	OCTEN/L*/88	283/027/31
Q NET 31/91	361/005/31	MOHAWKVTN	033/040/08
STAR* 13/73	FEB.STAR* 99/39		013/003/04
WDN/E*57/17	589/195/31	WDN/L*04/64	552/115/31
BLUELINE/33	288/034/31	NYS/L*3677	281/086/31

*NTS Net, VHF Thin 51-0-4 (Jan); 44-0-5 (Dec). HAMFESTS. Owego STARC May 3, Rochester May 17-18, Rome June 1, Cortland June 14, Batavia July 13. THANKS Salt City DX Association for hospitality at monthly meeting attended by W3ABC W2BCH and W2MTA to honor AJ3K for his QST series, winner of the 1984 Technical Excellence Award, "The Effect of Real Ground on Antennas." Packet Radio linking continues to grow, as does the number of participants. Tracing the digipeater links in upstate still shows holes, or unknown areas, let me know of your activity. Here are some of the links: W2UXC-1, KD2AJ, N2AMK, K2GV1-1, W2DUC, K2YNW, WB2WHD, WA2RKN-2, WB2KMY-1, KG1O-5, K2VD, WA3PWX, WA2IKF, W2OW, K3RLI, NE2W, KC3BQ, W2GJ, KB2KW, W2BCH, N2HR AND KA2MYD. The matter of packet handling of third-party traffic is providing to be an interesting subject, especially with the recent FCC ruling in Docket 85-105. In the interim until further ruling by FCC, a control operator must be present at each domestic intermediary relay point for transmission of third-party. Field Day is coming up fast, see you there! Traffic: VE2FMQ 393, WB2IDS 387, WB2OWO 327, WA2HSB 268, WA2FJJ 227, W2MTA 184, ND2S 134, KG2D 106, N2ABA 96, NN2H 87, WA2KOJ 83, K2YAI 78, KA2UBX 72, N2EVG 63, WA2SMZ 54, KA2DBD 50, WB2QIX 46, W2FR 43, N2FQP 41, W2UYE 38, AF2K 29, W2ZOJ 24, W2GJ 16, WB3CUF 10, WB2NAO 7, N2CJQ 6, WA2OEP 2, K2VR 2.

WESTERN PENNSYLVANIA: SM, Otto L. Schuler, K3SMB—STM & ASM: WN3VAW. SEC: WA3UFN. OOC: KJ3Q. PIO: WB3IZJ. SGL: K3HWL. TC: K3LR. BM: KR3P. ACC: AK3J.

NET	QNI	QTC	SESS	KHz	T/D	NM
WPACW	266	113	31	3585	7:00P	WA3UNX
WPAPTN	548	143	31	3983	6:00P	WA3HLN
WPA2MTN	489	84	31	148.28/88	8:00P	KA3BGC
NWPA2MTN	709	5	31	145.13/53	1499Z	KC3NY
PFN	265	143	31	3958	5:00P	WA3THT
KPN	91	23	8	7235	1:00P	N3EMD

The Keystone Phone Net is the Sections new day time net to be on Monday thru Friday at 1:00P on 7235+ kHz if conditions allow. If conditions on 40 are not good the net will move to 3950 kHz and try to move tfc. N3EMD is Net Manager. This is a good time for those who are at home during the day. Club officers for 1986 are: WPADX ASS'N Pres. KC3MR, VP N2MA, Sec. KX2A, Treas. KJ3Q. News Ed. AD8J. Tech. K3MC. DX Info WA3CGE; GPVHF Soc. Pres. WA3QKX, VP WA3IKG, Treas, K3JZD, Sec. WA3CAS, Trus. K3JDC & K3AZP; BVARA, Pres. KA3MRG 1st VP KG3L, 2ND KC3TN, Sec. KA3BNG, Treas. WB3HWB, E-BD WB3FKE & KA3JRR, Trus. WA3ZEW; Triple "A" ARA, Pres. K3NPX, 1st VP KA3COX, 2nd VP WA3ZJE, Sec. N3EJL, Treas. K3NPW, Ch. ENG. KA3DJO, Trus. W3VRZ, News Ed. KX3H & N3EJL; Foothills ARC Pres. WA3HZM, VP N3AEP, Sec. KA3EGE, Treas. N3CNU Mem at large K3TTN. ECs are needed for the following Ctys: Potter, Indiana, Mifflin, Lawrence, Fulton, Greene, Warren, Elk, Forest, Clarion and Blair. If you can help please get in touch with WA3UFN after last years tornados and floods, we need your help. Traffic: W3EGK 310, KQ3T 290, N3EMD 174, W3OKN 123, WA3DBW 90, W3KMZ 76, WN3VAW 64, W3NGO 64, K3SMB 63, WA3UNX 61, W3RUL 45, WA3QNT 43, KC3JO 36, W3KUN 31, K3LTV 27, N3ECV 25, N3EKJ 15, KC3HR 14, W3DWL 19, N3FM 19, KA3EGE 8, KB3NV 4.

CENTRAL DIVISION

ILLINOIS: SM, David E. Lattan, WD9EBQ—SEC: W9QBH. STM: KB9X. OOC: W9TT. BM: K9ZDN, SGL: W9KPT. PIO: K9IDQ. ACC: WB9SFT. TC: N9RF. ASM: K9ORP.

NET	FREQ	TIMES (Z WIN)	QNI	QTC	SES
ILN	3690	0030/0400 DY	458	138	58
ITN	3705	0100 DY	210	27	31
ILPN	3915	1430 SN	113	5	4
NCPN	3915	1300 DY(X SN)	501	108	27
NCPN	7270	1815 DY(X SN)	347	57	26
IEN	3940	1500 SN	101	5	4
IARES	3915	2230 1+3 SN	54		2
ISN	3905	0000 DY	507	103	31
CTN	147.69/09	0300 DY	717	154	31

The early time slot for ISN which has been needed due to the propagation conditions has made it hard for N9CLB or KA9EWN to pickup end of month Makanda traffic. Special thanks to W9NXG and W9HLX who have been mailing traffic received at their locations to me. Out of town work projects have kept me from being on the net

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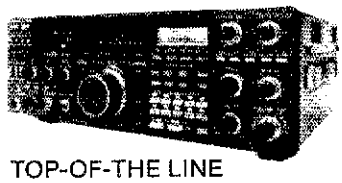

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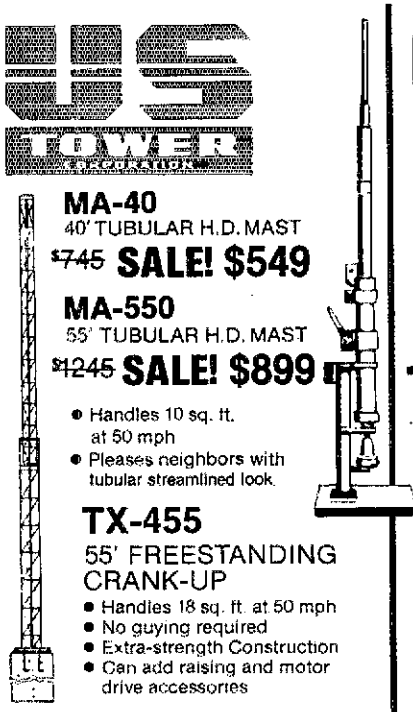

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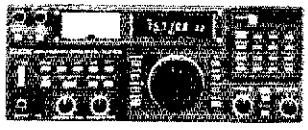

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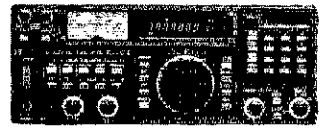

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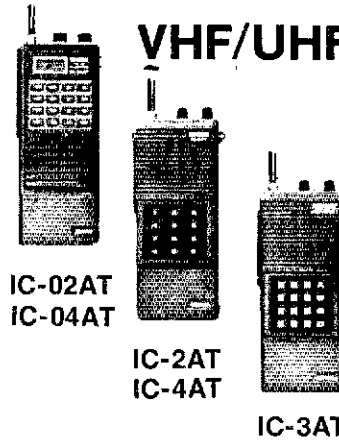

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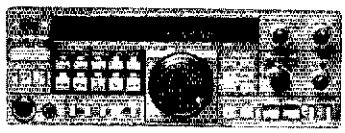

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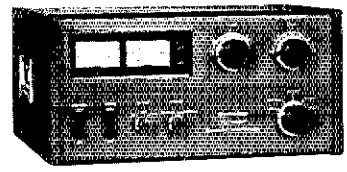

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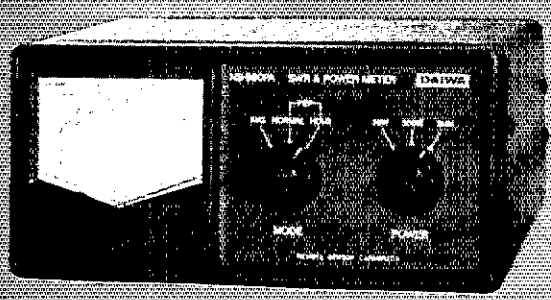

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Tolerance: ± 10% at full scale
Illuminated meter face
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Power Source: 6.5–20 VDC
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Frequency Range: 140–525 MHz
Power: 3 Ranges (Forward, 3/30/300 W)
(Reflected, 6/6/60 W)
Tolerance: ± 10% at full scale
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NS-668 SWR/Power Meter* For UHF Band
Frequency Range: 900 MHz–1.3 GHz
Power: 3 Ranges (Forward, 1.5/15/60 W)
(Reflected, 3/3/12 W)
Tolerance: ± 10% at full scale
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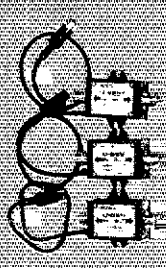
N Type Connectors
*Optional sensors adapt each meter for use on other bands.



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(Reflected, 2/10 W)
SWR Detection Sensitivity: 1.2 W Min.
Tolerance: 15% at full scale
Backlit
N Type Connectors

NS-448 SWR/Power Meter for UHF Band (Separate Sensor Type)
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Impedance	50 ohms	50 ohms	50 ohms
Power	10 W CW	20 W CW	2 W
VSWR	Less than 1.2:1	Less than 1.2:1	Less than 1.2:1
Connector	N Type	N Type	N Type

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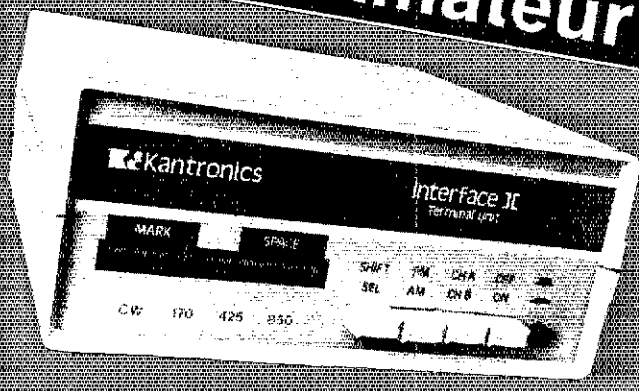

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from home, as well as, poor propagation hampering my mobile efforts. Quite often I can hear the net, but the net can't hear me. Hopefully, the months ahead will find the end of month situation somewhat back to normal. WCRA did a fantastic job under trying conditions with their HAMFEST this year, as they were forced into a much smaller than usual facility because of the fire at Arlington Park. At the ARRL forum, the nets were well represented by NC9T and WB8RFB, but were outnumbered by the EC crowd. The forum, led by EBQ and QBH, covered section progress for the last year as well a number of FCC related topics. The ARRL booth was aptly run by DD W9PRN and VD K9KM and their YLs. ACC WB9SFT was also in attendance. NA9X reports that the Madison County ARES net has changed frequency from the 146.79 repeater. W9OES presented a program at the newly revived Jacksonville Radio Club on Electromagnetic Pulse, ARES and the ATC program last month. The club is planning to have SKYWARN training from NOAA sometime in February. A common complaint about the Section Activities column has been the amount of publication lag time. HQ has changed the publication gameplan to knock a month off of the current lag on these columns. This means that I have to have the column in the mail by the evening of the 7th of each month, or there will be no Illinois column. This means that I need your reports in the mail on the 6th, or off the nets the evening of the 6th. These are not new deadlines for appointees, but there is no longer any "fudge factor" at all. If I don't have them by the 6th, they won't make QST. Traffic: KW9J 362, W9HLX 236, KA9FEZ 195, W9NXG 173, WB8RFB 166, KJ9L 107, W9HOT 94, K9BVE 86, W9LWH 64, KZ9I 39, W9EHS 34, KA9BBV 26, W9KR 22, WD9DZV 15, W9LNQ 12, K9QEW 11, K9WMP 11, W9RTD 11, W9DBO 10, WD9HOW 8, WB9TVD 6, KA9MAB 5, W9IL 5, W9KPI 5, KD9TK 4, W9VEY/M 4, WA9RUM 2.

INDIANA: SM, Bruce Woodward, W9UMH—SEC: WB9ZQE. STM: W9JUJ. ACC: K9TUS. TC: K9PS. GL: WA9VQO. OBC: KC9TA. PIO: K9DIY. RC: N9WB. OOC: KJ9G. Net Managers: ITN KD9DU, QIN KJ9J, ICN KW9D, IRN N9ASH, VHF W9PMT, IWN KA9ERC.

NET	FREQ.	TIME/DAILY UCT	QNI	QTC	QTR	Sess.
ITN	3910	1330/2130/2300	3580	251	4590	92
QIN	3656	1430/0000/0300	679	303	1747	92
ICN	3708	2315	68	19	425	19
IRN	3629	00:30	101	1	473	26
IWN	3910	1310	1485	0	359	31
IWN	VHF	Bloomington	1138	0	310	31
IWN	VHF	Kokomo	1180	0	221	31

Hoosier VHF Nets for January QNI 5385, QTC 99, Bulletins 33, QTR 3913 in 104 sessions for 16 nets. CAND 589 messages in 31 sessions. D9RN 100%. Stns. W9JUJ. 9RN Cycle 4 Report for December QNI 410, QTC 907, QTR 1363 in 62 sessions. IN 100% Stns. N9AEI, W9CSJ, W9FC, N9HZ, KJ9J, WA9QCF, W9QLW, WB9UYU, K9WWJ. Appointments: N9DFL EC for Lake County KA900H EC Johnson County, WB9JKU EC Ohio County. 00/AA N9CJT Columbus, ORS KA9MUU Greenwood. Although I have alerted the Connecticut SM to our net interference problem on 3910 and our own 00/AA coordinator KJ9G of New Castle, we are still plagued by millicious interference. I must ask "How effective is our program? Is the emphasis on local 00/AA coverage most desirable?" Congratulations to WA9UGF upon his appointment as Atlantic Phone Patch Nets Manager for Air Force MARS. Thanks to ARES in Aurora: N9BED, N9CJV, WB9ZMJ, WB9JKU, KA9CZM and hams in Huntingburg: KD9LX, N9APH, K9LMJ, KA9JML, WB9PFZ for their help with evacuations due to chemical spills. Traffic: W9JUJ 648, W9JZV 315, KJ9J 234, W9FC 157, KA9FFO 112, WA9YIF 94, KB9HH 76, WA9QCF 61, KB9NR 53, WB9UYU 53, WB9AWI 48, W9UMH 45, W9PMT 40, K9TKE 37, KW9D 36, KD9ER 38, KA9EIV 33, K9KTB 26, K9OUP 25, KW9C 24, KA9RBY 24, WD9DWD 23, N9DTG 20, KI9R 19, WB9IHR 16, W9ZGC 13, WD9HII 12, WB9OZZ 10, WA9OKK 10, W9RTH 8, KA9KRE 8, KC9XE 8, W9BTZ 7, K9PS 6, N9DYC 4, K9DIY 4, W9BUQ 4, KD9CC 3, W9XD 3, WD9GWM 3, W9KMY 2, K9SBW 2, N9DOK 2, W9BDP 1, WB9PFZ 1.

WISCONSIN: SM, Richard R. Regent, K9GDF. SEC: W9OAK. STM: K9UTQ. BM: WB9JSW. OOC: NC9G. PIO: K9ZZ. SGL: AG9V. TC: K9GDF. ACC: KA9FOZ Congratulations to Green Fox ARC for qualifying as a Special Service Club. The prestigious Milwaukee RAC has been selected to handle QSL cards for Space Mission Challenger 51-F QSOs. ATC N9EYU is TVI Chairman for MRAC and successful in finding a variety of interference. ATC WB9YSD teaching license classes and building voice synthesis frequency readout for blind operators. ATC N9EJO set up his own repeater on 145.29 in Wisconsin Rapids area. W9PH of Whitefish Bay has been licensed radio amateur for over 72 years. KD9QR is now Chief Operator KBYR/KNIK-FM in Anchorage, Alaska. Madison Swapfest, Dane County Expo Center Forum Building, April 6th. Please complete and return the survey in the March Public Service column of QST to Headquarters by April 15th. I'll be at the Fox Cities ARC meeting, Roosevelt High School in Appleton on April 21st. Sorry to report Silent Keys W9PD and WB9KYR. WB9FMU gave RFI/TVI talk to Rock River RC, is WBEV Engineer, and gives 5-minute radio show about hamming each week. ARRL affiliated clubs can receive a Club President's Workbook, loaded with tips and ideas for motivating your club members. Headquarters sends a free copy when they receive a completed annual report from your club. N9EQP is on Packet Radio. Traffic Training Assistants, amateurs with NCS or NM experience, are needed for the Superior LaCrosse, Green Bay and Madison areas; contact K9UTQ. My manuscript for the Emergency Communications chapter of the 1986 ARRL Operating Manual has been accepted.

BWN	3984	6 A.M.	WD9IID	1127-1364-27
BEN	3985	Noon	WB9ESM	
WSBN	3985	5:30 P.M.	WA9ZTY	
WNN	3723	6 P.M.	KA9OBP	128-21-21
WSSN	3645	6:30 P.M.	N9BDL	186-36-31
WIN-E	3662	7 P.M.	WB9ICH	222-94-31
WIN-L	3662	10 P.M.	KC9CJ	127-30-31
NWTN	34/94	6:30 P.M.	KA9SKU	410-53-31
WCWTN	31/91	6:00 P.M.	KA9RII	541-45-31

Traffic: WB9YPY 1321, KC9CJ 626, WD9IID 374, K9GDF 202, W9IHW 185, KA9BHL 160, KA9RII 157, W9YCV 145, N9BGE 142, K9UTQ 109, W9CBE 105, W9UCL 94, N9BDL 93, WB9ICH 89, W9DND 84, AG9G 64, N9AUG 62, N9DHT 58, W9FDY 56, W9LDO 54, KA9JJY/T 33, N9EQP 16. (Dec.) KC9CJ 998.

DAKOTA DIVISION

MINNESOTA: SM, George Frederickson, Jr., KC0T—SEC: KA0ARP. STM: KD0CI. Hello again! Amateur radio played a big role in the John Beargrease Dogsled Race from Duluth to Grand Marais, held in early January. This grueling 400+ mile race of 65 continuous hours put some 30 amateurs to the task, some who worked over 24 hours non stop at very remote spots. The N0BZZ and N0EXP rptr

system was used and covered the course completely. NØEXP, EC for Lake County, explained to me just how complete the coverage was. While checking out checkpoints in the course, they were able to access the Silver Bay rptr from the most remote point at Skyport Lodge on the Gunflint Trail with a handheld, a distance of 58 miles! We salute this fine group of amateurs who put alot of effort into this race coverage with little if any media recognition. Race officials admit that they could not do it without the help of amateur radio. Our congrats to Ed Martinson WØGYH who recently received his 160 meter DXCC certificate. He now has 6 Band DXCC. Ray Welhe, WØIH, recently received a 60 year continuous membership plaque in ARRL from ARRL VP Gar Anderson, KØGA, as well as a 60 year Gold Decal for his QCWA Golden Anniversary Award. NET NEWS: Two XYLs made their Piconet NCS debuts during January, and the competition was fierce. KAØAJF and KAØCDC competed for checkins on their hours all month. When the dust settled, KAØCDC had won. However, I'm proud of both of them. Now KAØCDC has a permanent hour on PAW, while KAØAJF manages the Mille Lacs Lake Area Rptr Net and continues faithfully as my XYL. The moral to this is, even in amateur radio, mother is always right. KAØCDC is the mother of KAØAJF. Congrats to KDØYM, Cal McNutt of Rochester as "Amateur of the Month" for January. I'm sad to report a long list of silent keys including Bill Lounsberry, WØEHI. He will be missed on our CW nets where he has been a mainstay for many years. Silent Keys from the Twin City area include Wm Lattimen, AJØD, Paul Binstock, WØDXG, A.M. Reynolds, WBØKIP, Pep Huber, W7KNO (ex WØOSR), Frank Schuna Sr., KAØQYI, Merrill Johnson, WØSLD, Ed Berglund, KØUAZ and Bill Owens, WAØYLF. All members of the St. Paul ARC or the QCWA Upper Midwest Chapter. Grover Taylor, KAØCIN, of Gilbert and Paul Dunstan, WBØOGH, of Willmar are also Silent Keys. Our deep regrets to their families and friends. In case you have not heard, Howard Mark, WØOZC, is the new Dakota Division Director. He replaces Tod Olson, KØTO, who is now an ARRL VP. Would you like to earn a certificate and do your part in the public service at the same time? Become a regular member of any of our ARRL Section Nets listed below and you can earn a net certificate. Learn about nets and traffic handling, you might be needed more than you know. You could even become a net control or liason. 73 de KDØOCI.

NET	FRE.	TIME	QNI/QTC/SESS	MGR
MSN/1	3685	6:30 P	295/72/31	KAØEPY
MSN/2	3685	10:00 P	233/44/31	NCØE
MSN/RTTY	3620	7:00 P	39/1/10	WAØLUT
MSSN	3710	6:00 P	217/28/30	KAØODQ
MSPN/N	3929	12:00 P	514/155/31	WBØWNJ
MSPN/E	3929	5:30 P	1159/120/31	WDØBGS
MNAMWXNT	3929	6:15 P	397/231/28	KAØIZA
PICONET	3925	9:00 A	4635/404/167	WDØBAC

EMERGENCY FREQ: 3929 BULLETINS: 3685 & 3929. MSO: 3620. Traffic: WBØWNJ 48, WAØTFC 284, KDØCL 242, KAØEPY 231, KDØCI 111, W9DM 92, KT9I 87, NØCLS 82, WDØHDD 63, KAØODQ 59, KAØIZA 55, WAØONE 53, KAØARP 52, WØGRW 48, NEØD 46, KCØT 40, WDØBGS 34, KTØR 32, KØOGI 25, WØHZU 20, WØKYG 18, NØJP 17, KØCVD 16, KAØAJF 14, WDØGUF 14, NIØX 13, WAØMJF 12, KAØPQW 12, KBØCD 10, KAØCDC 8, NØEWA 8, KAØBFP 7 and KDØNH 6.

NORTH DAKOTA: SM, Michael Mankey, WBØTEE—On April 5, 1986, a testing session will be held in Bismarck. To take a test, send your 610 to Central Dakota Amateur Radio Club, P.O. Box 7162, Bismarck, N.D. 58502, and don't forget the check. Don't forget that the Dakota Convention will be held in Fargo this fall and the Peace Gardens Hamfest on July 12. The question for the month is "Will we have a blizzard or a tornado?" In either event get on 3883 kHz or your local repeater. Don't forget to be retrained in SKYWARN for this season. Want to lose some weight? If you haven't been on cw for a long time, work a little cw when you have the urge to eat. It will either frustrate you so you can't or satisfy you so you don't need to. 73s Mike.

SOUTH DAKOTA: SM, Roland Cory, WØYMB—Ole Johnson NØABE, STM & Bob Olson, WAØFPR, ASST SM. Warner Muns, KAØKPY, is the new Section Emergency Coordinator for SD. Warner, being in Sioux Falls, will have direct contact with the National Wx Service & also the Red Cross. Please make your monthly reports to Warner at 204 E. 35th Street, Sioux Falls, SD 57105. If u prefer, u may give him ur reports over the air. Using a wx balloon to suspend a 160 mtr wire vert & beverage ant for receiving laying on the beach. KØSTF & WBØPWA worked 32 countries & 47 states on 160 meters from the Cayman Islands. Even had time to go scuba diving. Traffic: KØERM 75, WAØUEN 71, WAØVRE 59, KØZBJ 52, WBØOMF 30, KAØKPY 13, WØYMB 12, NØABE 10, NØCTK 4, WAØCTK 4, WAØFPR 3, KDØYL 2.

DELTA DIVISION

ARKANSAS: SM, Joel Harrison, WB5IGF—ASM: K5UR. ACC: NI5D. SEC: N5BPU. STM: W9OK. TC: W5FD. BM: W5HYW. SGL: W5LCI. Repeater Coordinator: WB5FDP. 1986 Officers of the Arkansas River Valley Amateur Radio Foundation are: Pres. KA5ITI, VP W5RZ, Sec/Treas WB5BHS. Happy 75th birthday to W5TR, KD5IC and K5TCK are available to Central Ark. are clubs to present programs on Packet Radio. The KC5JH PBBS is now on 145.01 MHz. The Arkansas Hamfest and ARRL State Convention will be April 12 and 13 at the North Little Rock Community Center. Contact W5RXU for additional info. W5KL planted a tree in the Silent Key Forest in Israel in memory of former Delta Division Director Max Arnold, W4WHN. Leland has also been busy as the National Pres. of the QCWA. I was very honored to present the Faulkner County ARC their ARRL Affiliate Club charter in February. Congratulations to them. Traffic: W9OK 119, W5UAU 30, W5RIT 19, W5KL 5, WB5IGF 4, AC5W 4, WB5FDP 2, W5ODF 1.

LOUISIANA: SM, John "Wondy" Wondergem, K5KR—For several years the La. Emergency Net met on 3910 kHz at 8 PM Mondays. Lately the net has not met due to many problems but mainly poor 80 meter coverage and a resulting loss of interest. We need an emergency net that meets regularly to avoid the many problems that occur trying to gear up after an emergency occurs. We provide timely assistance immediately. With almost everyone having 2 meter equipment and the many repeaters covering the entire state we could obtain reliable voice/RTTY/packet communications by linking repeaters for the emergency net and emergency situations. The state of the art is with us now. On a weekly basis the Baton Rouge KD5SL is being linked with the Slidell W5VAS repeater. Additional repeaters will be linked in the next few months. Now what is needed is some leadership and action. Hopefully this will be spearheaded by the Baton Rouge Radio Amateur Service Club, a public service oriented club; located at the state capitol; with the know

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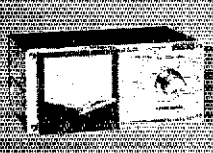

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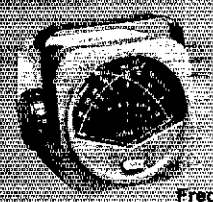

	CN-520	CN-540	CN-550
Frequency Range:	1.8-60 MHz	50-150 MHz	144-250 MHz
Power Range:	200/2000 W	20/200 W	20/200 W

	CN-410M	CN-460M	CN-465M
Frequency Range:	3.5-150MHz	140-450 MHz	140-450 MHz
Power Range: Forward	15 W/150 W	15 W/150 W	15 W/75 W
Reflected	5 W/50 W	5 W/50 W	5 W/25 W

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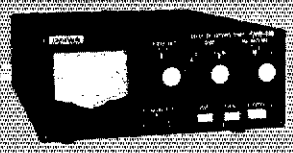

Frequency Range:	CNW-518	CNW-419	CL-680 (no metering)	CNW-919
	3.5-30 MHz (8 bands)	1.8-30 MHz (17 bands)	1.8-30 MHz (17 bands)	140-150 MHz
Power Rating:	1 KW CW (50% duty)	200 W CW (3.5-30 MHz) 100W CW (1.8-3.4 MHz)	200W CW (3.5-30 MHz) 100W CW (1.8-3.4 MHz)	200W CW 10-250ohm
Output Impedance:	10-250/25-100 ohm (On 3.5 MHz)	10-250 ohm	10-250 ohm	

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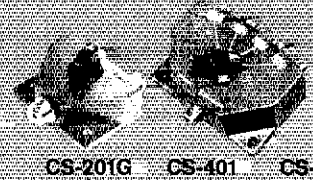

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Insertion Loss:	Less than 0.2 dB				

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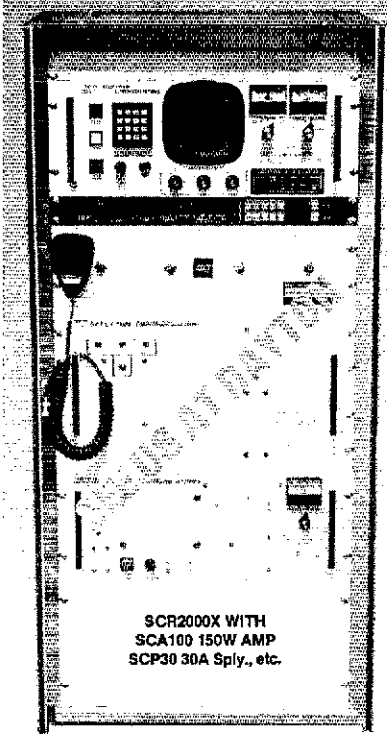

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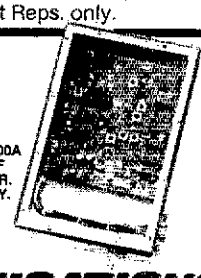

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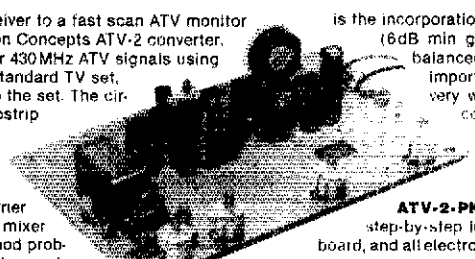

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how and expertise to make it work. Congrats to KA5VWZ & KA5VUR from Leesville for upgrading to Tech. Traffic: DRN5 62 Sessions; La 98% by WA5LHL, WA5LHW, WA5V, WA5QHP, K5WOD, WA5WBZ, WB5NCM, WA5DEV, N5HJE and KA5POL.

MISSISSIPPI: SM, Paul Kemp, KW5T—ASM: K5QNE. SEC: K4HKD. SGL: AL7GQ. ACC: KC5VD. STM: KB5W. OOC: W5VMC. VHF Coord: N5DWU. PIO: KA5VBE. BM: AJ0X. TC: WB5SXK. LAST CHANCE to make plans for Jackson Hamfest April 19-20! Regret to announce W5HLJ is Silent Key. Condolences to WD5IMP on loss of his XYL. New appointments: K4HKD as SEC, replacing AL7GQ, who is appointed SGL. Many thanks to Geno for fine job as SEC. Also KD5SW, PIA. WA5RKR new Secy-Treas for Hattiesburg ARC, replacing WB5ZET, who has moved from area. W5YRX new MSN manager. We still need ATC help; if you're interested in a particular technical area, notify WB5SXK. MTN and MSN still needing support. WD5IKD back on the club circuit, this time with satellite communications program at Hattiesburg ARC. Don't forget ARRL Info Net, Monday nights at 7:15. Also, keep the ASM or PIO informed of your activities; unless you toot your own horn, no one will know of your accomplishments. CAND(W5KLV) Sessions 31 QTC 588. DRN5(WB5YDD) Sessions 31 QTC 568. MSBN(W5HKW) Sessions 31 QNI 2382 QTC 51. MTN(K5OAF) Sessions 31 QNI 137 QTC 44. MSN(N5AMK) Sessions 31 QNI 77 QTC 9. MMN(KF5GK) Sessions 29 QNI 530 QTC 6. MLEN(WD5O) Sessions 4 QNI 106 QTC 0. HAEN(KA5ROA) Sessions 4 QNI 55 QTC 0. Traffic: KB5W 341, N5AMK 327, K5OAF 184, KT5Z 65, W5WZ 42.

TENNESSEE: SM, John C. Brown, NO4Q—ASM/ACC: WA4GLS. OO/AA: W9FZW. PIO: N7EJI. SEC: WA4GZQ. SGL: WA4GZZ. STM: NG4J. TC: W4HHK. The new hamfest swaptest season is now in full swing, and it is noted that a few new locations are on the calendar for this year. One is Clarksville for April 13. This is day after the Oak Ridge hamfest at Clinton. Two swaptest have already passed. It is requested that all Clubs or Associations pass along the date of your activity to your Section Manager so he can add it to his calendar and add it to this column. Its schedule might not be noted in other locations of publication. Would like to remind everyone to check the various changes to the amateur frequencies above 1200 MHz and in the GHz portion of the band. Also there are some changes relative to automatic control for digital operations. The prohibition of those persons who have had ticket revoked from taking part in any amateur radio operation to include third parties. Take heed or you might jeopardize your ticket. This information became available in January but think it is worth repeating just in case you missed it. The CW net honor roll only had one call this time, NG4J. Congrats gal. The message traffic count is down somewhat but that is expected for this time of year. All stations are urged to make a report to the Section Manager so that it may appear in this report. The Section traffic activity for this time is as follows: LF Sessions 93, QNI 3172, QTC 309; VHF Sessions 70 , QNI 2028, QTC 489; CW Sessions 47, QNI 225, QTC 161. Station activity for this period is as follows: W9FZW 228 (BPL), WA4FMR 117, K4WWQ 79, W4DDK 65, W4TYV 29, NN4S 22, W4PFP 19, W4PSN 9, KA5KDB 5, WA4RMP 3, N4KQX 3 and KB4UO 3. Looks like we missed some of you doesn't it? Hope to see your call next time. Be sure to include the Homecoming '86 whenever you can in your amateur communications.

GREAT LAKES DIVISION

KENTUCKY: SM, Dale Bennet, WA4JTE—My apologies to all for there being no Section News for January. With Christmas crush and traffic on D9RN, I missed the deadline by one day. Kentucky Traffic Net has been moved to 5:30 PM CST. This is a temporary move to get better propagation. Spring is around the corner. Is your repeater group ready for bad weather? Traffic (Dec/Jan) WA4JTE 895, WD4IYI 141/61, KA4SAA 110/31, WB4ZDU 107/85, W4WQV 60/50, WA4AVV 60/6, KI4QH 54/26, WA4SWF 32/31, KA4MTX 23/28, K4VHF 23/13, KA4BCM 22/19, WA4NOG 11/5, KA4GBZ 11/7, WD4CQF 10/9, K4HOE 6/23, KB4OZ /60.

MICHIGAN: SM, James R. Seeley, WB8MTD—There have been problems recently in certain segments of the MI amateur community which I feel stem, at least in part, from a lack of understanding of what should be expected from volunteer workers. That which follows is editorial in nature, with no fingers pointed at any individual or group; simply one of those "If the shoe fits . . ." kinds of things. It is well known that the League's functions are carried on primarily by the efforts of the unpaid and often unthanked volunteer leaders and workers within the membership. Ultimately, the only real "reward" for these people is an inward feeling of personal satifaction, be it from the knowledge of worthwhile contribution to public service, furtherance of some key aspect of the hobby, enjoyment of the smooth and effective running of an ARES group or a traffic net, etc. For many, it is the idea of giving a part of themselves in the sense of putting something back into a hobby from which they have taken much pleasure. My philosophy in dealing with volunteers (and I am one myself, after all) always has been to make no demands, to allow the people on my staff to go about their jobs in their own ways and to be satisfied as long as acdeptable results are achieved and the goals of the organization are reasonably well met. If I make any "demand" at all it is to urge those who work with me in leadership to approach their jobs with the same kind of philosphy. This is reasonable, and it works. No, I'm not so naive as to expect that there be no conflicts, no jealousies cropping up now and then, no hurt feelings. Radio amateurs are people, after all. But if we all could reflect occasionally on the idea that—and it can't be pointed out too often—this is a hobby we're involved with, that we participate for, as much as anything, enjoyment, then the course might be smoother. As I said, "If the shoe fits . . ." Traffic: KA8CPS 461, AF8V 298, NJ8S 220, W8QHB 212, KA8VOZ 122, WD8KQC 102, WD8RHU 92, NJ8R 83, WA8DHB 79, WD8OUO 65, K8GXV 64, W8SCW 47, WD8PAF 43, K6HAP 40, K8OCP 39, WB8YDZ 38, W8EOI 36, WD8EIB 35, W8RNQ 33, WD8MJB 32, N8CNY WB8SIW 21, W8YIQ 20, WB8SYA 19, W8IHX 18, W8URM 17, W8CUP W8VIZ 11, KI8Q 9, WA8MVH 6, WA8PIM 5, WB8HSN 1.

OHIO: SM, Jeffrey A. Maass, K8ND—

NET	QNI	QTC	Sess	Time(Local)	Freq.	Mgr
BNE(E)	265	138	31	1845	3.577	W8JMD
BN(L)	184	69	30	2200	3.577	W8BO
BNR	284	76	31	1800	3.605	W8EK
BSSN	514	287	62	0945,1830	3.885	K8OZ
ONN	126	27	26	1830	3.708	WD8KBW
OSN	304	97	31	1810	3.577	N8AEH
OSSBN	1984	553	93	1030,1615, 1845	3.9725	WB8MZZ

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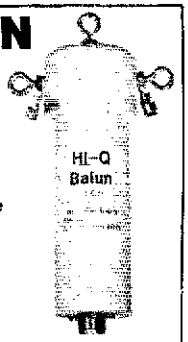

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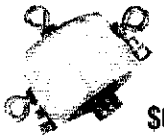

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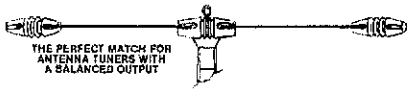

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D-20	20	33'	27.95
D-15	15	22'	26.95
D-10	10	16'	26.95
Shortened dipoles			
SD-80	80/75	90'	35.95
SD-40	40	45'	33.95
Parallel dipoles			
PD-8010	80,40,20,10/15	130'	43.95
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PD-8040	80,40/15	130'	39.95
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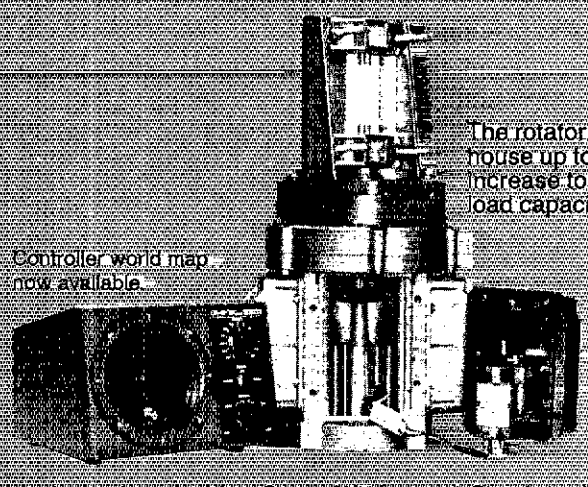

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Specifications

■ Rotator Unit

		MR-750E/PE	MR-300E
Rotation time	**60 Hz**	58 seconds (60 Hz input)	33 seconds (60 Hz input)
	50 Hz	70 seconds (50 Hz input)	39 seconds (50 Hz input)
Output torque Brake power	**1 motor**	610 lbs/inch 5,200 lbs/inch	220 lbs/inch 1,700 lbs/inch
	2 motor	1,200 lbs/inch 9,600 lbs/inch	440 lbs/inch 3,500 lbs/inch
	3 motor	1,800 lbs/inch 13,900 lbs/inch	650 lbs/inch 5,200 lbs/inch
	4 motor	2,400 lbs/inch 18,300 lbs/inch	870 lbs/inch 7,000 lbs/inch
Rotation angle		375 degrees	
Permissible mast size		1½ ~ 2½ inch (38 ~ 63 mm) < diameter >	
Control cable		6-wire cable 0.5sq—1.25sq (AWG16/18/20 etc.)	
Continuous running		5 minutes Max. permissible	
Dimensions		15.6" H x 8.43" W x 8.43" D (397 mm x 214 mm x 214 mm)	
Unit weight		16.5 lbs (7.5 kg) < with 1 motor unit fitted >	

■ Controller Unit

	CR-4 (for MR-750E/MR-300E)	CR-4P (for MR-750PE)
Power source	117 V AC (50/60 Hz)	
Power consumption	200 W (with 4 drive motors)	
Motor running voltage	24 V AC	
Dimensions	4.9" H x 7.1" W x 6.9" D (125 mm x 180 mm x 175 mm)	
Weight	9 lbs (4 kg)	
Operation	Manual	Manual/Pre-set

Wind Load	MR-750E/PE	MR-300E
1 Unit	16.1 Sq.Ft.	8.32 Sq.Ft.
2 Units	32.3 Sq.Ft.	17.84 Sq.Ft.
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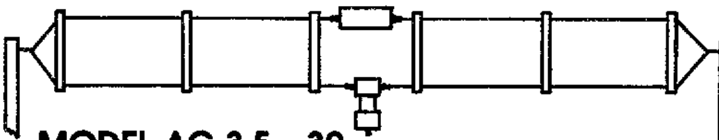

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Hamfests for April: The Dayton Hamvention, April 25-27, 'nuf said! The Ohio Area Repeater Council will meet at 9:30 AM on Saturday, April 12 at Red Cross in Columbus, 995 W. Broad St. Talk-in available on 146.97 and 147.24. Everyone is welcome to attend: repeater owners and operators are encouraged to attend! As Spring begins to arrive, we are entering the severe weather season. The National Weather Service has declared the week of April 6-12 as Tornado Awareness Week, and will be offering special programs in many parts of the section. On Wednesday April 9 at 10:10 AM, there will be a statewide tornado drill: check into your local SKYWARN or Weather Watch net and show your support for this vital program. On March 29 in the Cleveland area, channel 3 will be broadcasting a locally-produced program about the NWS severe weather activities, and featuring Amateur Radio prominently. Great Lakes Division Director George Wilson, W4OYI, and I attended the Dayton Amateur Radio Association (DARA) ARRL Night, and were greeted by an audience of active, involved amateurs: a very pleasant evening! During our visit, DARA was presented with their ARRL Special Service Club (SSC) certificate, making them only the seventh club in Ohio qualifying for this honor. DARA is offering two $1000 scholarships available to any FCC licensed amateur graduating high school in 1986. For details, write DARA, Box 44, Dayton, OH 45401, Attn: Scholarship Committee. Clubs form the backbone of Amateur Radio! Speaking of clubs, Ohio's new Affiliated Club Coordinator is Joanne Solak, KJ3O/8, of Mantua Ohio. Contact her for information on affiliating your club or applying for Special Service Club status. The Ohio Section needs you to volunteer to serve your fellow Amateurs! Ohio particularly needs Public Information Assistant (PIA) appointees to serve public relation/public information needs in their local areas; Official Bulletin Station (OBS) appointees to keep their fellow Amateurs informed on current events; Official Observer appointees to work in the new Amateur Auxiliary to the FCC Field Operations Bureau and to help keep Amateur Radio's reputation as a self-garding Service intact; and Assistant Technical Coordinator(ATC) appointee to share their knowledge and skills with those needing assistance. For information on ARRL Field Organization appointments, refer to your ARRL Operating Manual, write to me or to the appropriate leadership official (listed last month), or see me at the ARRL booth at a hamfest. Ohio needs you! New appointees: WB8QJW EC Shelby Cty; WB8RWP EC Coshocton Cty; WB8DMF NM Tuscarawas Cty Traffic Net; KC8UZ NM Knox Cty Emergency Net; WD8ATN ORS; WD8LKI PIA. N8AKS has resigned as Net Manager of the Buckeye Single Side Band Net, and K8OZ had been named as new NM: congratulations to all! For those of you passing through the Columbus area, I often monitor 147.09 (K1LT/R) during the day. Give me a call! See you all at Dayton! Traffic: W8BO 390, W8PMJ 302, K8OZ 238, WB9DMF 205, KD8KY 200, W8SKP 195, WD8KFN 176, K8JDI 147, W8JMD 147, NJ8P 147, W8QZK 141, K8TVG 115, K8ND 113, WD8RAO 108, KD8KU 102, W8ZOL 102, WD8MIO 96, WB8JGW 93, KA8GJV 90, WA8HED 90, W8EK 86, N8AKS 79, KA8KHS 76, KF8J 75, WB8HHZ 74, KA8CGF 68, KC8UZ 67, K8CMR 65, N8HAZ 59, NC8Q 56, N8AEH 53, K8LQM 52, NE8X 52, K3RC 51, NM8I 47, NF8B 45, WD8RIB 43, N8EFB 42, KD8IC 42, KV8Q 42, WA8SSI 40, KD8XL 38, WA8DYS 36, N8FPH 36, WD8MPV 36, K8EF 35, WB8MEK 35, W8WEG 35, KE8BE 33, N8FAZ 33, KA8TNT 32, W8IQ 31, KD8FW 30, W8FPA 27, WD8JAW 27, N8FWA 26, WD8CSP 25, WB8BWY 23, WD8JYE 22, WB8KWD 22, KA8UYM 22, NK8B 20, WB9KWC 19, KA8OQF 17, KA8TXJ 17, WD8CKK 16, K8DXZ 16, N8FNP 16, WB8HMI 16, W8BHL 16, KC8UR 15, NK8C 15, N8GOB 14, KA8THO 14, W8ZM 14, N8NJU 12, K8CKY 12, N8FBE 12, KA8ICB 12, K8NJQ 12, W8RG 12, W9SWM 12, N8EEK 11, KC8JV 11, KC8WH 11, N8CJS 9, NQ8K 9, KD8WH 9, WB8YFD 9, N8CW 7, W8LZE 7, KA8DRR 7, WB8NHV 7, KJ3O 7, N8GIY 6, KA8RBQ 6, K8VOY 6, KD8WI 6, W8FUP 5, N8GST 4, W8HVK 4, WB8TRK 4, KA8UPR 4, WD8EKI 3, WD8IKC 3, KA8RIX 3, KC8YV 3, WB8MRL 2, KA8MFG 1, KA8MFH 1, WD8NED 1. (Dec.) K8OZ 812, W8PMJ 419, NM8I 73.

HUDSON DIVISION

EASTERN NEW YORK: SM, Paul S. Vydareny, WB2VUK—ASM: K2ZM. STM: WB2MC0. SEC: AK2E. ACC & TC: N2BFG. BM: WB2EAG. SGL: KB2HQ. TC: KC2Z0. ATC: WA2VGM. NET LISTINGS (QNI/QTC): AESN 63/2 AETN 22/21 CDN 609/79 ESS 407/50 HVN 178/50 NYPON 679/314 NYSE 408/ 185 NYSL 281/86 NYSM 368/155 SDN 290/96. DEC Net CDN 579/104. CLUB NEWS: AARA planning Albany on the Air for Albany Tricentennial. New members WB2QGU KA2EXB Silent Key WA2DTE. N2AIG will talk on High Technology in Ham Radio. CCNR will have program on Field Day. Rip Van Winkle ARC is getting ready to put on demonstration at Home Show at Col/Grn. Community College. SARA learned about the beginning of commercial 2- way radio from W2GHK of E.F. Johnson. Saratoga RACES had film on SKYWARN. WARA saw slides and heard talk by W2KFB on his trip to Japan to visit a major manufacturer of magnetic tapes and disks. WECA had program on SAREX-shuttle equipment. They are having hamfest on 16 March. Now is the time to start thinking about Field Day arrangements. If your ARRL membership is due up for renewal, renew it thru your local club. If you are not a League member yet, join up now thru your local radio club! All clubs should be thinking about going around to local schools and recruiting young people to enroll in amateur radio courses. Now is the time to do "Ham Radio on the Road" demonstrations. Please get your monthly traffic/public service activity totals to WB2MCO no later than the 4th of the month! I now monitor 145.05 on packet WB2ZII-1. JAN PSHR: KA2MYJ WA2JB0 WB2VUK WB2MCO KC2TF AK2E N2EQM WA2BYM. Traffic: KC2TF 160, KA2MYJ 127, WB2VUK 122, WB2MC0 77, WA2JB0 61, AK2E 45, WA2YBM 17, N2EQM 12, K2ZM 11.

NEW YORK CITY-LONG ISLAND: SM, John H. Smale, K2IZ—ASM/ACC: WB2IAP. ASM/VE: W2NL. SEC: KA2RGI. OOC: NB2T. TCC/RFI: W2JUP. STM: WA2ARC. PIO: W2IYX. The following are traffic nets in and around the section:

*NLI	3630 kHz	1900/2200	WB2EUF mgr
NCVHF	6.745 rpt.	1930 M-F	K2MT mgr
BAVHF	6.67 rpt	2000 M-F	K2YQK mgr
SCVHF	5.37 rpt	2030 M-F	W2GZD mgr
ESS	3590	1800	W2WSS mgr
NYS/M	3677	1900/2200	WB2EAG mgr

*Denotes section net, all times are local, please try and help out by checking in whenever possible. LIMARC will continue to sponsor examination sessions on the second Saturday of the month at N.Y. Inst. of Technology, Rt. 25A, Old Westbury, in Salten Hall, Rm. 2, applicants are reminded to bring 2 forms of I.D., original and a copy of

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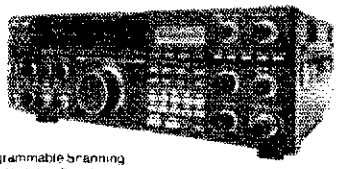

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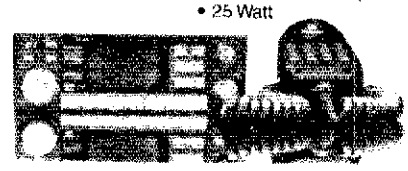

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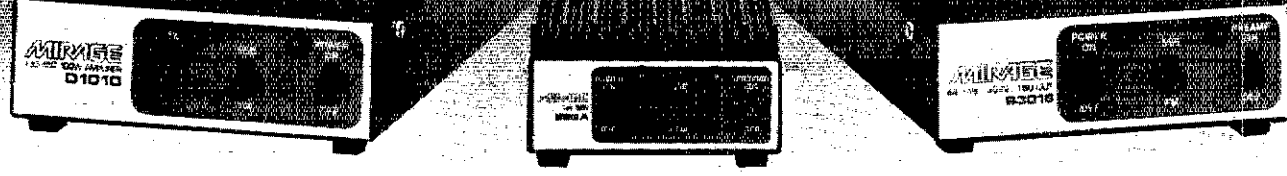

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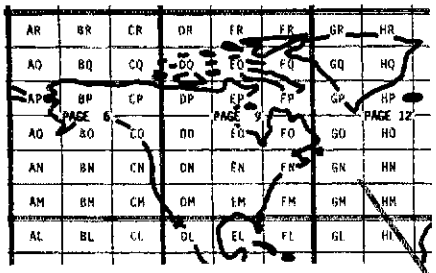

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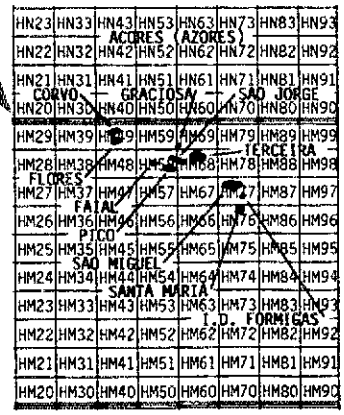

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your F.C.C. license, check for $4.50 made payable to ARRL/VEC, 2 pens/pencils and a calculator for the math questions, for further info contact Woody Gerstner WB2IAP, 42 Mohawk Avenue, East Atlantic Beach, N.Y. 11561. Any problem with antenna zoning in your town? Contact Vice Director Steve Mendelsohn WA2DHF for lots of info. KA2RGI, SEC for this section, reports that the Suffolk County ARES/RACES net will be meeting on 144.730/145.330 Monday at 2100 local also, please note that ARES ID cards expired at the beginning of the year, all active participants of ARES should renew their membership in ARES for 1986. LIMARCs outdoor Hamfairs will be held on May 18th and September 21st, location will be put in this column as soon as I get it. Congratulations to K2LJH on upgrade to Extra. Officers for SIARA: NA2V Pres., K2AIQ V.P., WA2ZBE Treas. Officers for Suffolk County ARC: KA2JMA Pres., KA2LAD V.P., N2ETG Treas., W2GZD Corr. Sec., WB2TYN Rec. Sec. Hall of Science presented the Paul Mazer award for outstanding service to Ham Radio to WB2WWE. Note that the POLI Sec., is KA2EYW and the correct address is 3 Jet Lane, Holbrook, 11741. Officers for Radio Central: KA2MUM, Pres., WA2MHZ V.P., K2VYD Rec. Sec., KB2XL Corr. Sec., N2FXG Treas. Officers for Great South Bay ARC: KA2RGI Pres., K2EAX V.P., WA2UJI Sec., WA2AWE Treas. Traffic: K2YQK 161, K2GCE 111, W2GKZ 12.

NORTHERN NEW JERSEY: SM, Robert R. Anderson K2BJG—ASM: (VE liaison): N2XJ. SEC: KB2ZM. STM: KA2HNQ. OO/AAC: N2WM. ACC: K2BJG. PIO: WB2NQV. SGL: W2KB. TC: K2BLA. BM: N2CXX. January 1986 appointments are: AG2R replaced W2VY as NM of NJN, N2DXP EC (City of Passiac), K2UFM OO, OESs N2DXP and KA2SPH, and ORS KA2SPH. KX20, DEC (Sussex) is conducting a membership drive for ECs and OESs. W2NKD, DEC (Union) held an administrative and communications meeting. W2UH EC (Chatham) has published a revised emergency plan. All of these efforts are promoting common membership in both ARES and RACES. SGL, W2KB has provided information and guidance with respect to amateur radio in relation to municipal zoning considerations to several NNJ municipal governments. He has also provided helpful information to several NJ amateurs concerning restrictive covenants. Antenna zoning problems affect all of us. Our Division Vice Director WA2DHF is working closely with our NNJ SGL and has been working directly with many NNJ town councils providing an educational view of antenna law (PRB-1) and Amateur Radio in general. Club program chairman are invited to contact WA2DHF for his presentation on this subject. TC, K2BLA, has designed an active low pass filter intended for repeaters containing a voice synthesizer. This effort was in connection with solving 15 kHz adjacent channel RFI between two NNJ repeaters. K2BLA is active providing technical talks at club meetings. Club program chairman are invited to contact him. BM, N2CXX is compiling a schedule of bulletin transmissions from NNJ OBSs. When complete, it will become a bulletin. Congratulations to: The Tri-County Radio Asso for 51 years of affiliation with ARRL 4/13/86. Affiliated clubs please note: Your 1986 annual club report should now be completed and returned to Hq. If you have not received the form (FSD-2 1/86), have questions, or need assistance, please contact our ACC. Congratulations to the following who were newly licensed or upgraded during January sessions of the Bersen Amateur Radio Asso (Fairlawn), and the NNJ VE Board (Crandford). Novice: R. Galbait, A. Dodd, A. Bulley, and J. Wallace. Technician: KA2FPN, KA2TXQ, KA2ZOU, KA2WKZ, KA2WLC and T. Okimatsa. General: N2FDL, KA2ZKD, KA2ZKT and R. Heimmel. Advanced: N2BIL, N2FPC, WA2DDO, KA2OOG, KA2UPB, and W2BIK. Extra: WD2HAZ, KD2OG, KA2YHI, and WB2OSC, 1/86 Data:

NET	FREQ.	TIME	SESS	QNI	QSP
NJM	3695	1000 DY	31	226	95
NJPN	3950	1800 DY	31	335	80
NJN/E	3695	1900 DY	31	233	116
NJN/L	3695	2200 DY	26	84	20
NJVN	49/49	2230 DY	31	237	83
OBTTN	147.51	2000 DY	31	334	95
NJRTTY	147.51	AUTOSTART			
NJPTN	145.01	WA2SNA-1	PBBS		

Uplink Amateur Radio News call 201-735-8550.

MIDWEST DIVISION

IOWA: SM, Rollin J. Sievers, WBØAVW—SEC: KDØBG. BM: KØIR. ACC: WBØQAM. PIO: NØEBA. OCC: KDØRT. TC: KØDAS. SGL: AKØQ. Due to QST requesting their information ten days earlier, the news and traffic will be considerably short this month. Eric Awkerman (KCØXL) is our new STM, we welcome him and I know he will be a great addition to the ARRL team. We need more ECs in the N.E. part of the state, let's get involved. Our weather has been extremely radical and emergency communications may be needed at any time. Tentative dates for the Des Moines Hamfest are July 19 and 20th, more later. WA6JCF is the new OBS for the Atlantic area. Congratulations to KAØUUB and NØGSR by up grading. New VEs for Northwest Iowa are WØCON and WAØUZI. Congratulations to the Siouxland Amateur Radio Club in becoming an ARRL Special Service Club. At the time of this writing, KCØXL (Eric) is being considered to be the new STM; his qualifications are very favorable.

NET	FREQ.	UTC	DAY	QNI	OTC	MGR
TLCN	3560	0030-0400	DY	252	128	WØYLS
75M	Noon	3970-1830	M-Sa	649	45	WBØJFF
75m	eve	3970-2330	DY	590	42	NØAEF

No reports from the ITEN and the ICN nets. Maybe due to the earlier reports needed. Traffic: WØSS 189, KAØADF 106, WAØAUX 104, KØGP 74, WØYLS 49, WDØFWB 35, W4JL 33, WØBW 32, WBØAVW 30, NØCKD 24, WBØJFF 19, KAØGSA 12, KØBRE 7.

KANSAS: SM, Robert M. Summers, KØBXF—SEC: NØBLD. STM: WØOYH. Net Manager KSBN/KPN, WØFRC. Net Mgr QKS, WBØZEN. Ks RTTY Mgr, KAØCUF. District Emergency Co-Ordinators are WØOAG, WDØCPZ and WØEB. Gov't Liaison is NØBLD. Tech. Coord. is WBØNQM. Bulletin Mgr, KØJDD. ACC, KØBXF and Manager of QKS-SS is WØMYM. Packet Radio is coordinated for KS RTTY MGR KØCUF. Club bulletin editors deserve a little acknowledgement from time to time, so now is the time. MIDWEST CHIRPS, Jayhawk ARS, WØEUY, GROUNDED GRID, Wichita ARC, N7PM. FEEDBACK, Jo. Co. NØFOT. HAM STRING REVIEW, Douglas Co. ARC, KAØTXJ. QRZ, Pilot Knob ARC, Leav. Co., WDØDOT. MINE CREEK AMATEUR RADIO CLUB, Mound City, KAØUUY. SHARC, is the newsletter of Sand Hills ARC, Garden City, KØFQH. THE BEAR FACTS, Boeing ARC, Wichita, WAØTAH. QSP is the newsletter of the CKARC, Salina, editor unknown at this Printing, however, officers for 1986 are KAØQNG, Pres.: KBØEY, VPres.: KAØNOO Sec/Tr Activities Chm WAØYML. That's the list of bulletins received this Past month. Have I missed your club? Could be your SM is not on the mailing list of your club. Sometimes, even though

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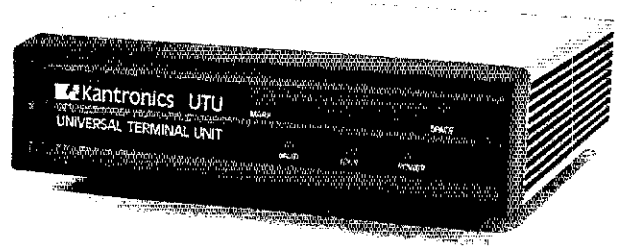

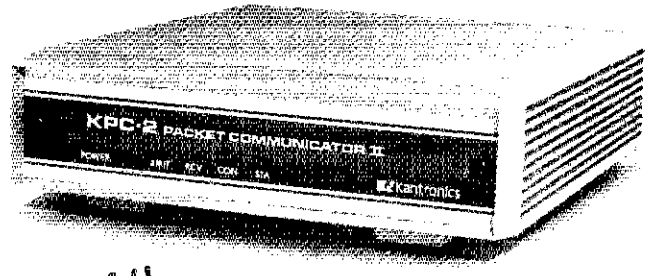

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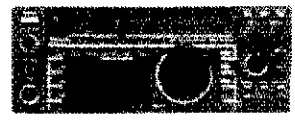

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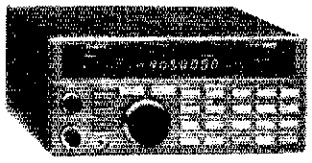

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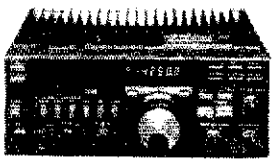

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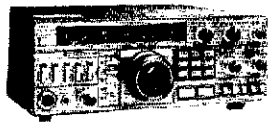

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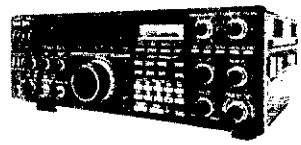

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PB-21H	500 MAH NiCd Pack for TH-21/41	29.95
BT-2	Battery Case for TH-21/41	7.95
SC-8T	Soft Case for TH-21AT/41AT	9.95
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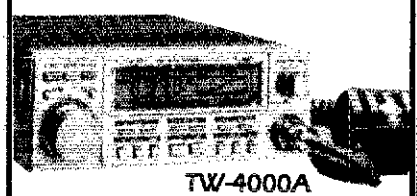

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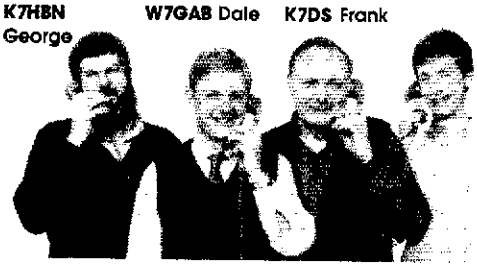

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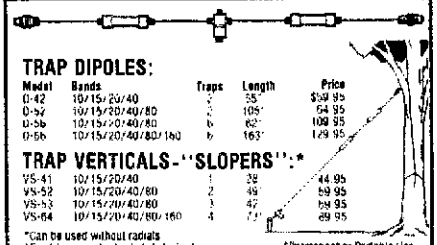

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Model	Bands	Traps	Length	Price
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D-52	10/15/20/40/80	2	105'	84.95
D-53	10/15/20/40/80	3	62'	109.95
D-56	10/15/20/40/80/160	6	163'	129.95

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VS-52	10/15/20/40/80	2	49'	59.95
VS-53	10/15/20/40/80	3	47'	59.95
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*Feed line can be buried if desired
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Model	Band	Length	Price
D-15	15	27'	18.95
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D-80	80/75	130'	25.95
D-160	160	260'	34.95

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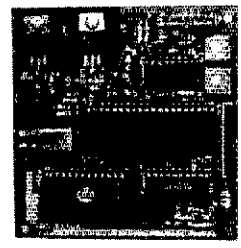

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late—old news does make good readin'!!

MISSOURI: SM, Ben Smith, KØPCK—In the February column of Missouri Section News, WØPXW was listed as a Silent Key. It should have been WØCAS. Elmo, WØPXW, tells me that he hasn't been too active on the air, but still going strong otherwise. My apologies for the mistake. WANTED! A club to take over the management and operation of Amateur Radio Booth at the Missouri State Fair August 1986. At the present time, we still have the same booth we have had for several years with the tower and antennas in place and ready to go. To keep this booth the State Fair Officials must be notified by the middle of March. The Ham Booth at the State Fair has been good PR for amateur radio in Missouri for several years, so I hope a club will come forward to take charge for 86. For more information, contact WØENW or KØPCK. Field appointments made in January: NØATH 00 and NEOA ATC. Any Novices in West Central Missouri needing advice on antenna work or other station problems contact NEØA. Congratulations to WBØVRD being named the Missouri Valley ARC Amateur of the Year. The following clubs have reported their officers for 1986: St. Charles ARC, Pres. NFØQ, VP, WDØCZE, Sec. KDØEN, Treas. KBØJ, Directors, WAØCKO, KDØIH, KOØZ and NØGL; CMRA: Pres, KØSI, VP, KA9HJF, Rec-Sec, KA1RLO, Cors-Sec KT5Y and Treas. NØFPI; Southwest Missouri ARC: Pres. WAØIIK, VP, KBØE, Sec. WBØTVY, Tres. KDØUD and Director WØZZQ and PHD Officers for 86 Pres. KØTLM, VP, WAØSOK, Sec. WBØCJB, Tres. WAØKUH. Silent Key reported to me WØRVA.

NETS REPORTING:

NET	Ses	QNI	QTC	Day	Time	Freq	Mgr
MON	62	323	154	Dly	7:00/9:45	3.585	KØSI
MEOW	31	611	67	Dly	5:30	3.983	KØDSQ
MOSSB	31	704	61	Dly	6:00	3.983	KT5Y
HBN	23	350	20	Mon-Fri	12:05	3.880	KØDSQ
PHD	4	129	11	Mon	9:00	146.43	WAØKUH
RRABN	29	423	3	Dly	8:00	146.39/79	KAØLLN
ZAEN	4	63	3	Tue	8:00	147.84/.24	NOØE
LARES	4	32	2	Wed	8:00	146.10/.70	WBØRHC
MOFON	5	31	2	Wed	8:15	222.42/4.02	AIØO
LOZFM	5	123	0	Sun	9:00	146.13/.73	WØRTL
TCN	5	74	0	Thur	9:00	147.09/.69	KAØLO
CMEN	4	64	0	Wed	9:00	146.16/.76	KØPCK
SARN	4	46	0	Thur	9:00	146.43/7.03	WØENW
JCCCN	5	40	0	Wed	8:00	146.40/7.00	WBØDZX
LOZCW	5	21	1	Sat	9:00	3.707	WØRTL

Traffic: WØBMA 278, KØSI 157, AIØO 98, KT5Y 80, NDØN 66, KØPCK 57, WØOUD 36, NØBKE 28, KØORB 27, KØDSQ 24, WAØYJX 23, WBØCJB 19, NIØR 17, K90CU 3.

NEBRASKA: SM, Vern Wirka, WBØGQM. STM: Jerry Kohn, WDØEGK. Please make note of a new address and phone number of the Nebraska Section Manager: Vern Wirka, WBØGQM 3106 Vinton Street, Omaha, Nebraska 68105 phone number 402-341-4572. Leroy Collinson, KAØELI, Custer County ARES members were activitated to participate in the search for an overdue medical helicopter on December 20, 1985. KAØELI says he received word from Buffalo County Emergency Coordinator at 2200 that a helicopter from the Kearney Good Samaritan Hospital was over due on a medical emergency run to Ainsworth. With coordination on the Kearney 146.31-91 MHz repeater and Taylor 146.40-147.00 MHz repeater, ARES members started phoning area residents to find out if anyone had seen or heard the missing helicopter. The ARES net secured at 0200 December 21. The wreckage of the missing helicopter was located by authorities later in the day on December 21, there were no survivors. A new chapter of the "QCWA" has been formed in the Scottsbluff area. For further information on the new "Pony Express" chapter of the "QCWA" contact KØLJK. The Tri-City Radio Amateur Club now publishes "The Condenser" as the official club publication and is now a regular feature of club membership. Thanks to all of the dedicated traffic handlers that have kept your messages flowing to me while I have been absent from many of the regular nets. After getting married in February, I moved to a new location which meant rebuilding an amateur station and getting up antennas. Traffic: KØDKM 103, WØKK 103, WBØTED 91, NOØA 28, WAØBOK 21, WDØBOX 12, KAØBCB 10.

NEW ENGLAND DIVISION

CONNECTICUT: SM, Robert J. Koczur, K1WGO—STM; K1EIC. SEC: KA1ECL. BM: K3ZJJ. ACC: KG1M. 00/RFI: NA1L. TC: W1HAD. PIO: KX1B. SGL: K1AH.

NET	FREQ.	LOCAL TIME	QTC	QNI	NM
CN	3640	1900/2200	131	223	K1EIR
CPN	3965	1800 M-S	86	336	KA1BHT
NVTN	22/88	2130	43	221	WA1EMI
WCN	78/18	2030	147	471	WB1GXZ
RTN	13/73	2100	38	210	KA1JAN

The winter staff mtg. of the Conn. Section was held January 25 in Harwinton and the New England cabinet mtg. was held January 18 at Chicopee, Mass. Both mtgs. were a complete success. The next mtg. of the Conn. Section will take place in April. At this mtg., we should be implementing a joint TRF/ARES emerg. plan, new language for the ARES/CAP agreement and streamlining of our field organization. OBS: NEWS . . . K3ZJJ is looking for new OBS appointees to represent WCN, NVN, RTN and CPN. If you are interested, please contact John. FARA, SARA and BEARS continue to offer VE exams the second Saturday of each month. For info. write Ham Test, Box 99, Southport, Conn. 06490. SARA will provide communications for the First Annual Stamford Classic Marathon on April 13. Volunteers are needed. WHARA will celebrate a charter party in March and will receive affiliate membership from ARRL. League and city officials will be guests. FARA is conducting novice, tech, and General license courses through the adult ed program. 00/RFI news: P.L. 97-259 enables amateurs to play a more vital and integral role in our radio destiny. Do you have what it takes to become an Official Observer? Find out how helping others becomes more fulfilling in the enjoyment of this great "hobby." For more details, contact Al. SM COMMENT: During the ARRL Bd. Mtg. Jan 23/24 at Minute 60, it was resolved that ARRL explore the possibilities of Memoranda of Understanding with National Weather Service and Civil Air Patrol. The first plan on a statewide level between ARES and CAP was signed by myself and Maj. Lano/CAP in 1982. This was the first official agreement of its kind in the nation. It is my extreme desire that this agreement become reality. Traffic: K1EIR 349, WB1GXZ 255, W1EFW 148, KY1F 75, KA1KTH 71, N1BOW 69, W1YOL 51, KA1GWE 50, N1DMV 44, KA1KPS 39, W1WP 38, KA1BHT 35, W1DPR 32, K1AQE 22, W1BDN 19, WB1ESJ 13, W1QV 5, W1CUH 4.

EASTERN MASSACHUSETTS: SM, Luck Hurder, KYIT—ASM: K9HI. 00/AA: KA1KF. SEC: KB1PA. STM: KW1U. ACC: K1AZE. TC: KA1IU. PIO: K1HLZ.

NET	MGR	FREQ	TIME (LOC)/DY	QTC	QNI
EMRI	N1AJJ	3658	1900/2200 DY	139	199
EMRIPN	N1BGW	3880	1730 DY	183	218
EM2MN	KA1AMR	145.23	2000 DY	112	341
NEEPN	K1BZD	3945	0830 SN	7	50

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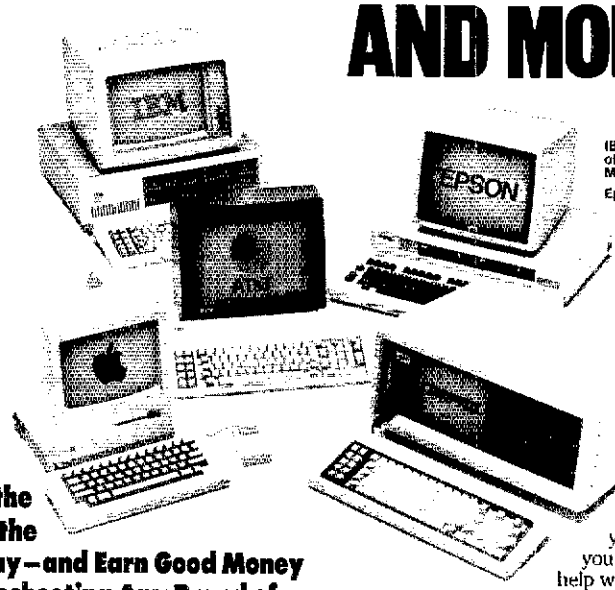

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Public Information Officer K1HLZ has 7 new PIA appointees this month, but is on the lookout for even more. Do you have contacts in the media? If so, get in touch with the PIO pronto. Ass't Division Director WA1IDA, Affiliated Club Coord K1AZE and many others working hard on large scale Amateur Radio displays at Boston Science Museum. They need a multitude of additional talents to assist. Please contact them to lend a helping hand. Framingham Circuit had informative article about the Police Amateur Radio Team (PART) of Westford, a group of Amateurs who assist police by providing a direct link to them on 146.52—a link that has begun to see increased use from Rte. 495 travelers. Tech. Coordinator KA1IU keeping busy with talks at clubs on homebrew equipment. Sturdy Memorial Hospital ARC, Wang ARC and our own Bulletin Mgr W1HH have had excellent coverage of their activities in the media. Cape Ann ARA members have been showing their VHF potential to the officials of Addison Gilbert Hospital, with an eye toward improving the hospital's emergency communications capabilities. W1HZC almost quadruples the next highest station's traffic count this month with a whopping total of 1221! The vast majority of this was done on one VHF frequency without the station operator having to lift a finger. How? Packet radio! If you're an RTTY or packet SYSOP, don't hesitate to send formal traffic totals to STM KW1U each month. Traffic: W1ZHC 1221, KW1U 363, WA1FCD 357, N1BGW 333, KB1AF 316, WA1TBY 252, N1BHH 252, N1DDC 221, KY1T 173, WB1CMQ 150, N1AJJ 140, N1CVE 103, KA1AMR 88, KA1ON 73, W1CE 61, K1BA 56, KA1EID 46, N1DVI 42, K1ABO 37, KA1LIH 28, W1DMH 24, KB1PA 22, KA1KCU 20, K1BZD 11, WA1SNH 14, K1LCQ 6, WA1FNM 4.

MAINE: SM, Cliff Laverty, W1RWG—SEC: KL7IJG/1. STM: AK1W. ACC: KY1C. BM: W1JTH. OOC: W1KX. PIO: KY1E. SGL: K1NIT. TC: K1PV. PSHR: WA1YNZ 84, W1RWG 80, WB1CBP 75, N1BJW. NETS: Sessions/QNS/QTC - LPTN20/70/9, SGN/27/863/132, AEN/4/70/0, RACES/4/57/8. January 20/21 four retired hams furnished comms between two areas for Winter Special Olympics on Sugar Loaf. W1HTG, KA1FTO, KA1GZR (and xyl), and WA1JZP were stationed at touring center, and start & finish lines. Kudos go to Glen, K1MAN, for concern and thoughtfulness in setting up a station for Ernie, W1SKE, a shut-in at the Camden Health Care Center. PAWA elected officers: KN1M, pres; K1JB, vice pres; KA1NJT, treas; KA1KUH, secy. KD2EU is chief op. PAWA flea market May 31. KQ1L conducted 2-way packet radio demo at Augusta EARU meeting. CMEN reported: 9/187/8. Do get active on the nets and report your traffic. K1PV needs Assistant Tech Coordinators, and KY1E needs a list of speakers available to speak at non-ham organizations. Traffic: AK1W 105, W1ISO 85, KA1JPR 82, K1MZB 65, WB1CBP, W1RWG 61, N1BJW 59, KA1JOJ 50, W1BMX 28, ND1A 24, WA1YNZ 24, W1JTH 16, W1KX 14, KL7IJG 13, W1VEH 13, N1BME 10.

NEW HAMPSHIRE: SM, Bill Burden, WB1BRE—SEC: W1NH. BM: K1OSM. Many clubs celebrated the new year by singling out Amateurs deserving of awards for outstanding achievements. The Port City club gave awards to K1ACL, WA1PEL, and W1YFZ (all Field Org members) for their effort in 1985. K1OIQ, EC, Coos City, presented certificates of appreciation to AG1Z and KA1IXA for public service during Hurricane Gloria and W1LQQ for service as NCS during the Mt. Washington Bike race. Thanks to all Hams who helped make Amateur Radio better in 1985! I want to report that I am team-teaching a Novice class with K1CII in Nashua. We have 10 students and by the time you read this, we will probably have a new batch of Hams. We have teenagers to folks in middle-age and they are all enthusiastic and eager to join us in this exciting hobby. They are studying hard (sometimes it's hard to keep up!), and their excitement is contagious. I would recommend teaching a Novice class as a good way to remind you of how exciting this hobby is! Around the state-congrats to N1CPX on getting his BPL Medallion. The Mt. Moriah Repeater Society completed their first ARRLVE session in Salem in January. KY1N reports that 14 out of 17 candidates upgraded. The Mt. Moriah club has also voted to become an ARRL Affiliated club-congratulations! A recent addition to our ranks is Dave Maydwell, NH State CD Officer-welcome aboard, Dave. Traffic: NHN 180, GSFM 150, GSPN 56, MSQVTP 39. W1PEX 609, N1CPX 342, N1NH 294, K6UXO 145, W1TN 141, K1TM 99, N1AKS 84, K1PQV 48, W1ALE 41, WB1GXM 40, KK1E 30, K1TQY 30, KA1LBW 24, KV1S 21, W1FYR 16, KA1HPO 11, W1LQQ 6, N1ALM 5.

RHODE ISLAND: SM, John (Bob) Vota, WB1FDY—New Officers OSARG: Pres. KZ1E, V.P. WB1CPO, Sec/Treas. K1VOB. I enjoyed interesting visit and looks like OSARG in for a good year. New Officers Prov. Radio Assoc: Pres. K1HGC, V.P. W1EYH, Sec. KZ1K, Tres. N1BBM. The NCARC will be on hand for the Tall Ships and the Triathalon coming soon to Newport, RI. They are also involved with ARES Net on Tues. Nites on 70. TNX guys for the help. The BVARC had a 33% increase in membership in the last 6 months, another club on its way. New club in RI NPARC will have more info. next month. Looks like RI on its way to expansion. Traffic: W1EOF 193, KA1JXH 78, KA1DYD 38, WA1CRY 35, TNX for the phone patch work.

VERMONT: SM, Ralph T. Stetson, KD1R—Here is April already not to long before FD 86 is here. For any of you who might be interested, I can come to your club and show the videos I made last Field Day. It is a composite of the four sites I visited last year during FD 85. Would like to see more club and or individual efforts this year. I visited the sites of the Central V-ARC, Green Mtn Wireless ARC, Silicon Junction ARC and the individual station of K1BA, W1MJ at W1KRVs QTH. To be more accurate, I had to walk up a small mountain to visit their QRP set up in the dark yet. I would have liked to visit more stations, but did not know when and where you will set up and I will be there with my video camera and notebook. As most of you know by now, House Bill #520 has been introduced. It deals with Call Letter plates. A special thanks to the Central VT ARC for getting this much-needed bill introduced. Mitch, WB2JSJ, and Frank, W1CTM are continuing to teach Novice/Tech level theory classes in Burlington ARC Building. As is Don, KK1U, with the Central VT ARC, classes are ongoing with the Green Mtn. Wireless Society in Rutland. Lots of new VT hams coming along. Sure looks good when you look at the figures showing Amateur radio is on a negative growth in rest of country. To all instructors and their aides, a hearty thank you for a job well done. As I sit here writing this months column, the farmer down the road is checking out his Sugering gear. Plus other signs of Spring are becoming more evident like the new frost heave that wasn't there before. Along the same lines hearing of plans for a new 2-meter repeater in the St. Albans area more on

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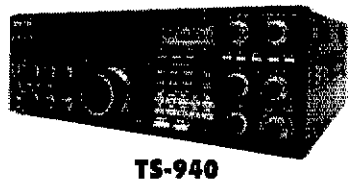

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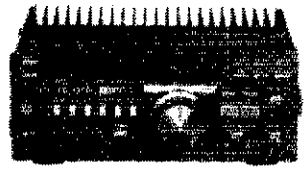

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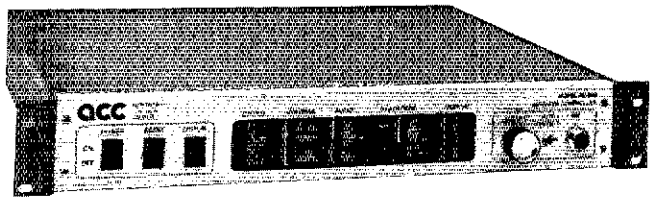

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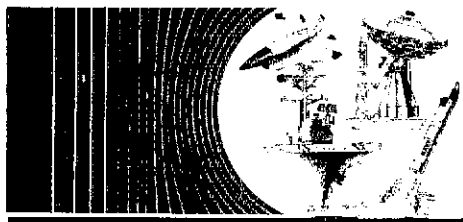

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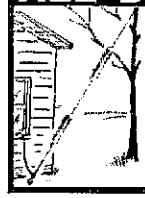

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that next month. Till then duck when you see the signs BUMP AHEAD. Traffic: KT1Q 702, AETT 118, N1DHT 51, W1KRV 51, W1OAK 22; NETS: VTN 31/176/921; CAR 27/957/53; VTPN 4/76/6; 27/463/42; CVFM 4/106/7

WESTERN MASSACHUSETTS: SM, Don Haley, KA1T—PIO/ACC: K1BE. SEC/SGL: WB1HIH, 00/RFI: N1CM. STM: W1UD. TC: KA1JJM. Western Mass Phone Net is now meeting at 6:00 P.M. on 3937 and early signs are that this is a better hour with more checkins and more traffic. Try to join in any evening you can. No experience needed. Provin Mt. running CW practice on Thursday nights and Hoss Trader's on Tuesday's on 146.70. Has your club sent in the Annual Report yet and received your copy of President's Leadership Workbook? Montachusett ARA flea market on April 26 in Fitchburg. Museum of Science in Boston will have Amateur Radio exhibit April 26 and 27. Drop in if you are in the area and contact WA1IDA if you can help. WPI club giving exams March 29 on campus. Walk-ins welcome. PSHR: N1DMU, WB1HIH. Traffic: N1DMU 387, W1UD 198, KA1T 117, W1SJV 80, WB1HIH 53, W1JP 52, W1KK 44, KA1EKQ 38, WA1OPN 18, W1ZPB 17, WAIMJE 1.

NORTHWESTERN DIVISION

ALASKA: SM, Jim Moody, Jr. NL7C—"Break-up" should officially arrive soon. I think it has been here off-and-on all winter! Communications for the Iditarod Sled-dog race have been successfully completed. Amateurs from all over the state assisted by providing communications from the non-village checkpoints and the headquarters locations utilizing both HF and VHF. KL7GG and his assistants have updated coordinated repeaters and have sent the information to ARRL HQs for inclusion in the next Repeater Directory. There are some volunteer positions open now. If you would like to volunteer for any of the positions please let me know. My address is on page 8.

IDAHO: SM, Lem Allen, W7JMH—CLUB NEWS: The Boise Club has new officers: N7DYU Pres, KD7JN Treas, K7DXU Sec. It is offering Novice, General, Extra classes this spring to finish in April or May. VE exams are scheduled every other month in the Boise area, usually on the first Saturday of the month. ARRL MATTERS: we still need a volunteer for EC of Canyon County. PEOPLE AND THINGS: KD7HZ and W7LVX are back in Boise from the hot country. W7JMH, WB7PFQ, WA7VIN, K7CXG, W7IWU, WA7TXB have been demonstrating Ham Radio to several Grade School and Jr. High groups. NET REPORTS:

NET	FQ. MODE	TIME	SESS.	QNI	QTC
NW TRC	146.36/98FM	730PDA	31	729	30
FARM	3937Lsb	7PDA	31	1066	23
ID CD	3990Lsb	810A M-F	23	858	23
IMN	3635cw	8P DA	25	236	58

GENERAL: An election was held for Net Mgr of the FARM Net and WA7RQI was selected. The FARM Net is a Wide-Coverage Independent net serving most of the Northwestern States. Traffic: W7GHT 120, N7BHL 116, W7JMH 32.

MONTANA: SM, Les Belyea, N7AIK— Recent up-grades reported: To Adv.-N7CTS N7HAE WA7JLA N7HFU WA7ZUR KA7MJL KA7QVN N7BYD. To Gen.-KA7SVR KA7VEY. To Tech.-WB7EWJ KA7VLA KA7ULH. Congrats to all Havre will be having a test session in April; contact W7IDK for the data and details. Great Falls will administer exams on May 24th; see N7DKY. There will be a big day in Butte on April 19th. The Treasure State Chapter of the QCWA will have their spring meeting followed by the annual Butte ARC installation party and dinner dance, guest speaker will be W7FTD, our division director W7QGP will also attend. KA7ADM has moved from Miles City to Bozeman to attend MSU. KE7LI, formerly KA7QZK has returned to Missoula, you might remember his article in July '84 QST titled No-Budget Hamming. PSHR: WB7WVD KF7R. NET SESS QNI/QTC/MGR MTN 31/2185/132/KF7R IMN 25/236/58/WA7GQO MSN 4/82/0/K0PP. Traffic: WB7WVD 74, KF7R 54, N7AIK 29.

OREGON: SM, William R. Shrader, W7QMU—Upgrades: KA7SEB KA7WRY KA7VYQ KA7WXF KA7TJO KA7TYZ KA7TFW KA7TIX KA7UYH KA7NXH KA7WFP KA7QVF KA7WBL KA7NED KA7OOT (Technician); N7HMZ KA7WGW KA7WIX KA7WIW KA7SYG KA7WCR KA7RSH KA7VEL KA7KCX KA7RSA (General); N7HQM KA7SKE N7HMV WB7SDC KA7KCX WB7CDU N7HQV N7HIY (Adv); KA7HGU N7HIM N7AKJ KE7DE W6TGB KE7LN KA7WOB (Extra). What a list! VEs are really doing a job Congratulations all. Salem ARC officers; KB7CW Pres.; N7EDX VP; KA7WPT Sec; KA7CVZ Treas. K7YLO WA7ZBL WA7ZQR and WB7SOZ keeping Cent. Ore. ARC on course. Sunset Empire ARC officers; NM7Q Pres, W6LLC V. Pres, W7FBM Treas, KA7CXP Sec. Oregon Emergency Coordinator Net changed to 1st Monday at 5:30 PM after ARES Net on 3993.5 MHz. Farmer's Mtn Repeater group welcomes visitors on 2nd Tues at 7:30 PM at John Marshall High at SE 91st south of Powell in Portland. SUPPORT SeaPac Convention, make your arrangements early. WA7AWJ W7HMV AL7W and WA7VID were awarded Certificates honoring their work in support of ARES activites. W7VSE, Oregon STM, didn't make BPL for first time in 5 years. K7IFG did! Traffic: W7VSE 399, N7FXJ 123, N7ELF 116, K7OVK 115, W7ZB 77, KA7AID 45, N7BGW 28, AL7W 13, WA7VTD 9, W7LNE 3. (Dec.) K7IFG 1426.

WASHINGTON: SM, Gene Sprague, KD7G—PIO/SGL: W7CKZ. STM: KD7ME. TC: W7BUN. SEC: N7DRT. ASM: KR7L. ACC: KC7PH. OOC: N7IL. *Reported totals for Nov & Dec '85, and Jan '86*

NET	FREQ	TIME(Local)	QNI	QTC	MGR
NTN	3970	1200	3845	391	W7UU
EWTN	146.64	1730/2230	176	119	WA7CBN
PSTS	145.33	1730/2230	534	375	W7IEU
WARTS	3970	1800	8333	588	W7IGC
NWSSB	3945	1830	900	91	W7VDR
WSN	3590	1845/2145	1212	438	W7GB
WIN	3987	0930 (Washington Info Net)			W7GNR
WEN	3987	1830(Mon) ARES/RACES Net			KD7G
WARNS	3940	1900(Mon) Amateur News Net			W7CKZ

Events - April 6, Walla Walla Valley Amateur Radio Club, W7DP annual Ham Radio Swapfest at Milton-Freewater, OR. Spring/Summer activities are close at hand. These activities are an opportunity, if you wish to participate, to promote Amateur Radio and have some fun at the same time. Some clubs are planning for Field Day in June, other groups are planning for ??-A-Thons, (ADA Bike-A-Thon on April 27), etc. If you would like to volunteer your communications skills, check with the local Emergency Coordinator or a local club. TNX to K7CR, Sec/Trs of the WWARA, for keeping our area repeater data current and submitting it to the ARRL for the Repeater Directory, which many of us use as we travel around the country. Washington Section AREA groups (King Co. * Island Co., two that have reported) were involved in assisting agencies in their counties during the very heavy rains in January; again a job well done by all. Thanks to the clubs who are sending their news letters to me. Your activities,

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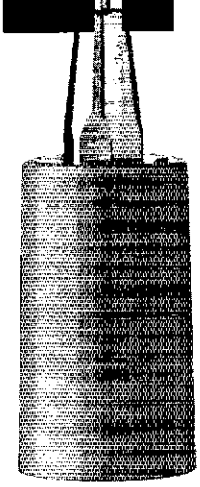

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which are of interest to others, are placed in this column. A lead time of 70 days minimun is needed for articles, please submit early. Kudos to KG7U, a CCRN who reported that he assisted at an accident scene in January. He made contact with K7RWU via 146.28/88, who contacted the authorities. There is much more to the report, but again it illustrates what Amateur Radio can do when an emergency is at hand, or when help is needed. Well done gentlemen! Congrats to W7IGC, WA7CBN, W7UU on ORS appointments and to W7IGC as Net Manager WARTS. Congrats to new Amateurs and to the new upgrades. Has your club sent in the ARRL 1986 club report? Please report if you have not, so we can serve you better. Traffic: KD7ME 325, WB7WOW 238, KF7R 138, K7GXZ 101, W7GB 64, W7LG 44, W7IEU 37, WA7BDD 26, K7SUX 15, N7GGJ 14, W7APS 13, N8EQZ 13, K7AJT 10, N7GDW 10, WA7CTS 8, KD7TJ 7, KD7G 7, N7FXM 3, W7AIB 2. (Dec) KC7PH 24, N7DDP 23, N7GGJ 12, W7APS 5. Do you have a question or concern? Pls write, 73.

PACIFIC DIVISION

NEVADA: SM, Joe Lambert, W8IXD—The Nev. Section is planning an informal lunch get-together May 17 in Reno. More details in next month's column. Joe Lambert, SM, and Rod Stafford, Division Dir., will bet here. Contact K7HRW or W8IXD for info. Congrats to our TC, K7ICW, on his wedding February 15. Glad to hear Jerry Mann's (N7CAH) health has improved and he is back at work. KA7DXU organized a dinner of hams held at the Tower of Pizza in Henderson 2/5/86. SNARS now reports 67 members. They report Carson City rally with 21 hams—great success. TARA reports 2 new repeaters—one near Fernley on 146.79 and one east of Fallon on 145.35. Year-end TARA membership was 109. Sagebrush Net is being reorganized by K7HRW. The recently formed Frontier Amateur Radio Society (So. Nev) put a 145.39 repeater on Black Mtn. N7ECU reports an open repeater for RTTY on 146.70 in LV. LVRAC now meets at Nevada Power Bldg., 6226 W. Sahara, 7:30 PM, 2nd Sun. Talk in on 146.94.

PACIFIC: SM: Army Curtis, AH6P—Aloha and hafa adai to all of the Pacific. At the request of Jimmy, AH6CO, I am beginning my new term a little early. It is a real pleasure to be back and I look forward to working with all of you again. Please, we need help. Contact me to find out how you can contribute to this great hobby. State CD conducted a surprise exercise on 1/29 that saw Amateur Radio participating from the local EOC's. Very good practice to test our readiness. Are you prepared for a real emergency? Contact your local EC to find out what you can do to be prepared. Much activity with classes and testing making many new Hams. Please do all you can do to assist these newcomers to our hobby. Traffic: KH6S 43, AH6P 3, AH6J 3. Aloha!

SACRAMENTO VALLEY: SM, Bob Watson, W6IEW—The Amador County ARC Annual Dinner was very SPECIAL. VP Bill Stevens, W6ZM, Pacific Division Director Rod Stafford, KB6ZV, Assistant Director Glenn Koropp, W6YFW, Section Manager Bob Watson, W6IEW, and EC Dave Carlson, KE6NS represented the ARRL. After good food and drink came the awards. "Past President" additions to their badges for Ron Brown, WA6WIY, Bob Watson, W6IEW, Jim Wilmeth, WA7QQR. Certificates of Merit to Helen Szucs, KB6BNC for assistance to the handicapped in license exams to Jim Wilmeth, WA7QQR for his efforts in acquisition and outfitting of the club's emergency van; to John Szucs, WA6ZGS for installation and repair of Lifeline units; to Tim Thomson, KF6GY for Novice and upgrade classes; to Marjorie Watson, N6JTJ for recruiting new ARRL members for the "Club Challenge for the '80s" contest. Rod Stafford presented club president Sterling Ross, KB6AFF, with a Special Service Club renewal certificate and made the BIG ANNOUNCEMENT. The club had WON the "Club Challenge" contest in the medium size category and thus would get a new HF transceiver. Two new clubs have applied for ARRL affiliation, the Sierra ARC in Plumas County (K6KWN, VP) and the Hangtown ARC in the Placerville area (KB6JHS, Pres). Bill Tubbs, WK6A, found his new job so demanding that he resigned as DEC for Metro-Sacramento. El Dorado County ARC has a new president, Bob Baker, KB6JPZ. License classes being sponsored by River City ARC have about 80 students, half working on the Novice grade. Congratulations to Sierra Foothills ARC and editor Russ Ahlberg, N6MYI, on excellent newsletter and to Randy, KG6XC, Frank, N6JUI, and George, KA6UDW for teaching a Novice class.

SAN FRANCISCO: SM, Bob Smith, NA6T—SEC: KE6LF, Pete Spruance. STM: K6TP, Bob Franklin. Nels, N6AQY, and Jackie, N6LZC, were chosen as "Hams of the Year" at MARC for 1985. If you are interested in PACKET and near Marin County see KG6TT and WB6OVH at MARC, and bring your C-64, also see them on W6SG-1 on 145.05 MHz. AG6C, Betty, is the "Ham of the Year" in SCRA. Is there a challenge between REXDA and SCRA for Field Day 1986? Can a General Interest Club CLEAN HOUSE on a DX-Contest Club? Stay tuned!! ACS now has 911 available on K6GWE, good idea. Maybe other local autopatches should do the same W6PW-1 is operational at the VA, now you can submit newsletter articles via Packet on 145.03. DNARC and FWRA rptrs were used in a RED CROSS and Del Norte County Emergency Exercise with good response from county officials. Get out and support your local club activites and make 1986 a BANNER YEAR for your club. Traffic: N6FWG 94, KK1A 82, W6PW 34, K6TWJ 21, K6TP 29.

SAN JOAQUIN VALLEY: SM, Charles McConnell, W6DPD. SEC: WA6YAB. STM: N6AWH. TC: WA6EXV. ACC: N6ECH. Asst. SMs: W6TRP and K6YK. Appointments renewed: STM N6AWH; ORS WD6FRS; OES N6CDD. Each club should appoint a public information person to help get Amateur Radio news into the media. If the person is an ARRL member, he should contact me for a Public Information Assistant appointment. Your club should also have someone to help solve RFI problems. If this person is an ARRL member, then he is eligible for appointment as Assistant Technical Coordinator (ATC). New officers of the Central Valley Radio Club are: Pres W6TRP, 1st VP WA6CDB, 2nd VP N6IWD, SIT W6VMB. Officers of Stanislaus ARA are Pres N6JRC, VP KG6OU, Sec KB6ECF, Treas KB6DXX. K6CWU and WA6MFU are SILENT KEYS. KB6KSO is Tech. N6JQT is WO6D. WA6SZC is WO6T. KB6HAP is N6MXF. KB6HGW is N6MXG. The Fresno Hamfest is May 2-4, 1986. Traffic: N6AWH 89, W6DPD 14, K6PMG 5, WA6YAB 2.

SANTA CLARA VALLEY: SM: Glenn Thomas, WB6W—BM: W6BCY. PIO: (vacant) TC: WA6PWW. SEC: K6ITL. ACC: W6MKM. ASM: NS6N. STM: W6PHT. The Famous Foothill Flea Markets will be held again this year, the second Saturday of each month, or March thru September at least . . . Cyn W6PHT, our own STM, spoke to the Naval Postgraduate School on the fine art of traffic handling . . .

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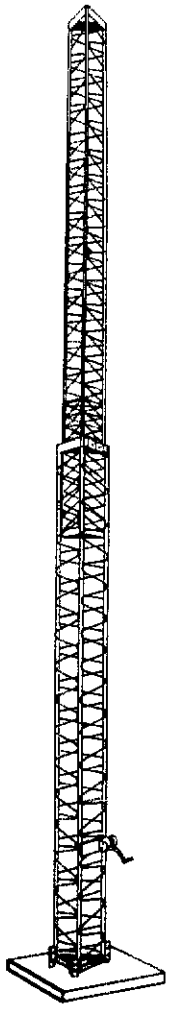

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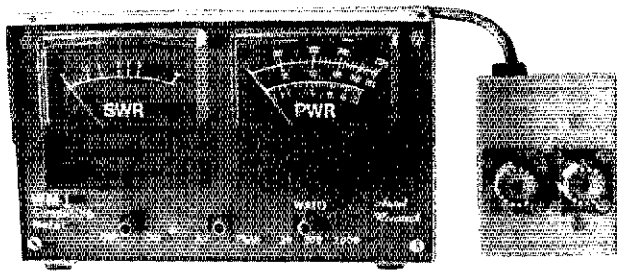

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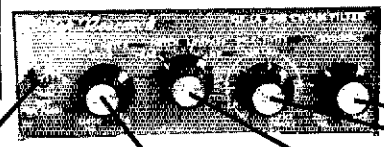

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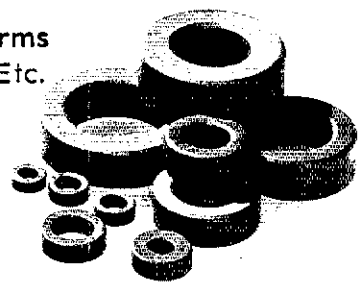

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The Silicon Valley Emergency Communications System has signed their 200th ARES member, KB6KUF, as reported by "George" . . . Meanwhile the South Peninsula Emergency Communications System (SPECS) held another one of their fine breakfasts . . . PAARA had a very interesting talk on the famous Clipperton Island DXpedition by Bob, W6RGG . . . Kevin Levonius, NJ6L, received an Emergency Communications Commendation for saving a boy's life in a house fire. Thanks from all of us to Kevin . . . ARES participated in the MEDEX exercise in February. A simulated plane crash into an industrial complex provided a good drill for both ARES and the emergency rooms at several local hospitals . . . Project OSCAR held their 1986 Annual meeting at the Electronics Museum at Foothill College. The AMSAT Phase IIIC bird, JAMSAT, ACSSB, satellite packet, and a number of other interesting subjects were discussed . . . Let's see those reports come in from YOUR club! I'd really like to hear from you folk, for this column, and to know what's going on out there. Traffic: W6PHT 107, W6KZJ 93, W6ZRJ 26, KA6SXW 25, W6PRI 9, KB6ZV 8, W6CF 3.

ROANOKE DIVISION

NORTH CAROLINA: SM, Rae Everhart, K4SWN—SEC: AB4W. STM: K4NLK. BM: K4IWW. ACC: WC4T. PIO: WA4OBR. OOSC: K1PLR. TC: K4ITL. SGL: KE4ML. BIG NEWS this month is the ARRL State Convention sponsored by RARS in Raleigh on April 13. Hamfest, fleamarket, meetings, exams. Come and say hello, and shake a hand with the bonds of amateur radio friendship. Congrats to N4SU for 50 years of being a ARRL member. To upgrades: KB4FSI, KB4RHP, KJ4LO. NEW CLUB officers at W4MOE Pres. KA4CAC VP KA4YCY. SECT. KB4FVH. Tres. N4KOZ. at W4PAR Pres. WA4JVD. VP W4UIJ. Sect. N4HHG. Tres. N4ARF. KA4DHP and K4NLK reporting good results with bazooka antenna. Congrats to new YL novice, KA1LON, who is active on 80/40 from Snow Hill. Let's make her welcome to Tarheel State. This month marks the beginning of the Tornado season. Lets ALL be prepared. League HQ has new reporting deadlines so everyone be advised that all SARs and PSHRs must be received by the 5th of the month to be at HQ on time. Late reports will not be published. This includes all station appointees reports as well. The end result is to receive your QST approximately one week earlier. Roanoke Division League Planning Meeting (LPM) will be held at the Ramada Inn, Greenville, SC on May 10/11. Contact WD4HLZ for info and preregistration. Attention ECs/DECs. Most counties and cities in section are now working on new budgets. Have an active ARES/NTS group? Make contact and see if amateur radio had been included in the budget process. Need help, contact State Emergency Management Office in Raleigh. W4ACY has retired so Phil will have plenty of spare time with XYL WA4ZMA. Phil was former division director and has done much for ARRL in section. See him and wish him well. Traffic: K4NLK 399, WB4HRR 223, NJ4L 192, KA4TLC 154, AB0Y 119, AK1E 102, KB4FWL 70, WB4N 70, N4LST 63, WA4MNR 62, WB4WII 59, K4SWN 52, WD4EQK 43, KB4IVV 43, KB4OGR 40, KI4YV 37, NE4J 32, KA4YMY 31, N4BYV 30, N4CJJ 28, AA4MP 28, K4GI 23, WB4CYN 20, N4LUO 20, K4YJB 20, N4JEO 18, WD4MRD 17, N4UE 17, K4DDY 16, KA4EYF 14, K4QXA 10, WD4RMQ 10, N4KYD 9, KU4W 9, WD0DQL 8, W4EHF 4, KA4OXF 4, WR4E 2.

SOUTH CAROLINA: SM, Jimmy Walker, WD4HLZ—The '86 Amateur Radio season has started and once again Roanoke League Planning Meeting will be held in our section. The Blue Ridge ARS will host the event May 10-11 and ARRL Publications Manager and Packet enthusiast, Paul Rinaldo, W4RI, will be speaking at the Greenville meeting. Most importantly, YOU will have the opportunity to present views and vote on resolutions that will give directions to the Roanoke Division and ARRL. LPM-86 is YOUR meeting and we EXPECT ideas and resolutions. Second, lets us not forget Amateur Radio Week for '86. Governor Riley will sign the Proclamation prior to Field Day so your Club will have a copy for a Press release. See you at HAMFEST and LPM-86 in Greenville. Nets, July-Dec: Blue Ridge 11843/406, SCSSB 5696/687, Greater Pee Dee 5103/574, York 1972/346, Lancaster 743/90, Anderson 724/76, Carolina State Line 279/18, SCNT 197/54. Traffic: K4ZN 223, W4ANK 119, W4DRF 114, W4FMZ 104, KB4BZA 83, KA4LRM 66, K4FRX 40, W8IKT 36, KA4YEA 34, K4ZB 28, WB4UDK 15, WA4JWS 12.

VIRGINIA: SM, Claude Feigley, W3ATQ—STM: KB4WT. SEC:WB4UHC. OOC: W4HU. ACC: NT4S. BM: AB4U. TC: WB4MAE. SGL: W4THV. For a listing of section NTS Nets see last month's QST. I regret to report Hal Richman, W4CIZ, as a Silent Key. Hal was OIC of the 24th District FCC office and was a real friend to amateur radio. The Bedford Amateur Radio Club has been approved as an ARRL affiliated club. The Chesapeake Amateur Radio Service Club and the Marion club have asked for info regarding affiliation. KB4PW, EC, for the Roanoke area submitted a fine report on their activities during the November floods. He says they are working with the National Weather Service to setup a "SKYWARN" Net covering 21 counties in SW Va. OOs KE4EQ, W4HU, W8IRT and KB4WT report activity monitoring the bands for operating discrepancies. The 4th district QSL bureaus report an overload of unclaimed DX QSL cards. Remember these QSL bureaus handle cards for all amateurs whether you are a League member or not. If you have worked any DX you should have an envelope on file at the proper bureau for your cards. If you need info, contact the SM or NK4U. Frank MacHovec, KE4EQ, an active "OO" has been named state director of quality assurance in the Va. Dept. of Mental Health and Mental Retardation and will be moving to Richmond. All ARRL affiliated clubs should have received their 1986 annual report forms. Please complete and return to Hdqs promptly. If forms are needed contact ACC, NT4S or the SM. Future VE exam sked for the Tidewater area, May 3, Hampton, June 7, Portsmouth, July 12, Va. Beach. AA4AT reports plans for the Roanoke Division Conference, Aug. 23-24 moving smoothly. Plan now to attend. Are you interested in sending ARRL bulletins and other local Hams into over your local repeater, if so, contact BM mgr. AB4U for an "OBS" appointment. Interest in Packet radio continues to grow with N4HSJ and W3ATQ the latest converts. Once again N4EXQ and N4GHI lead the traffic handling pack with both making BPL. Total ttc handles was 3509 with 43 station reporting. Traffic: N4EXQ 572, N4GHI 553, AA4AT 333, KB4WT 177, WB4PNY 142, AA4GL 129, W3ATQ 114, K4JST 103, WD4ALY 93, WA4CCK 93, K4JUM 93, WA4LJI 85, WD4MIS 77, WD4OCW 75, KB4NGO 71, K4AXF 64, K4MTX 61, KA4ERP 59, NN4I 59, K4VWK 53, N4KSO 47, K4JM 46, WB4KIT 42, K3RZR 42, NT4S 40, N6ANO 36, K4GR 34, WB4EDB 32, KB4PW 29, K4BGZ 25, WB4UHC 23, NW4O 17, W4TZC 16, KA4IUM 14, WB3ANC 5, KC4HN 5, WA4TVS 5, N3RC 4, W4YE 4, N4FNT 3, W4JLS 3.

WEST VIRGINIA: SM, Karl S. Thompson, K8KT—SEC: K8QEW. STM: KD8G. ACC: WA8CTO. TC: K8CG. SGL:

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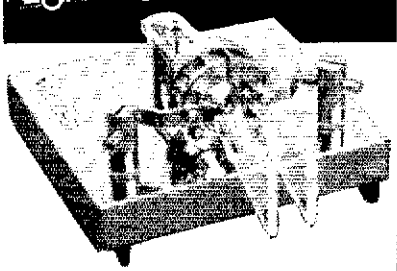

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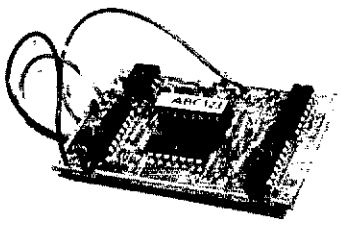

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A3	3 ele. triband	210.00
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215WB	15 ele. wide band 2mt boomer	79.95
424B	24 ele. 70cm boomer	77.00
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AOP-1	OSCAR pack 2mt & 70cm	140.00
AR-2	2mt vert. ringo	24.50
ARX-2	2mt vert. ring ranger	30.00
ARX-2B	2mt vert. ringo ranger II	37.00
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RM10/RM15	10m-15m resonator (sta.)	11.95
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RM30	30mt std. resonator	16.95
RM40/RM40S	std. & super	17.95/24.95
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435-40CX	70cm satellite	155.95

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TA33JR	3 ele. triband	179.00
CL36	6 ele. triband	359.00
CL33	3 ele. triband	265.00
PRO37	7 ele. triband	465.00

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MV3AHR	7/21/28 vert.	80.45
MV3BHR	14/21/28 vert.	80.45
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SQ-10	28MHz Swiss Quad	118.95
SQY-06	2mt Swiss Quad	55.95
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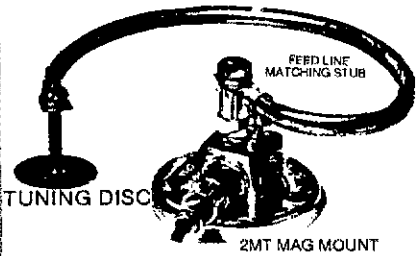

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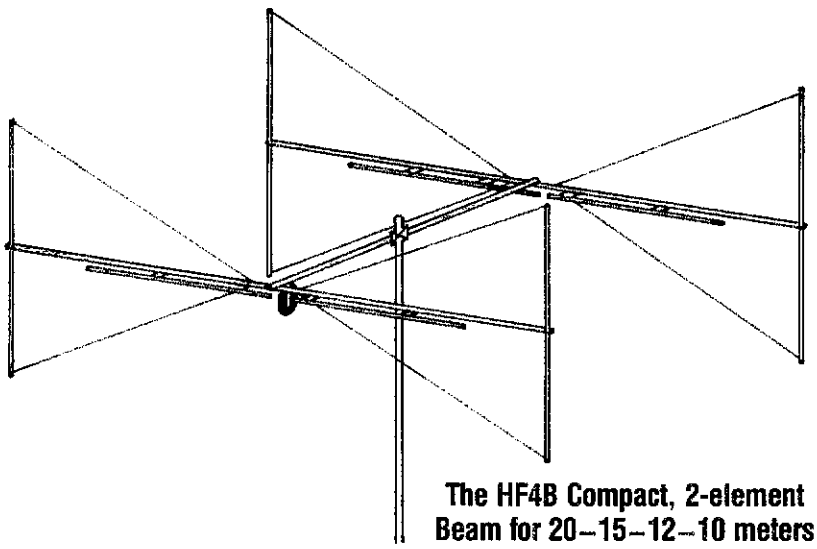

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K8BS. Repeater Coordinator: WD4KHL. Plan now to attend WV ARRL Conv. at Jax. Mill on July 5 & 6. Plans are shaping up for another banner year. Chas. area H.F. will be July 27, at Chas Civic Ctr. Exams will be given in Fairmont May 13, and Aug. 12. Walkins ok. Contact KU8C for info.

NET	FREQ.	TIME	QNI	QTC	SESS	NM
WVFN	3865	6:00	978	107	31	W8YP
WVMD	7235	11:45	972	88	31	W8FZP
WVN	3567	7:00	298	73	30	KZ8Q
WVRN	3640	6:30	262	31	30	KD8RD
WVNN	3730	5:30	117	25	27	WD8DLY
Hillbilly	14290	Noon Su	143	12	4	W8YP

Traffic: KZ8Q 168, W8YP 162, WA3NUI 123, WD8LDY 115, N8EMQ 102, W8FZP 90, N8GJO 81, K8UQY 51, KA8WNO 36, K8QEW 35, K8KT 33, WA8KCJ 26, WD8DHC 18, NC8G 8, KD8G 7, KA8OGF 5.

ROCKY MOUNTAIN DIVISION

COLORADO: SM, Bill Sheffield, KQ0J—SEC: WB0FQB. STM: WD0AIT. ASM: W0RSG-KA0MQA. ACC: WB0DUV. PIO: N0FOE. SGL: WD0GQL. TC: NC0F. BM: KD0RX. The Health Fair is being held during April, this is a statewide event and during the week that Channel 9 sponsors this public service, many amateurs will be involved in communications. If you can help in this worthwhile annual event at one of the sites, contact WB0TWE. April 27th will be the date of the 5th annual ARA Hamfest to be held at the Nat'l Guard Armory in Aurora. VE testing will be available, contact (WA7WDJ). Always a good hamfest . . . plan to attend. From Durango ARC, they have installed a packet digipeater on 145.01. Elevation is 9860 ft. and will give good coverage to the four corners area. The call on the digipeater is KD0DI. They are also running Novice-Technician classes this year. Congrats to DARC for assisting the Mancos Co. Snowmobile Club with their snowmobile races by handling communications. Congrats also to ECHO for communications provided for the Mtn. Man Triathalon held in Avon, Co. 73, KQ0J. NETS: Col; QNI 821, QTC 37, Inf 79. CWN; QNI 103, QTC 53. CWXN; WNI 2985, QTC 2367. HNN; QNI 1993, QTC 132-Inf 558. NCTN; QNI 381, QTC 121. SCTN QNI 102, QTC 15. Traffic: WA0HJZ 2200, N0BQP 1275, K0RXK 678, W0ACH 558, K0JAN 385, KB0Z 176, WA0OYI 167 N0DZA 100, WD0BSZ 76, WB0FVV 62, WD0AIT 47, K0CI 30, AI0W 27, KA0NLI 17, W0NFW 12.

NEW MEXICO: Joe T. Knight, W5PDY—ASM: W5HD. DEC: KB5XD. STM: ND5T. NMs: WA5UNQ K6LL W5VFQ. TC: W8GY. ACC: W5HD. Southwest Net (SWN) meets daily on 3583/7083 at 0230 UTC and handled 128 msgs with 188 stations in. New Mexico Roadrunner Net meets daily on 3939 at 0100 UTC and handled 56 msgs with 1056 stations in. New Mexico Breakfast Club meets daily on 3939 at 1330 UTC and handled 114 msgs with 942 stations in. Yucca 2-mtr Net 78/18 handled 19 msgs with 408 checkins. Caravan Club 2-mtr Net 66/06 handled 22 msgs with 124 checkins. SCAT 2-mtr Net 66/06 handled 18 msgs with 654 checkins. Alamo ARC new officers are WA6DUI, Pres., KD5HP, VP, K5BHE, Sec. & W7MBH, Treas. Caravan Club had excellent Christmas Pot Luck in January. ENMARC (Clovis) HAMBONER newsletter was good. W5LQM is a silent key. He was Charter member of Caravan Club. ABQ DX Assoc had good Mtg with KD5VV bringing DR. DX. Traffic: W5DAD 492, W6SX 26.

UTAH: SM, Jim Brown, NA7G—SEC: Rich Fisher, NS7K. STM: John Sampson, W7OCX. Note that Rich (formerly WA7JJL) finally decided to shorten his call (did it take too long to send on CW?). Congrats to Jody, KA7TGM, for upgrade to Extra. There's a move afoot to rekindle RACES activity in Utah. We have 72 signed up so far; if you're interested, contact me and I'll see you get an application. Field Day, already? It's coming—better plan early. 73 de NA7G. Traffic: K7HLR 178, WA7KHE 61, N7ASY 45 WA7MEL 32, NS7K 22, W7RO 19, NA7G 15, W7OCX 6.

WYOMING: SM, Dick Wunder, WA7WFC—ASM: KA7AWS. SEC: W7TVK. STM: KA0X. Casper VE test was very successful with the efforts of everyone. Thanks to all those who participate in the Volunteer Exam teams in the state. Wyoming Hamfest will be the second weekend in July at the Wyoming State Fairgrounds in Douglas, Wyo. Recent upgrades include KB8KW to EXT; N7HPW, N7HHQ, & N7GVV to ADV; N7HQH to GEN; KA7WOZ; KA7WQI, & KA7WRN to TECH; two nonhams, 1 to NOVICE & 1 to TECH. Congrats to all. KC7AR reports the Wyoming Cowboy Net held 23 sessions with 947 QNI and 6 QTC. The Casper Emergency Net, 4 sessions & 57 QNI. WARN held 4 sessions & 152 QNI. Traffic; NN7H 54, KC7AR 10, W7SQT 7, NQ7Q 5.

SOUTHEASTERN DIVISION

ALABAMA: SM, Joesph Smith, Jr., WA4RNP—STM: N4JAW. SGL: KA4WVU. BM: KF4VV. OO/AUX: AA4BL. TC: N4AU. ATC: WB4BYQ. ACC: WA4RNP. The 1986 Club officers of the Decatur Club are: President W4YXQ, Milt; Vice President WA4OUE, Steve; Secretary WA4MGJ, Ed; and Treasurer W4CKL, Bill. The WAARS (Tuscaloosa) officers are: President WD4DAT, Kelly; Vice President W4WYP, Herbert; and Sec/Treasurer KB4JXP, Pat. From Huntsville here are the Haylarc Officers: President N4HIX, Melanie; Vice President WA4AXA, Mary; Secretary WB4TJE, Lynda; and Treasurer WA4DJW, Elizabeth. The newest Official Bulletin Station is WD4FFA, Dan from the Gadsden area. A special award was bestowed on the B'ham club by the National Weather Service for meritorious service; keep up the good work folks. If your club does something special please drop me a line so it won't go unnoticed by our section members. Traffic for Jan: CAND reports 589 messages in 31 sessions with ALA rep 100% by NW4X and W4CKS. DRN5 reports 568 messages in 62 sessions with Ala rep by WA4JDH, W4CKS, NW4X, KC4GS, WA4PIZ, and W4WJF. AENB reports 45 messages in 31 sessions and AEND reports 55 messages in 31 sessions. Brass Pounders League: WA4JDH Public Service Honor Roll: WA4JDH, W4CKS, WD4NYL, and WA4RNP. Traffic: WA4JDH 625, W4CKS 54, WD4NYL 49, K4AOZ 46, WA4RNP 37, W4DGH 24, WB4TVY 18, W4WJF 18, Seven Three, Joe.

GEORGIA: SM, Eddy Kosobucki, K4JNL—ASM-BM: K4VHC. SEC: NC4E. STM: W4PIM. ACC: WA4ABY. OOC: NA4I. PIO: WA4PNY. SGL: W4BTZ. TC: K4UDR. Once agn tnx fer the newsletters & reports. Club officers please see that the 1986 ARRL Club report form is filled with the League. If u haven't received one please contact me ASAP. This yearly report is of vital importance. Kennehoochee Hamfest in Marietta on Sat April 19th. For info on Atlanta ARC 1986 Scholarship Awards for licensed High School Graduating hams contact Phil Latta W4GTS at 259 Weatherstone Parkway, Marietta, Ga. 30067. Hurry. Savannah ARC 1986 officers are: Pres: N4JIV, VP: KA4CQY, Sec: WB4FNK, Treas:KB4GQA, Act. Mgr: WD4AFY & Trustee: KK5M. SE DX club elected N4NX Pres, VP: WB4GNT, Sec: KC4BX, Treas: WI4K & Act. mgr:

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N4RJ. Following made the PSHR roll for Jan., W4PIM, KB4JPN, K4EV, W4HON & K4MOG. I know that many more qualify each month so send me ur reports. Congrats to our SE Director, W4RH, on being appointed to the ARRL Executive Committee. The Atlanta YAARAB Shrine Temple in Atlanta has begun plans for a fully equipped Communications Van. W4NEB is coordinator & they are planning to be operational by this summer. All nets are important. Please have ur editor list the section & local in the monthly newsletter. It will help stir up some activity. QCWA Net meets Sat mornings at 0900 local on 3832. If u hear of a Silent Key please send me the obituary ASAP as that I can send it in to ARRL. I must once agn congratulate the ladies of MALARC for the many activities they get involved in. It seems that most belong to other clubs & they really aren't afraid to get the ball rolling in many activities. Keep up the gud work girls. Have A GUD MONTH. Traffic: W4PIM 202, W4WXA 117, WB4WQL 54, WB4SPB 44, W9MHS 43, W9NXC 32, K4EV 31, KA4HHE 29, WB4DVZ 24, K4MOG 24, W4HON 21, N4UZ 19, WB4RUJ 13, WD4DBO 12, K4BAI 12, KI4IG 5. (Dec) WB4RUJ 120, WA4CBT 113, N4UZ 37.

NORTHERN FLORIDA: SM, Phil O'Dwyer, WF4X—ASM: WF4X. ACC: N4ADI. STM: WB4GHU. SEC: WA4PUP. PIO: WA4PUO. SGL: KC4N. BM: KB4LB. OO: K4JJE. TC: N4KF. The propagation for January has remained terrible, as predicted, but our net controls and net managers have kept the traffic moving in spite of it, and it is probably fortunate that traffic was at a low ebb. Our Technical Coordinator, Charlie N4KF, is still looking for a few good hams to help him as Assistant Technical Coordinators, so I have asked him to contact some of the clubs that list a TVI committee to see if he can draft some volunteers and invite anyone interested in being a super "Elmer" to contact Charlie. I am really impressed with the caliber of the club newsletters that you editors and PIOs are kind enough to send me. Please remember to send one to Miss Petey, WA4PUO, our PIO, along with any news that's of interest to the rest of our Section. Remember that our medium speed CW Net, FMSN, meet daily on 3650 KHz at 2130Z and the Slow CW net where we train so many good ops and NCS's is on 7115 KHz at 0000Z, and I guarantee that they will make you feel welcome! Packet radio keeps on growing at leaps and bounds in my local area—I have one on order and hope to be doing it in 6-8 weeks when all the hardware and soft stuff gets here. Sure could use a digipeater in Pensacola, so drop me a note if you know one. Traffic: WX4H 515, WD4IIO 504, N4PL 384, KB9LT 358, WB4ADL 321, WA4QXT 258, WF4X 246, KQ4VK 151, WA4EYU 146, AA4HT 135, WB4GHU 125, KD4KK 117, WC4D 109, KB4LB 109, WD4IUI 108, KI4PB 94, KF4U 94, WF4Y 92, W4KIX 88, N4JAQ 63, N4GMU 56, W4LDY 52, WD4MLQ 41, WA4PUP 33, KJ4HS 32, W8IM 32, WB4TZR 31, KB4MHH 31, NF4O 25, KI4CQ 24, NQ4P 24, WA4SXW 23, KA4KAH 22, KF4TM 22, WD4HBP 21, N4EDH 21, W4MGO 20, WD4EQB 19, N4ADI 18, WB4FJY 12, WA4PUO 11, KF4GY 10, NS4C 10, N4ENL 9, NA4F 9, N4IIP 7, WB4AWG 5. (Dec.) N2AOX 40.

SOUTHERN FLORIDA: SM, Richard D. Hill, WA4PFK—SEC: W4SS. STM: K4ZK. TC: KI4T. BM: WD4KBW. PIO: W4WYR. SGL: KC4N. OO: W4SS. ACC: WA4NBE. WB4WDK conducted an amateur radio demonstration before the Board of County Commissioners of Highland County - The object was to place a call into the meeting room via the two meter repeater autopatch. However, the commissioners' secretary refused to forward the call because a meeting was in progress! Hi. The Chairman of the Board then read and presented a resolution unanimously adopted which acknowledged and commended the members of the Highlands County ARES for their service. W4IEF was also recognized for his initiative and talent in designing, building, and maintaining the EOC repeater. AA4MI had the honor of presenting a 50 year plaque to W2EKL at the Platinum Coast ARS meeting. N2WX reports that Melbourne has the first known network switch on amateur radio in use. AA4WJ reported that he and his daughter, KB4AEV, are now active on the FAST net. The 80-meter band really played havoc with QFNS this past month. It seems as if the band would drop out from about 8 until 9 PM just when the net was trying to operate! One night there were three NCS's with a total of five QNI between them and none of the NCS's heard each other. As Miss Phil, the net manager, so aptly puts it, 'on this net we really try to beat the band' - HI. The members of that net are to be commended - right in the novice band and with those conditions, and they still kept the net stats right up there!! 73 de WA4PFK. Traffic: W3CUL 3258, W3VR 1436, WA4PFK 405, K4SCL 332, K4ZK 238, W4NFK 219, KF4JA 212, KA4YHS 203, W4HAW 200, KA4FZI 190, WA4RUE 189, WA4EIC 183, WA4WYG 136, K4EUK 130, AA4BN 114, KA4GUS 114, N4KFU 111, KA4NXF 107, W4TAH 82, KY0T 82, W4DL 82, N4JOA 78, N4KB 78, WD4CHO 76, WD4KBW 75, KF4RL 66, K4IA 60, N2WX 51, W4SME 50, N4ET 48, W4ESH 47, W3IJR 39, WT4F 39, WA4HDH 39, W4YCL 39, KB4MON 38, K5IHH 35, W1NJM 33, W4SS 32, K4JI 31, KB4KAW 27, W3TLV 26, KB4LPL 26, N4MML 25, KY8Y 25, WA9VND 25, KA4SIH 24, K4FQU 20, KI4ZW 19, KB4EWO 19, WD9AEP 19, K9EHP 18, WD4NXK 17, W4MFD 16, KD4GR 16, WV4F 16, K4BLM 15, K9AKY 15, N4MXH 14, W4MPV 13, WA4NBE 12, WD4MCC 12, K4OVC 11, W4WYR 11, W4PKP 11, KB4BLN 10, W8OM 8, KB4LKT 8, W4UIO 8, WK4F 7, N4ILN 7, KA4GDU 5, WB4GSV 5, AA4IF 4, N4IXQ 4, KA4KDD 4. (Dec.) N2WX 44, W4SME 42.

WEST INDIES: SM, Alberto L. Valdejuli, WP4CSG—STM: KP4ABK. SEC: NP4HF. TC: KP4ARY. PIO: KP4EW. Carlos Flores, WP4J, our previous SM, resigned because he was transferred out of our Section. WP4CSG was appointed to continue for the remainder of the term. St. Croix Amateur Radio Club just completed licensing and upgrading classes with following results: Licensed was Jimmy Hamilton - WP2AEH; Upgradings: WP2AEM, WP2AEK, KA1WDX, WP2AEG, Technician; WP2AEL, KA8UOG, WP2ADP, WP2AEO, General; WP2AEF, Advanced. The P.R. ARC started its classes during the last week of January, 1986. Plans to continue reviving ARES are ongoing. Coordinations are still being made with local Civil Defense officers for the implementation of emergency plans. We hope for a closer affiliated club coordination in the future, and meetings with officers from these clubs will be programmed for the near future. WP2VI, NM for WINE reports Sessions 25, QNI 82, QTC 2. KP4DJ, NM for WINS reports Sessions 28, QNI 88, QTC 1. WINC reports Sessions 20, QNI 301, QTC 54; NCS: WP4DOR, WP4DRW, WP4EJT, WP4CSG, KP4FMM (NM) NP4OX, NP4RI. Traffic: KP4DJ 18.

SOUTHWESTERN DIVISION

ARIZONA: SM, Jim Swafford, W7FF—STM: W7EP. NMs: K6LL, KA7HEV, WB7CAG. Long-time OO at Yuma, KB7VY, became a Silent Key in Nov. We'll miss him. W7SA and XYL were eye-witnesses to the Challenger spaceship

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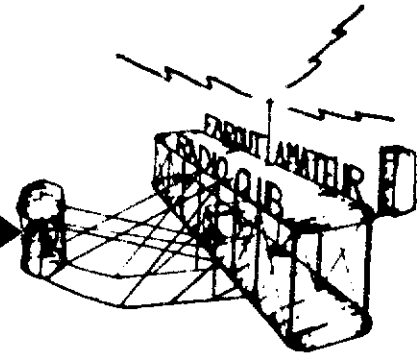

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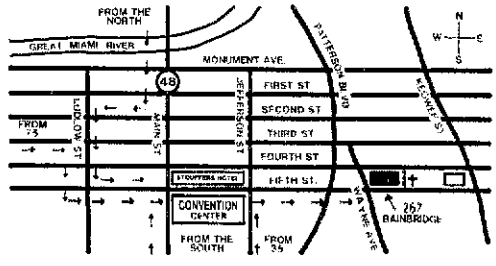

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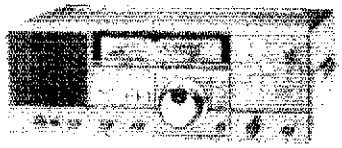

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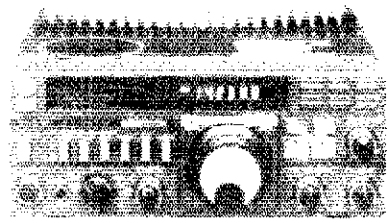

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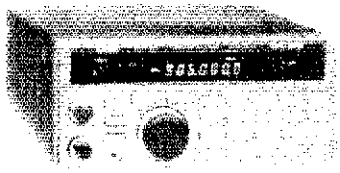

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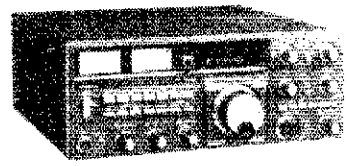

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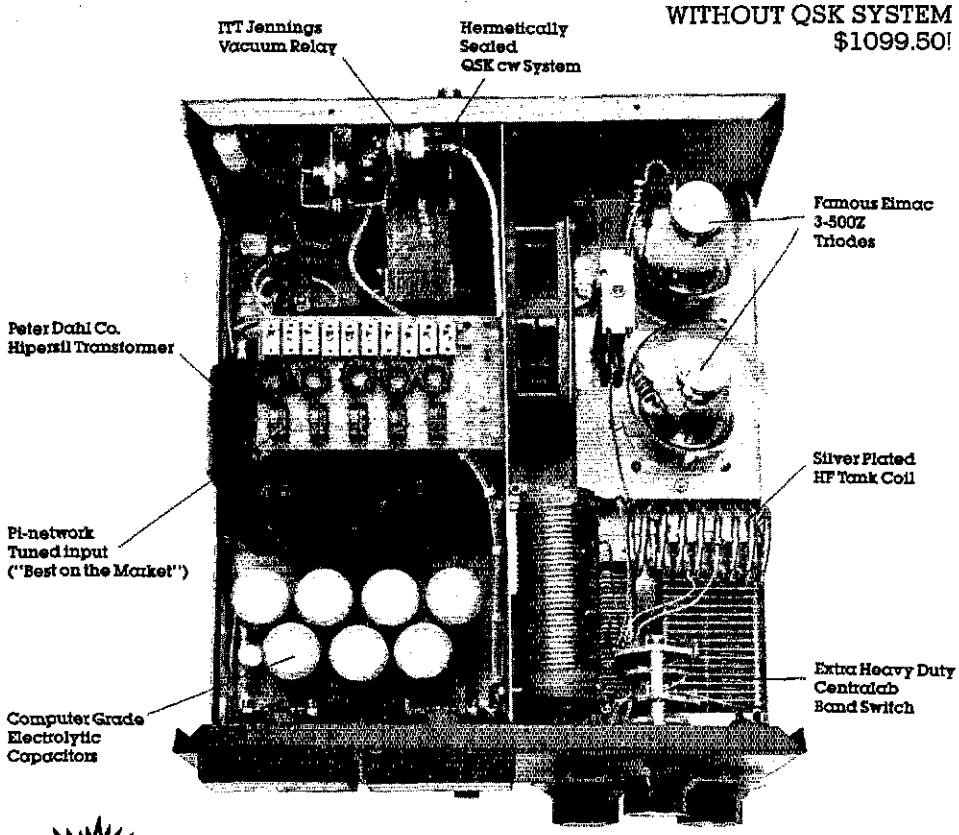

Thinking of buying a linear amplifier? You owe it to yourself to check out the new LK-500ZB.

The LK-500Z series of amplifiers were created to offer the best value you can buy in HF linears covering 160-15 meters. Last year, it was demonstratively the best value. It was the lowest priced, full feature pair of 3-500Z's on the market. It had the longest warranty and the only amplifier with a money-back guarantee. It's not surprising that the LK-500ZA, both the standard and "hipersil" version, became one of the most popular amplifiers on the ham bands.

Now, for 1985, Amp Supply engineers have taken this durable, dependable "rock crusher," fantastically improved it, and called it the LK-500Z "B" version.

Improvements include an ITT Jennings vacuum antenna changeover relay with a companion sealed relay QSK system which eliminates any signal attenuation between CW characters. The silver-plated HF tank coil and the extra heavy duty silver-plated Centralab bandswitch are the finest available.

The LK-500Z "B" version has all the outstanding standard features of the LK-500ZA; such as the Peter Dahl Hipersil power transformer, and a full-wave bridge rectifier system (we will not produce amplifiers using weak voltage doublers). Computer grade electrolytic capacitors are standard and the low-pass pi-network tuned input is the absolute best on the market. Oh yes, we only use Eimac 3-500Z triode tubes in the LK-500Z amplifiers.

Amp Supply Co. has been a pioneer in manufacturing quality amateur radio products, providing service to back them up and selling at low prices. The people of Amp Supply Co. have been designing and manufacturing amplifiers since 1974, and we challenge any competition to match our total amateur HF amplifier production — 17,678 amplifiers in eleven years. You don't manufacture and supply that many amplifiers unless you have first-rate products and service. Join the thousands of satisfied radio amateurs who have come to the people at Amp Supply Co. for their amplifier needs. We believe good service starts with answering your questions and needs before and after you buy.

NEW!

EXTERNAL POWER PACK OPTION AVAILABLE NOW.
No Limit, Key-Down Service 24 Hours/Day
Great for Those Long Contest Hours PAC-5 $399.50.

All Amp Supply amplifiers carry a two year warranty. Ask our competitors what theirs is!

Our price is the whole price. LK500Z "B" version: $1295.00 includes UPS surface charges and insurance in the continental USA. In a hurry? Two day UPS air service is just $20.00.

The LK-500Z "B" version is clearly a progressive, new amplifier, a leader in its field; but what else would you expect from a company called Amp Supply?

Thank you for purchasing an Amp Supply Co. product.

Denny Hall
Denny K8KXK

NO RISK GUARANTEE
If you are not completely satisfied with the performance of your new LK-500ZB you may return it within ten days for a refund less shipping and repackaging. If you can get any of our competitors to give you the same guarantee, buy both and return the one you don't like. We know which one you'll keep.

LK-500ZB	$1295.00
LK-500NT-B No-Tune-Up	$1595.00
LK-500-ZB Without QSK System	$1099.50

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For fastest delivery, send cashiers check, money order, or order by credit card. Personal checks, allow 18 days to clear. North Carolina residents, add 4½% sales tax. Hours: Monday-Friday 9:00 a.m.-5:00 p.m. E.S.T.

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ICOM

Fine Tuning For Maximum Performance

Modern HF transceivers are truly a marvel of electronic technology, and they're chocked full of exciting front panel attractions. Their overall performance and/or shortcomings, however, are not always discernible in colorful advertisements or hamfest-type displays. ICOM wants you to enjoy maximum possible returns from your amateur radio investments, so this Tech Talk will consider some important points in transceiver designs.

Todays busy amateur bands demand receiver designs capable of handling a variety of spectrum conditions. Sometimes signals are strong, sometimes they are quite weak, and overall noise levels fluctuate constantly. A panel switchable RF preamplifier and an RF attenuator are invaluable for mating with those daily variations. Naturally, these features are included in ICOM transceivers.

Likewise, balanced RF amplifier circuits yield the greatest dynamic range and lowest noise figures. ICOM began using these circuit designs many years ago, and their popularity is now widespread. Balanced RF amplifier circuits can be spotted by first tracing a transceiver's schematic diagram from the antenna to its first RF amplifier. If that section includes matched transistors in a push-pull looking arrangement, or diodes in a bridge circuit, it's using a balanced-type design. ICOM calls its mixing balanced scheme a "direct feed mixer" (DFM).

Optimum receiver selectivity is also mandatory for copying desired signals on crowded bands and for minimizing undesired noises. These capabilities are provided by a unit's IF filters and circuits to adjust the range of frequencies passing through those filters. Two of the most popular means of achieving the latter capabil-ity are: IF Shifting and Passband Tuning.

IF Shifting essentially changes the center frequency of passband (received) signals directed into an IF filter. The purpose of such "IF recentering" is to move adjacent channel interference out of the second IF filter's range while accentuating a desired signal. Since the first IF's overall width remains unchanged, however, unoccupied portions of its passband are subject to noise and additional interferences. That interference can influence a receiver's AGC and reduce signal readability.

Passband tuning, though more expensive because of the addition of a narrow filter in the first IF, overcomes some of the shortfalls of the IF shifting system. ICOM's Passband Tuning concept includes this dual filter concept, plus it also includes the "frequency recentering" capabilities of IF Shift. This "double action" effectively varies an IF's bandwidth to provide interference protection while it accentuates a desired signal. It can be center-set for highest quality SSB reception during times of minimum interference, or offset for weak signal SSB copy on a busy band. Its bandwidth is variable from approximately 2.4KHz to 800Hz at -6dB. When combined with Receiver Incremental Tuning, ICOM's Passband Tuning concept is also quite beneficial for RTTY and CW operations.

A final, yet significant, receiver consideration involves the use of an IF rather than an AF notching circuit. This feature's purpose is to reduce single frequency interference by inserting a very narrow and deep notch which can be tuned to null out an interfering signal. Notch Filters offer attenuation of undesired hetrodynes, and allow smooth copy under otherwise futile conditions. Some transceivers include this notch circuit electrically "before" their SSB/CW detector circuit (IF notch); others include the notch circuit "after" their SSB/CW detector (AF Notch). An IF Notch's obvious advantage is nulling interference before it adversely affects a receiver's AGC, causes intermod, and degrades reception. An AF Notch functions "after the fact" and can't be expected to compensate for IF shortcomings. Once again, ICOM uses IF notch circuits in its transceivers designs.

Did you expect anything less than optimum from a manufacturer dedicated to providing Simply The Best...and offering top of the line units and service to back that statement?

ICOM America, Inc., 2380-116th Ave NE, Bellevue, WA 98004 **(206) 454-8155** / 3150 Premier Drive, Suite 126, Irving, TX 750
1777 Phoenix Parkway, Suite 201, Atlanta, GA 303

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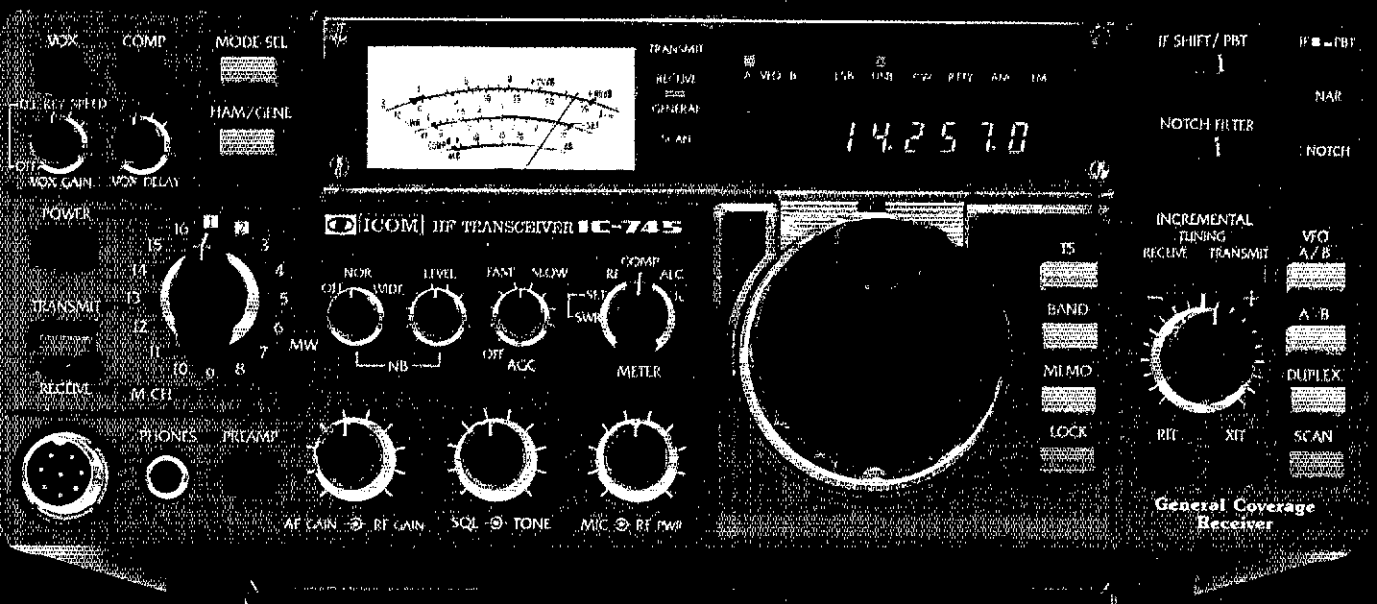
OM HF Transceiver

IC-745



High Performance Maximum Flexibility

he IC-745 is a full fea-ed, high performance HF e station transceiver n a 100dB dynamic range elver. PLUS features ally found only in more ensive units.

pare these exceptional ndard Features:

- 0KHz – 30MHz Receiver.
- 0 Watt RF output / 100% uty Cycle
- assband Tuning AND IF hift
- djustable Noise Blanker idth and level)
- djustable AGC
- eceiver Preamp
- tunable Memories with hium battery backup
- Wide selection of filters and filter combinations (opt.)
- Continuously adjustable transmit power
- 10Hz/50Hz/1KHz Tuning rates with 1MHz band steps
- IC-HM12 Microphone with Up/Down Scan

Other Standard Features. Included as standard are many of the features most asked for by experienced ham radio operators: dual VFO's, RF speech compressor, tunable notch filter, program band scan, memory scan, all-mode squelch and VOX.

Options. Internal IC-PS35 power supply, external IC-PS15 or IC-PS30 system supply, IC-SM8 two-cable desk mic, EX241 marker, EX242 EMI module, EX243 electronic keyer, IC-SM6 desk mic, and a variety of filters.

Filter	-6dB Width	Center Freq. MHz
FL45	500 Hz	9.000
FL54	270 Hz	9.000
FL44A	2.1 KHz	0.455
FL52A	500 Hz	0.455
FL53A	250 Hz	0.455

The IC-745 is the only transceiver today that has so much flexibility at a surprisingly low price. See it at your local ICOM dealer.

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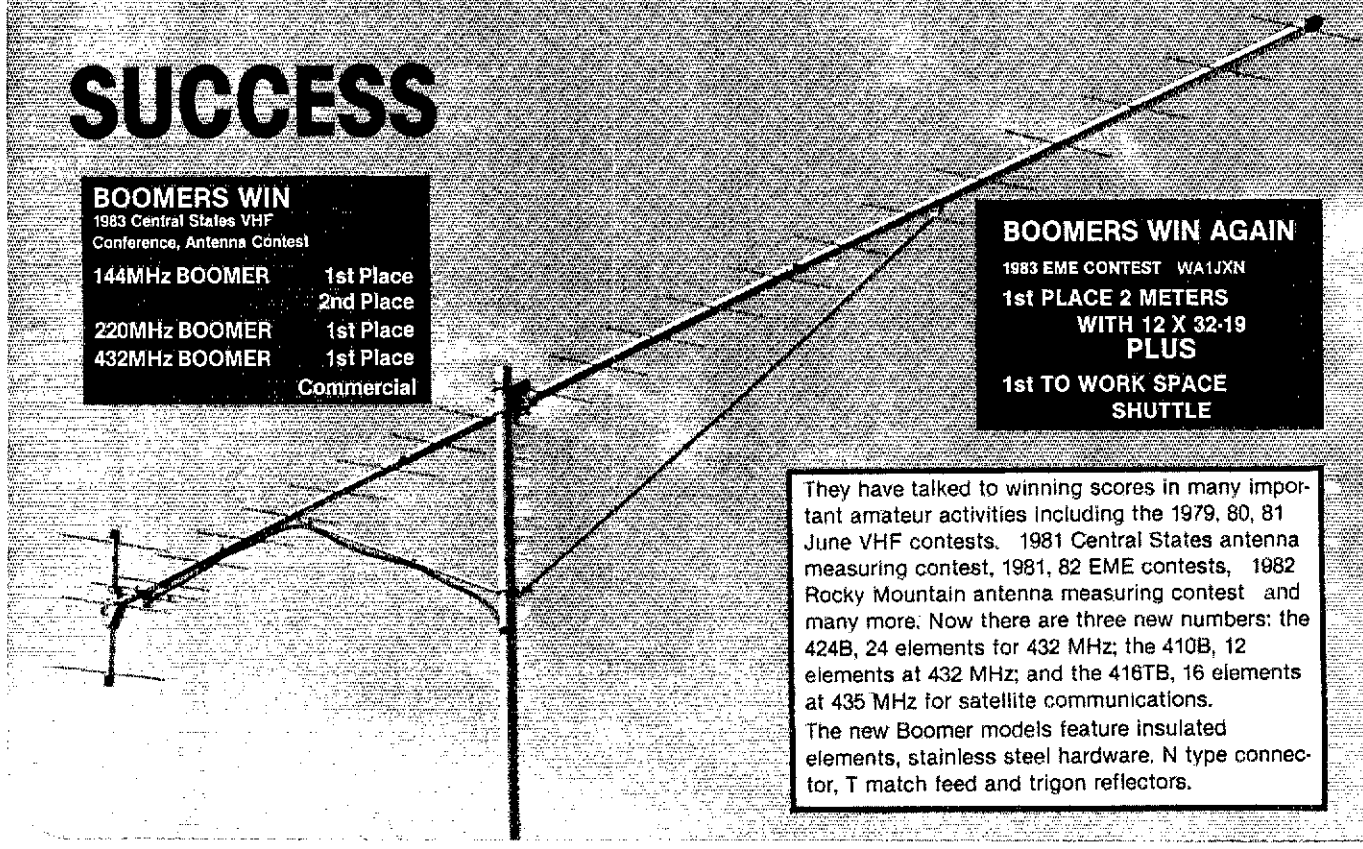
Our numbers talk

424B

SUCCESS

BOOMERS WIN
1983 Central States VHF Conference, Antenna Contest

144MHz BOOMER	1st Place
	2nd Place
220MHz BOOMER	1st Place
432MHz BOOMER	1st Place
	Commercial



BOOMERS WIN AGAIN
1983 EME CONTEST WA1JXN
1st PLACE 2 METERS
WITH 12 X 32-19
PLUS
1st TO WORK SPACE SHUTTLE

They have talked to winning scores in many important amateur activities including the 1979, 80, 81 June VHF contests. 1981 Central States antenna measuring contest, 1981, 82 EME contests, 1982 Rocky Mountain antenna measuring contest and many more. Now there are three new numbers: the 424B, 24 elements for 432 MHz; the 410B, 12 elements at 432 MHz; and the 416TB, 16 elements at 435 MHz for satellite communications.
The new Boomer models feature insulated elements, stainless steel hardware, N type connector, T match feed and trigon reflectors.

THREE EXCITING NEW BOOMERS

HIGHEST GAIN BOOMER XL

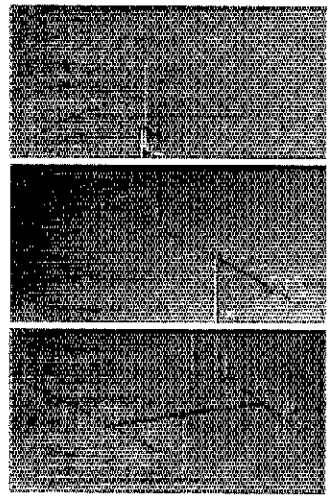
Boomer XL is "the antenna for 2 meter DX" with higher gain and cleaner pattern this antenna is designed to perform and survive in harsh environments. It has 18 elements on a 28.8 ft. 8.8 m tapered boom.
MODEL 4218XL 144-145 MHz

WIDEBAND BOOMER 215WB

Featuring the latest in wideband technology. The 215WB is high performance across the entire 2 meter band, for FM, SSB or CW. It features 15 elements on a 15 ft. 4.57 m boom.
MODEL 215WB 144-148 MHz

FM BOOMER POWER PACK

A combination of 215WB Boomers vertically polarized with support boom, power divider, and interconnect harness. Like all boomers it features all stainless steel hardware. You'll easily work those distant repeaters.
MODEL 230WB 144-148 MHz



OSCAR BOOMERS

Enjoy the thrill of OSCAR 10 with a Cushcraft antenna system, featuring the fabulous 416TB BOOMER, giving more performance through better electrical design and superior construction.

Order a complete package as shown left: 416TB, A144-20T and A14T-MB. For less than $200.00* you'll enjoy the thrill of worldwide OSCAR communications.

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IC-1271A

©M 1.2GHz Transceiver

Explore the World of 1.2GHz!

Explore the world of 1.2GHz with ICOM's new IC-1271A base station transceiver. ICOM has a complete line of 1.2GHz gear to meet your operating requirements...the IC-1271A base station, IC-120 mobile and IC-1210 repeater.

IC-1271A. ICOM introduces the first full-featured 1240 to 1300MHz base station transceiver, the IC-1271A. With 10 watts of RF output power, 32 memories, scanning and multi-mode operation including ATV (amateur TV), the IC-1271A is a pioneer in 1.2GHz technology. Whether your interest is in mobile, DX, repeater, satellite or moonbounce operation, the IC-1271A has exceptional receiver sensitivity because of its front end GaAs FETs.

A variety of options are available for the IC-1271A including the IC-EX310 voice synthesizer, UT-155 CTCSS encoder/decoder, IC-PS25 internal AC power supply and the TV-1200 interface unit.

TV-1200. The interface unit allows amateur television (ATV) operation when used in conjunction with a video recorder or a video camera for transmission, and a television monitor for reception. Explore the new facet of amateur radio, "video hamming."

RP-1210. Complete your 1.2GHz system with the RP-1210 repeater. The RP-1210 features PLL frequency selection (198 channel, DIP switch), high stability PLL, repeater access to CTCSS, three digit DTMF decoder for control of special functions, 10 watts, selectable hang time and ID'er.

IC-120. The 1.2GHz mobile transceiver features six memory channels, scanning, an HM-14 up/down scanning mic, RIT, LED readout and three tuning rates. Accessories include the ML-12 10 watt amplifier and the PS-45 slim-line power supply.

See ICOM's full line of 1.2GHz gear at your local ICOM dealer.

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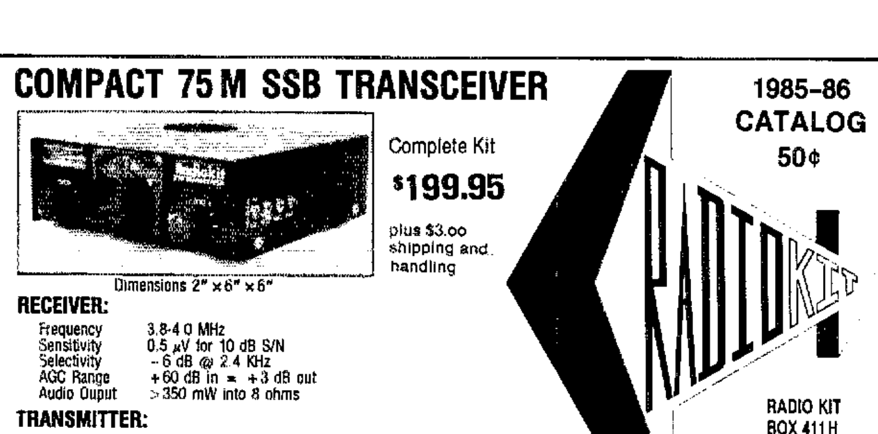
disaster. Am sure all of us felt great sorrow for the unfortunate loss of the seven brave astronauts. W7AB, recovering from a stroke, is back on the air pounding out CW on forty meters with his keyboard. Welcome back, Bob. K7HQT put up a 160 meter "guided wave" antenna by stringing wire under the facia plate around his house, and says it works like "gangbusters." K7OMR also reports good results on 160 using a loaded sloper off his fifty ft. tower. W7YS reports considerable activity in VE testing in Flagstaff. They have nine VEs and have tested sixty-two applicants with forty-nine successes since Oct. '84. Good work. We need more licensed hams. Changes along the ZIA two meter system are being planned. Among these are removing the Mt Lemmon 147.15 repeater and associated links. It's replacement will be 145.25 on Pinal Peak near Globe. Also, there is to be a westward extension to the Quartsite area which should provide coverage on both Interstates 8 and 10 into eastern California. Contact N5IA if you wish to contribute or support this FB linked-repeater system. Maricopa Co. Dept. of Civil Defense and Emergency Services is looking for volunteer operators. Contact KA7PAG at 273-1411 or 964-2787. WØROD submitted FB report on many recent and interesting activities at Green Valley R.C., including a demonstration of club stn on OSCAR 10. W7EP is doing a great job of collecting and reporting our monthly section traffic activity. Thanks, Bob. Ft. Tuthill hamfest now scheduled for July 25, 26 & 27. Mark your calendars and plan to be there. Have scheduled ARRL forum for Saturday afternoon. Speakers will include K9CH from League HQ as well as our own SW Divn Director, WA6WZO. See you there! 73, Jim.

NET	QNI	TFC
SWN	188	128
Cactus (2m)	242	69
Cactus (75m)	585	51
ATEN	1067	136
Apache JRN	356	50

Traffic: W7AMM 166, KB7FE 130, W7EP 126, K6LL 117, W7KCM 86, W7OIF 65, WB7CAG 53, KA7HEV 42, W7GAQ 37, W7KXE 31, WA7KQE 28, KE7EO 27, KA7MUL 27, K7POF 14, K7JKM 7, K7NMQ 6. (Dec.) WA7JCK 29, W7YS 1.

LOS ANGELES: SM, Bob Poole, AJ6F—ASM: K6IYK. SEC: AK6Y. STM: W6ING. ACC: KX7Q. OOC: K6BMG. Many thanks to the amateurs who forfeited sleeping in on the weekend of the Los Angeles Marathon. Hams were on-site in the early hours before the event in order to support KN6F in this important public-service event. The Hughes ARC, The Los Angeles Area Council of Radio Clubs and ARES/DCS members were instrumental in the successful performance of the various functional nets setup for the Marathon. Worthy of note is the fact that KN6F and many of the Marathon volunteers were out in support of the City of Los Alamitos' Marathon the day before! These tireless hams certainly are dedicated! KN6H reports the Los Angeles Council has moved to the Red Cross facilities in Los Angeles (Wilshire/Ramparts). The council serves as a forum for area clubs to exchange news and ideas. Does your club belong? SEC AK6Y arranged for a meeting in February of the Federal Executive Board on Emergency Preparedness to discuss the ARES plans for participation in the plan. W6PGM is the local representative to the Board. The same day, there were caucases of the Director's cabinet, Section Managers and several other groups. Attention leadership: if you haven't already done so, please remember to respond to the survey in the March QST Public Service Column. Deadline for comments is April 15. Congratulations to KN6H for not accepting a "NO" answer and persisting in getting the So. Cal. DX Club reinstated in the Los Angeles DWP auditorium for their regular meeting place. Contesting is fun for the serious contester and the casual "point givers" alike. Why not review the rules for the various contests as published in QST, and get on and give out a few points? You may surprise yourself with a rare contact to boot! Please support the Field Organization to whatever extent you can. Contact AJ6F for details on how you may be of service! QCWA Chapter 130 will have their spring dinner May 24 (location not announced yet). QCWA Chapter 7 will have their meeting and spring dinner April 12 at the Petty Officers Club on Terminal Island. The newly formed OOTC chapter will have their first official meeting in June. They plan to have quarterly meetings. Contact KA6HOQ or W6FYV for further info. January gave the traffic boys a rest. Now things will pick up again with Valentines just passed. We can look forward to the County Fair and Boy Scout messages starting up. Traffic: K6UYK 606, W6INH 303, WB6VPY 116, N6LHE 73, W6ORF 29, W6NKE 20.

ORANGE: SM, Joe H. Brown, W6UBQ—SEC: Jim, AE6N. STM: Ernie, WA6QCA. OCC: Alex, W6RE. SGL: Loren, N6HIQ. TC: John, KD7XG. PIO: Joe, WB6DXT. ACC: KB6FRW, Phil. OBM: Brooks, K6GGS. ARC Officers for 1986. Barstow ARC, Pres Bob N6KUW, Vice/Pres. Bill WB6SAK, Sec/Tres Donna N6LGY. Buena Park ARC, Pres, Art W6EA. Vice/Pres George KG6TB, Tres, Chester KB6EHX, Sec, Bob WA6PLM. Ways and Means, Arnie KA6HUI. Lee Deforst ARC, Pres, Willie WA6BAN. Vice/Pres W6WJ Stan. Sec N6HIW Rich. Trea KG6NL. The Coachella Valley ARC had six regular VEC exam sessions last year plus 2 special sessions. 110 people took the exams and 62 upgraded, plus numerous people took Novice tests. Buena Park ARC will be presenting a Novice class to the Boys Club of Buena Park (which includes girls). If all goes as planned, there will be group of Novices in a few months and will want to help them establish a station. Old gear and helpers will be needed. Have now received notification from ARRL that the Southern California Six Meter Club was elected to become an affiliated club, glad to have you with us (remember, there's strenth in numbers). ROAD Emergencies, an article in Jan 86, QST brings up one of the really valuable uses of a repeater-reporting traffic problems. The article goes into what situations should and should not be reported. Read it for your own education and to prepare for that emergency report. Paul, W6SUL, has Response Plan for the California Blood Bank System (CBBS). All amateurs should be familiar with the CBBS and their requirements. There is a blood bank net at 2000 on 3845 first Wed of each month, check in! A vital need exists. RED CROSS UN-DISASTER DAY, Jan. 22nd, was great success. A niche was made in the Orange Section Comm. System. Mike Burton (N6KZB) from the Riverside Co. Office of Emergency service stated that with the new technology, he was able to tie in all the shelters thru 440/220 remote and augment 2 meters and HF. The Riverside Co. 220 Repeater was invaluable. To those people who donate their time and equipment in the interest of Public Service and Amateur Radio. Thanks! Mark Costa KB6GNZ, Orange Co. Fire Department EMD Program Coordinator had requested a meeting with ARES ARRL Officials. Purpose of the meeting: to coordinate a Disaster Response Support Plan to include RACES, ARES,



ICOM 144, 220 and 440MHz

MOBILES

The World's Most Compact Mobiles

ICOM's three ultra compact mobiles...the IC-27A 2-meter, the IC-37A 220MHz and the IC-47A 440MHz... are the smallest mobiles available.

Even in such a small package, the 25 watt mobiles contain an internal speaker which makes them fully self-contained and easy to mount.

Size. The ICOM compacts measure only 5½"W x 1½"H x 7"D (IC-47A is 9" deep), which allows them to be mounted in various "compact" locations. Yet the compacts have large operating knobs which are easy to use in the mobile environment.

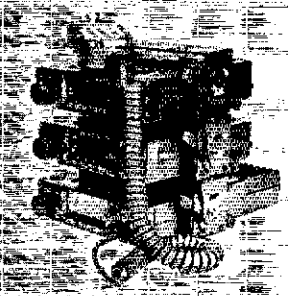
More Features. Other IC-27A/37A/47A standard features include a mobile mount, IC-HM23 DTMF mic with up/down scan and memory scan, and internally adjustable transmit power. An optional IC-PS45 slim-line external power supply and IC-SP10 external speaker are also available.

32 PL Frequencies. The IC-27A/37A/47A come complete with 32 PL frequencies.

9 Memories. The compact mobiles have 9 memories which will store the receive frequency, transmit offset, offset direction and PL tone. All memories are backed up with a lithium battery.

Speech Synthesizer. To verbally announce the receive frequency, an optional UT-16 voice synthesizer is available.

Scanning. The ICOM compacts have four scanning systems...memory scan, band scan, program scan and priority scan. Priority may be a memory or a VFO channel, and the scanning speed is adjustable.



Stacking Mobile Mounts. The IC-27A/37A/47A can be stacked to provide a three-band mobile station. Each band is full featured and will operate even when another band is in use.

The IC-27A/37A/47A provide superb performance in the mobile radio environment. See them at your local ICOM dealer.

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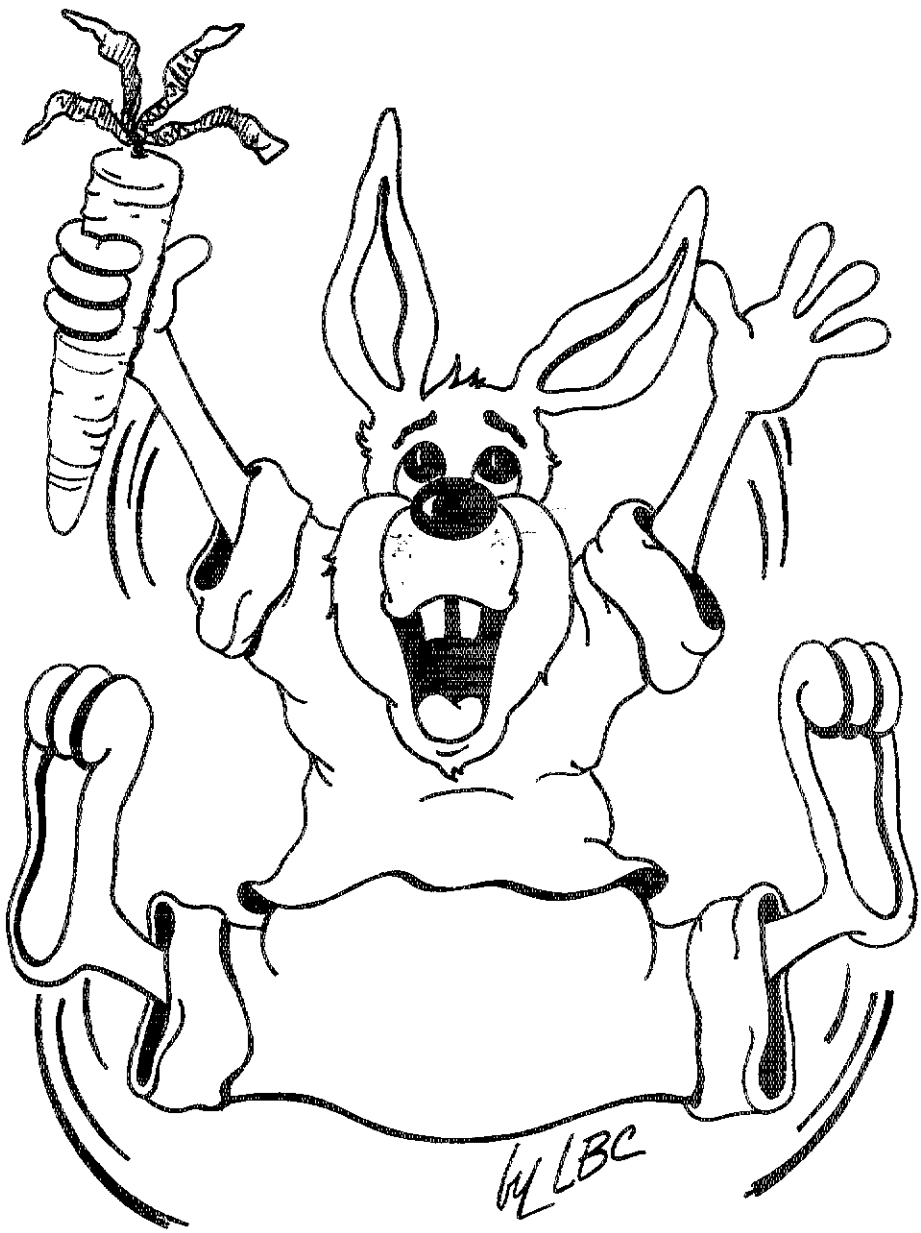
HAPPINESS IS A FRESH CARROT AND...

Doug DeMaw's QRP Notebook!

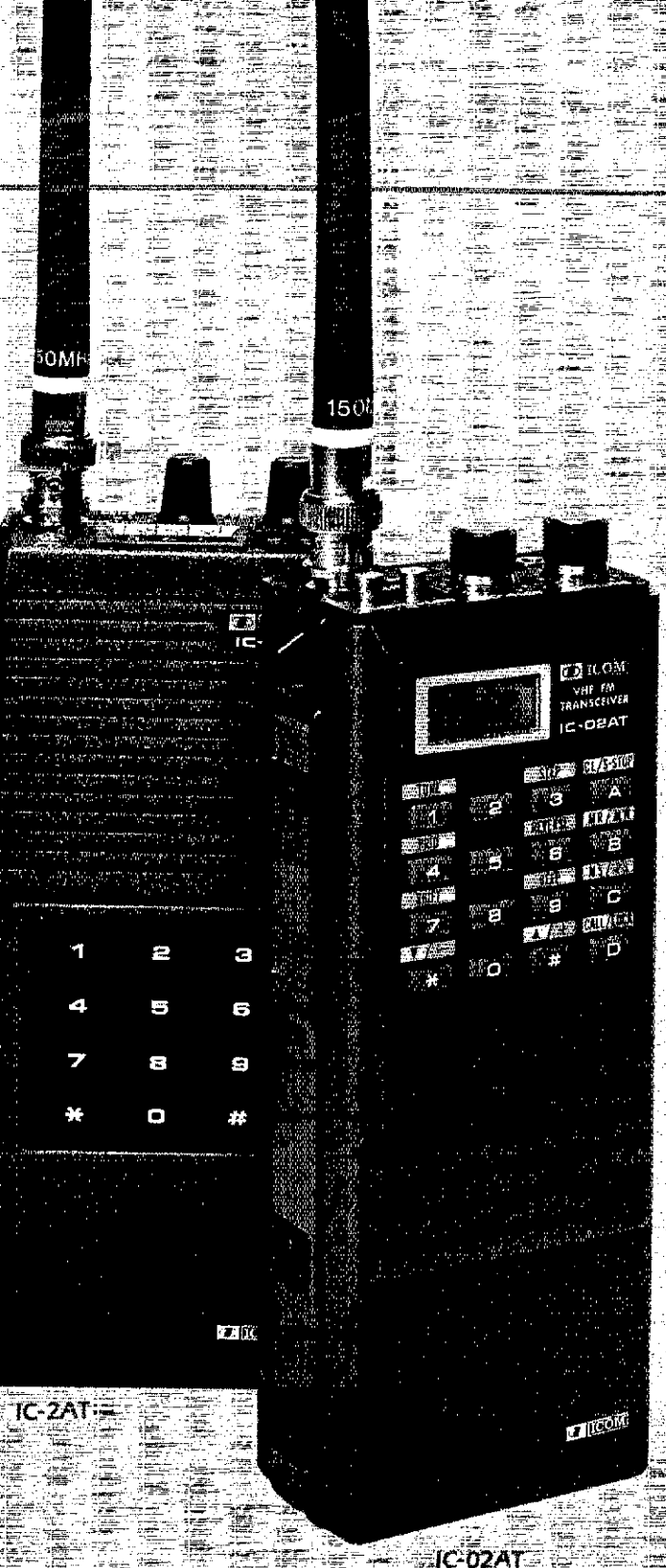
Doug DeMaw, W1FB, has been writing articles about QRP operating and equipment construction for many years. In this new ARRL publication, Doug presents construction projects for the QRP operator, from a simple one-watt crystal-controlled transmitter to more complex transceiver designs. Rather than simply presenting a collection of completed units, Doug guides you through the projects "building-block" style. This way, you gain an understanding of how the circuits operate and learn how the building blocks might be put together in other configurations.

Experimentation and low-power operating go hand in hand. Construction of a complete modern transceiver is a major undertaking, but some of the circuits in this book can be put together in an evening or a weekend from a few dollars' worth of parts. Once built, the equipment can be tested and improved as your understanding and skill grow. Many of the simpler circuits can be used later as parts of the more complex projects. The **QRP Notebook** will be available during mid-April. 112 pages #0348 copyright 1986 $5 Postage and handling $2.50 ($3.50 for UPS)



THE AMERICAN RADIO RELAY LEAGUE, INC.
225 MAIN STREET
NEWINGTON, CT 06111

IC-02AT



IC-2AT

IC-02AT

ICOM 2-Meter Handhelds

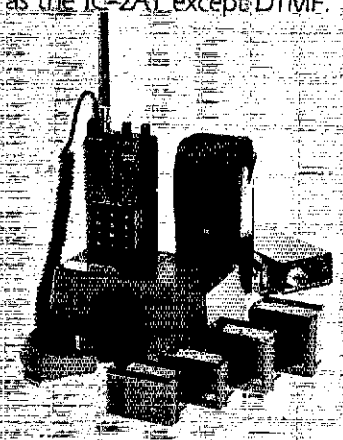
If you want a 2-meter handheld with exceptional features, quality built to last and a wide variety of interchangeable accessories, take a look at the ICOM IC-02AT and IC-2AT handhelds.

Frequency Coverage. The IC-02AT covers 140.000 through 151.550MHz and the IC-2AT, 141.500 through 149.994MHz...both include frequencies for MARS operation.

IC-02AT Features. ICOM's top-of-the-line IC-02AT handheld has the following outstanding features:

- DTMF direct keyboard entry
- LCD readout
- 3 watts standard, 5 watts optional (with IC-BP7 battery pack)
- 10 memories which store duplex offset and PL tone (odd offset can be stored in last 4 memories)
- Frequency dial lock
- Three scanning systems: priority, memory and programmable band scan (selectable increments of 5, 10, 15, 20 or 25KHz)

IC-2AT Features. The IC-2AT is ICOM's most popular handheld on the market. The IC-2AT features a DTMF pad, 1.5 watts output and thumbwheel frequency selection. The IC-2A is also available and has the same features as the IC-2AT except DTMF.



Accessories. A variety of slide-on battery packs are available for the IC-02AT and IC-2AT, including the new long-life 800mAH IC-BP8 which can be used with both handhelds.

Other accessories include the HS-10 boom headset, HS-10SB PTT switchbox, HS-10SA VOX unit (for IC-02AT) and an assortment of battery pack chargers.

The IC-02AT and IC-2AT come standard with an IC-BP3 NiCd battery pack, flexible antenna, AC wall charger, belt clip, wrist strap and ear plug. See the IC-02AT and IC-2AT 2-meter handhelds at your local ICOM dealer.

Often imitated, never duplicated.

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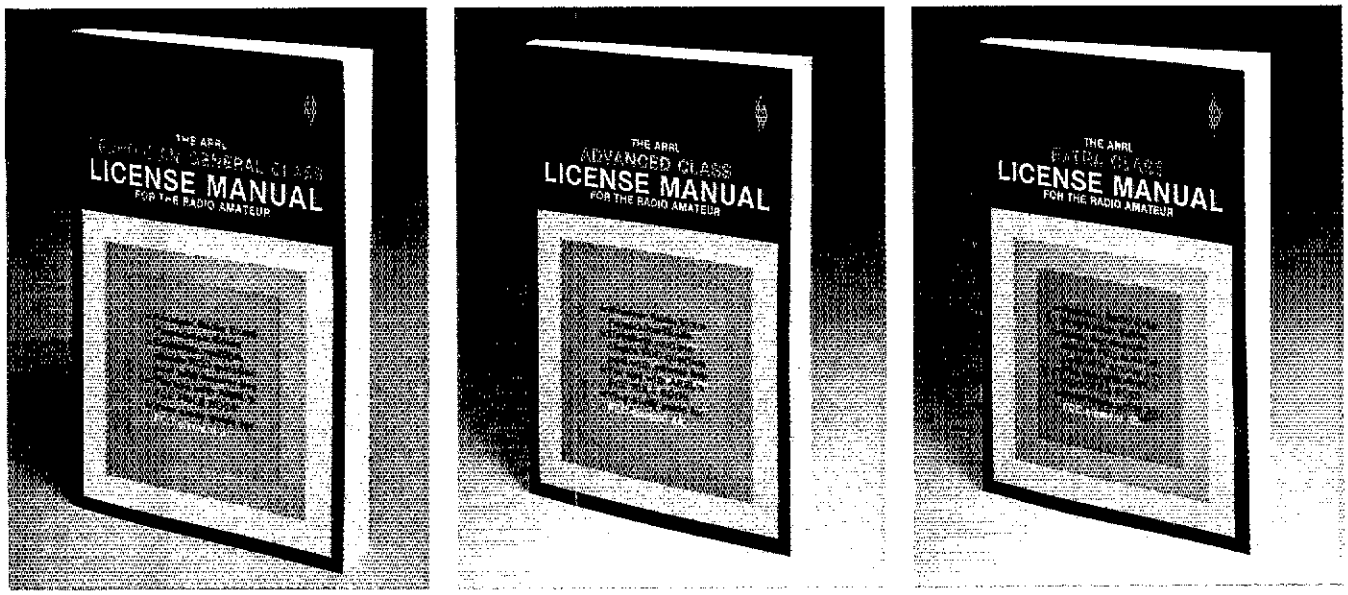

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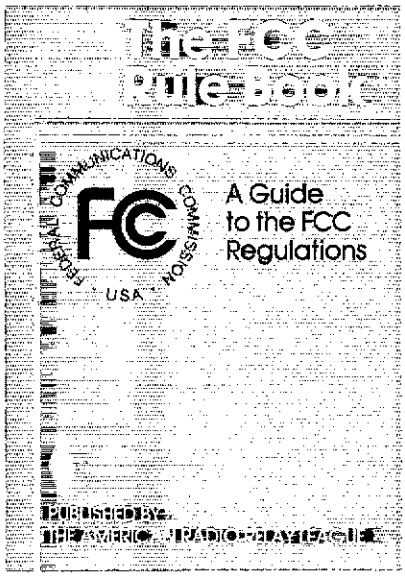
THE 1986-1987 ARRL
TECHNICIAN/GENERAL
CLASS LICENSE MANUAL

The ARRL 1986-1987 Technician/General Class License Manual has just been revised to include the question pool now in use. Like the other books in our **License Manual Series,** we begin each chapter with a list of key words. The reader is directed to study small groups of questions as the appropriate portions of the text are covered. **Tune in the World with Ham Radio** for the beginner was just revised also and has all of the up-to-date information the student needs in order to pass the Novice exam. Every amateur needs a current copy of the FCC rules and interpretations, and **The FCC Rule Book** fills this need besides being must reading as a study guide for the regulatory material found on the exams.



Tune in the World with Ham Radio 1986 edition
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Duaf Bands. The IC-3200A overs both the 2-meter 40.000–150.000MHz) and 0cm (440.000–450.000MHz) nds. The IC-3200A also fea- res fully programmable off- ts in 5KHz steps for MARS d CAP repeater operation.

25 Watts. The IC-3200A livers 25 watts of output on th bands. Or the low power n be adjusted to one to ten atts.

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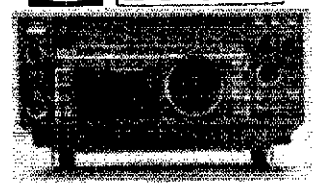

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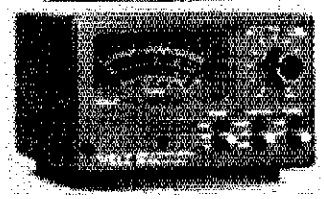

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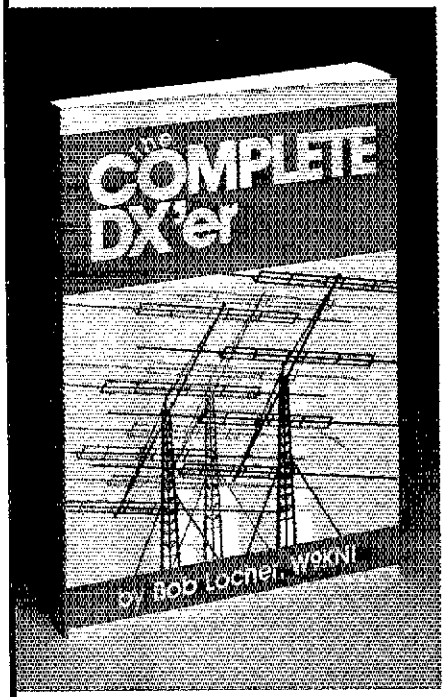

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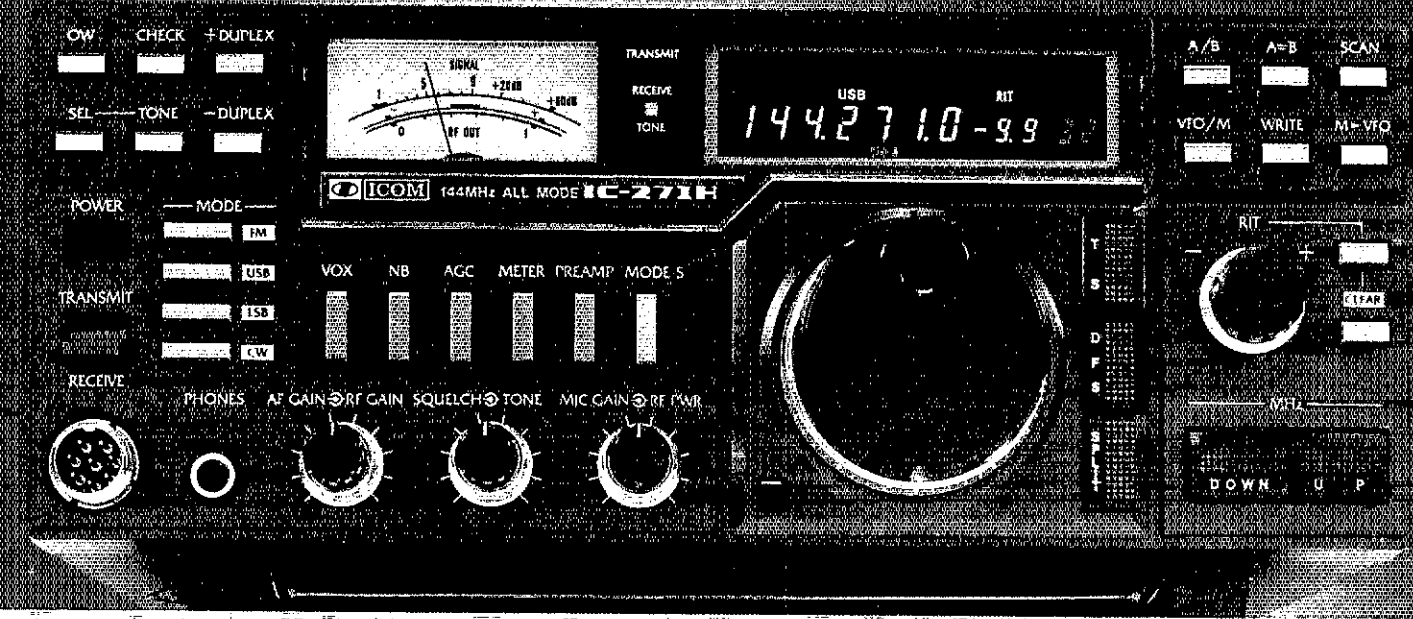
The Complete DX'er by Bob Locher, W9KNI covers all important aspects of the DX'ers life both in and out of the pileups: the art of listening, the chase, the capture and the quest for the elusive QSL. Gives advice on equipment and antenna selection. Contains 187 pages of practical information.

Both books are written by avid DX'ers, and you shouldn't be without either of these books. Both are paperbound and sell for $10.00 each. Add $2.50 ($3.50 for UPS) per order for shipping and handling.

ARRL 225 MAIN ST., NEWINGTON, CT 06111

ICOM VHF Transceiver

IC-271H



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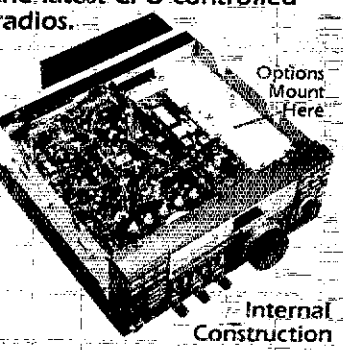
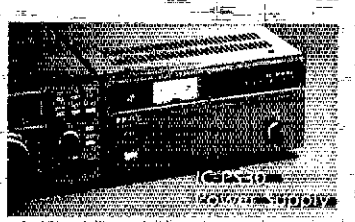
For the ultimate in 2-meter communications, ICOM presents the IC-271H transceiver with a high dynamic range receiver and a 100 watt transmitter...And all the advanced functions of the latest CPU controlled radios.



Internal Construction



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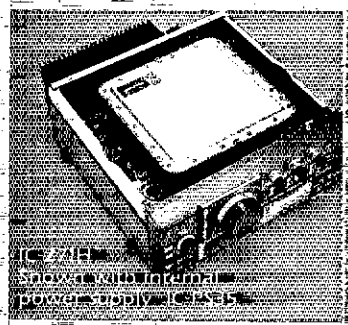

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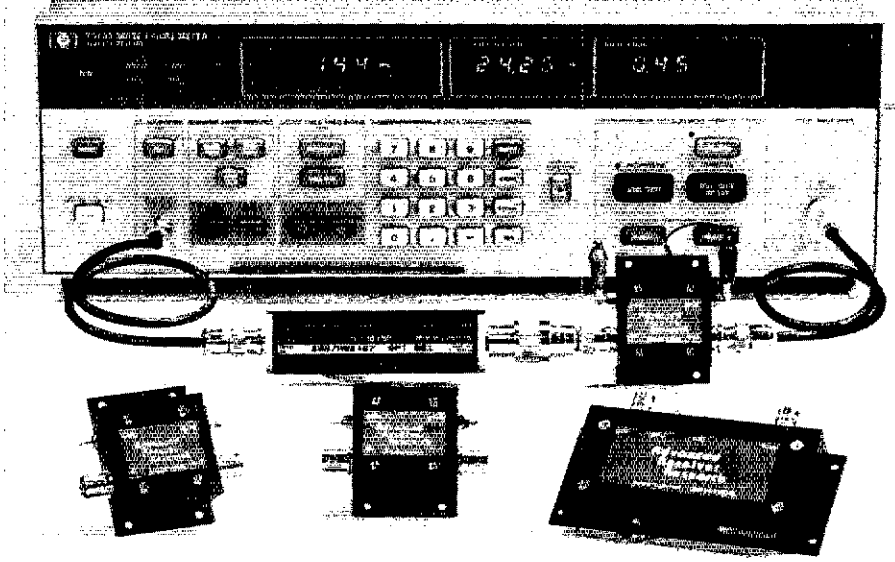

Receive Only	Freq. Range (MHz)	N.F. (dB)	Gain (dB)	1 dB Comp. (dBm)	Device Type	Price
P28VD	28-30	< 1.1	15	0	DGFET	$29.95
P50VD	50-54	< 1.3	15	0	DGFET	$29.95
P50VDG	50-54	< 0.5	24	+ 12	GaAsFET	$79.95
P144VD	144-148	< 1.5	15	0	DGFET	$29.95
P144VDA	144-148	< 1.0	15	0	DGFET	$37.95
P144VDG	144-148	< 0.5	24	+ 12	GaAsFET	$79.95
P220VD	220-225	< 1.8	15	0	DGFET	$29.95
P220VDA	220-225	< 1.2	15	0	DGFET	$37.95
P220VDG	220-225	< 0.5	20	+ 12	GaAsFET	$79.95
P432VD	420-450	< 1.8	15	− 20	Bipolar	$32.95
P432VDA	420-450	< 1.1	17	− 20	Bipolar	$49.95
P432VDG	420-450	< 0.5	16	+ 12	GaAsFET	$79.95
Inline (rf switched)						
SP28VD	28-30	< 1.2	15	0	DGFET	$59.95
SP50VD	50-54	< 1.4	15	0	DGFET	$59.95
SP50VDG	50-54	< 0.55	24	+ 12	GaAsFET	$109.95
SP144VD	144-148	< 1.6	15	0	DGFET	$59.95
SP144VDA	144-148	< 1.1	15	0	DGFET	$67.95
SP144VDG	144-148	< 0.55	24	+ 12	GaAsFET	$109.95
SP220VD	220-225	< 1.9	15	0	DGFET	$59.95
SP220VDA	220-225	< 1.3	15	0	DGFET	$67.95
SP220VDG	220-225	< 0.55	20	+ 12	GaAsFET	$109.95
SP432VD	420-450	< 1.9	15	− 20	Bipolar	$62.95
SP432VDA	420-450	< 1.2	17	− 20	Bipolar	$79.95
SP432VDG	420-450	< 0.55	16	+ 12	GaAsFET	$109.95

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and other Amateur Radio Emergency Service groups. The ATC Program is alive and well, the TC reports a document detailing packet station equipment requirements for school shelters under Project Quake Safe has been prepared for Riverside Co. Emerg. Svcs Div of Co. Fire Department. A helping hand was given to the OOC W6RE regarding a CATV1 problem. A fine example of the system at work. OO and ATC working together. Conducted survey of Orange Co EOC RACES Room with Program Coordinator Emergency Services Division of the Orange Co. Fire Dept. Purpose: to assess capabilities and make recommendations to fully utilize Amateur Radio. A buzy month for the TC. John also copies (on tape) MARCE telemetry via AO-10 from Shuttle STS-61C and sent same to AMSAT and MARCE Officials. For how to or speaking engagements call John Lind, KD7XG, 714-737-9949.

NET	FREQ.	TIME	SESS	QNI	TFC	NM
SCN/1	3598	1830	31	247	175	WF6O
SCN/2	3598	2015	30	166	73	WF6O
SCN/V	146.645	2100	31	424	215	WA6QCA
RTTY/V	145.12	0900	62	485	132	KA6HDX

JAN 86 PSHR: WF6O, WA6QCA, WB6QBZ, KA6HJK/T. Traffic: WF6O 422, WA6QCA 187, KA5HJK 176, N6GOT 108, WA6QBZ 97, K6ZCE 44, AD0A 36, W6CPP 16, W6RE 11, N6LNI 2, KE6US 28.

SAN DIEGO: SM, Arthur R. Smith, W6INI—1986 National Convention, Sep 5-7, in San Diego. Packet was demonstrated for the San Diego Red Cross on "Undisaster Day" with a link from a simulated Mass Care Center to Red Cross Headquarters. Damage assessment reports and shelter registration info were sent. WA7HRA operated with an Apple 2E computer. N6BUK with a Commodore 64. Assisting were W6INI, N6JZE, K6PD, KD6QJ, W6QLJ. A county-wide earthquake drill is planned for May 2. Packet can show off its capabilities if enough operators can participate with ARES. Portable operation with hard copy is a must. 120 v ac gear can be operated from inverters. Contact WB6TOF (277-6779) for info. Attn public service event coordinators: To get recognition for participants, file copy of FSD-157 with me after event. Copies available on request. 1986 club officers: Poway ARS Pres WB5TAA, VP N6KGM, Sec N6EFG, Treas K7YCI, South Bay ARS Pres W6VMN, VP K6QM, Sec KG6IV, Treas KF6UB. Call sign change: KG6ZL to WO6P. Upgrade: KE6VB to Extra NCTN: 30 Sessions, 45 msgs. ARES CW: NCS WA6IIK reports 4 sessions with 15 ck-ins. Traffic: KU6D 140, N6GW 25.

SANTA BARBARA: SM, Byron Looney, K6FI—The ARES flood exercise in Santa Ynez Valley will be history when you read this. Santa Barbara ARC and SYV group are coordinating to make this a county effort. Santa Maria ARES meets at 7:30 on second Thursdays. Bring your mobile rig into Santa Maria fire station Saturday morning for a checkup. Satellite ARC already making FD plans to recover the Trophy from Paso Robles ARC. Your SM recently spent some time in Ventura and Santa Barbara listening to emergency nets. Very impressive. SLRC looking for students to sponsor at CSTI Earthquake classes starting next September. It is the only emergency management school in the county and a very worthwhile experience for ARES types. Contact the SM. Traffic: K6YD 27, N6HYM 22.

WEST GULF DIVISION

NORTHERN TEXAS: SM, Phil Clements , K5PC—ASM/ACC: NI5V. STM: AE5I. PIO: K5HGL. RFI: WB5JBP. TC: W5LNL. BM: W5OXK. SGL: W5UXP. The Section files have been purged and updated, and here is the appointee list as of Feb. 15th: ATCs: K5UPN KE5ZW KD5RC WA5KZA WB5KYK N5FXX KA5RCG W5RIY K5OD. PIAs: N5HBV WB5KTD WD5EEH. NMs: WB5VIH K5EVI KD5RC. OBSs: K5UPN NJ5Q K5IID NF5T. OOs: N5ANO K5PC K5EE KB5GU K2SCU W5ARV. ORSs: K5UPN NB5T KD5RC KB5UQ NI5V NF5T KB5UL AE5I WB5CIC. OESs: N5EZM KB5UQ WB5CIC. District ECs: K5UPN; East Tx Dist. 16 W5GPO; W.F. area; Dist. 8 N5OX; Childress area, Dist. 5. N8AJP; Waco area, Dist. 13. WA5KZA; Paris area, Dist. 14. W5MVJ; Panhandle, Dist 1. NF5T; Graham area, Dist. 9. WA5RWW; Lubbock area, Dist. 2. KB5UL; Snyder ara, Dist. 7. AE5I; Abilene area, Dist. 6. WB5CIC; Dallas area, Dist. 12B. K5MWC; Plano area, Dist. 12C WB5FLQ; Ft. Worth area, Dist. 12A. The Emergency Coordinators will be published next month as space does not permit in this report! Many thanks to all appointees for your service to amateur radio and your communities. Our League has grown by 15,000 members in the last year, including a record increase in our Section. Let's put these new members to work in their area of interest and expertise. Appointments are available in all areas of our Section structure. PSHR for January '86: KB5UL KA5SPT W5VMP K5UPN K5EVI. Traffic: KB5UL 192, W5TNT 144, KD5RC 142, W9OYL 139, KA5SPT 127, N5BT 112, K5UPN 110, KB4HML 69, K5EVI 65, N5BT 43, KA5QYV 19, W5VMP 18, W5ERT 18, N5IGR 16, KB5UQ 4, K5PC 1.

OKLAHOMA: SM, Dave Cox, NB5N—ASM: K5WG. SEC: W5ZTN. ACC: NJ5Y. BM: W5AS. STM: KV5X. PIO: WD5IFB. OOC: K5WG. SGL: W5NZS. TC: W5QMJ. Tornado season has arrived and I trust everyone has prepared well. OCAPA hosted an excellent WX meeting Feb. 18 for central Oklahoma hams. TRO WX meeting is March 22 for hams in northeast part of the state. Questions about WX net operations should be directed to your local coordinator. Information also available from your local EC, District EC (NR5L K5ENA W5VXU KE5MT N5FM), or the Section EC (W5ZTN). Upcoming events: Lawton Swapfest, Apr. 12; Mooreland Eye-ball QSO, Apr. 13 (VE exams on the 12th). New appointees: ECs NZ5H, Wagoner Co.; WB5OSM, Tulsa Co. Packet activity has escalated tremendously throughout state. Over 50 hams from OK, AR, and KS assembled in Muskogee Jan. 18 to discuss formation of OAKNET, a regional network to enhance packet activity. Kudos to all the pioneers in this news and exciting mode. Anyone interested in sharing our fascinating hobby with civic groups, schools, and other non-ham organizations are encouraged to join the new Section Speakers Bureau. Contact the PIO, WD5IFB, for information, or to join. Traffic: W5AS 229, K5CXP 202, WB5OHK 185, NX5I 172, WB5SRX 136, W5VXU 129, KB5EK 127, NX5E 110, KV5X 103, NB5N 88, NQ5W 87, W5RB 84, WA5OUV 83, N5IKN 72, W5REC 71, WD5IFB 51, NR5L 43, NG5O 40, K5GBN 32, W5VOR 30, WA5OGC 28, WA5ZOO 27, K5CAY 21, KX5W 6, KA5WGS 5, N5GVK 5, KA5TTH 5, N5DWN 4, ND5S 2.

SOUTHERN TEXAS: SM, Arthur R. Ross, W5KR—SEC: KA5KRI. STM: K5QEW. ASM: N5TC. TC: NZ5U. PIO: WA5UZB. OOC: WA2VJL. To all traffic handlers: please send your traffic totals to STM K5QEW; send other station activity information to SM W5KR. OOs reporting: W5BKK, K5VRF, WA2VJL; OOC WA2VJL still looking for OO applicants, especially in Corpus Christi and San Antonio areas. PIO WA5UZB reports Northwest ARS using their regular net to pass NTS traffic; working on NTS af-

ICOM 440MHz

For a Total UHF System, Choose ICOM

ICOM offers a variety of UHF gear to meet your operating requirements... the IC-471H base station transceiver, IC-47A compact mobile, IC-04AT or IC-4AT handheld transceivers, and the RP-3010 crystal controlled repeater.

The IC-471H all mode 430-450MHz base station transceiver provides 10 to 75 watts of adjustable power. With 32 full-function memories, 32 PL tones, memory scan, mode scan and programmable band scan, the IC-471H provides maximum UHF base station performance. The IC-471A 25 watt version is also available.

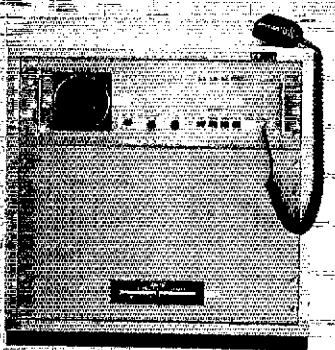
The IC-47A 25 watt 440-449.995MHz ultra-compact FM mobile provides superb performance in the mobile environment. Measuring only 5½" wide by 1½" high by 9" deep, the IC-47A also features nine full-function memories, 32 built-in PL tones and a complete scanning system. Each unit comes standard with an HM-23 mic with up/down scan and a mobile mounting bracket.

Optional AG-35 Mast Mounted GaAsFET Preamplifier for IC-471H

The IC-04AT top-of-the-line UHF handheld features DTMF direct keyboard entry, LCD readout, 32 PL tones, 3 watts standard (5 watts optional) and 10 memories which store duplex offset and PL tone.

The IC-4AT handheld features 440-449.995MHz coverage, a DTMF pad, 1.5 watts output and thumbwheel frequency selection.

The IC-04AT and IC-4AT come standard with an IC-BP3 NiCd battery pack, flexible antenna, AC wall charger, belt clip, wrist strap and ear plug. PLUS a wide variety of slide-on battery packs and accessories are available.



The RP-3010 crystal controlled UHF repeater covers from 430-450MHz and includes CTCSS, 3 digit DTMF decoder and CW ID'er.

See ICOM's full line of UHF gear at your local ICOM dealer.

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All stated specifications are approximate and subject to change without notice or obligation. All ICOM radios significantly exceed FCC regulations limiting spurious emissions. 471-HU184

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2m HT with TTP

FT 103
220 MHz HT / TTP

FT 703
440 MHz HT / TTP

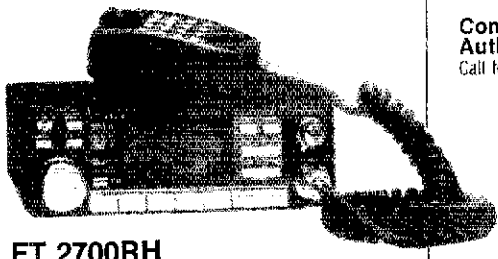
FT 209RH
2m Handheld

FT 709R
440 MHz Handheld

Accessories:
YH-2 Headset
MH-12A2B Speaker/Microphone
FTS-6 Programmable Tone Squelch
PA-3 DC/DC Car Adapter/Trickle Charger
MMB-21 Mobile Hanger Bracket
NC-15 Quick Charger/DC Adapter
FBA-5 Battery Case for 6xAA
FNB-3 10.8V, 425 mAh Ni-Cd pack
FNB-4 12V, 500 mAh Ni-Cd pack

FT 726R
Especially good for Oscar

Accessories:
6m-726 6-meter module
430-726 430-440 unit for Oscar
440-726 440-450 FM unit
HF-726 10-12-15 meter unit
SU-726 Satellite Duplex module
XF 455 MC 600 Hz CW Filter

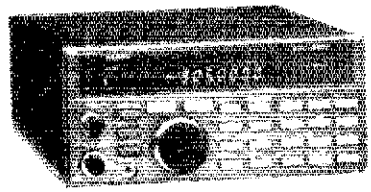


FT 2700RH
Duo-band 2m/440 Mobile Radio

FT 270RH
Compact 45 Watt 2m FM Mobile

Accessories:
FTS-8 Programmable Tone Squelch Unit
FVS-1 Voice Synthesizer Unit

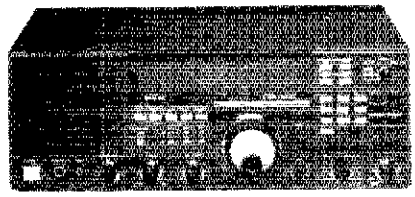
SHORTWAVE LISTENING



FRG 9600
Scanning Receiver for 60-905 MHz
FM/AM/SSB, 100 memories

Accessories:
PA-4B/PA-4C AC-DC Wall Adapter
SP-55 External Speaker
NTSC Video Unit

Coming soon: Software to extend the range of the 9600. Call for details.



FRG 8800
General Coverage Receiver
All-band, all-mode
AM/SSB/CW/FM, 150kHz-30MHz

Accessories:
FRV-8800 Converter for 118-174 MHz
FRA-7700 Active Ant for 150kHz-30MHz
FRT-7700 Antenna Tuner
DC-8800 12-volt kit
SP-102 Speaker with filters

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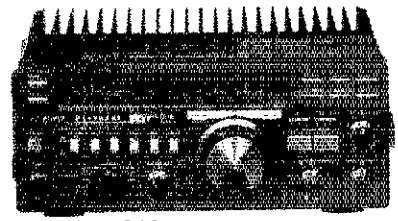
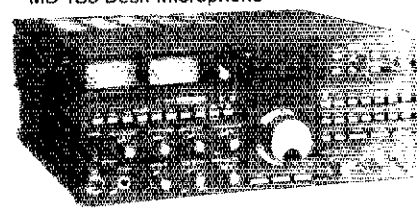
HF TRANSCEIVERS



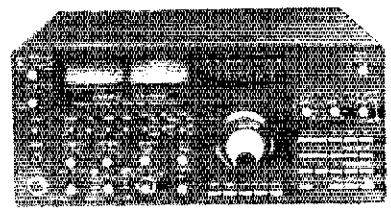
FT 757GX
Mobile Transceiver, SSB/CW/AM/FM
General Coverage Receiver
Receives 500kHz-30MHz

Accessories:
FP-757GX Flatpack Power Supply
FP-757HD Heavy Duty Power Supply
FC-757AT Automatic Antenna Tuner
FAS-1-4R Remote Antenna Selector
SP-102 Speaker
SP-102P Speaker
MMB-20 Mobile Mounting Bracket
FRB-757 Relay Box
MD-1B8 Desk Microphone



FT 980 CAT
Computer Controlled Transceiver

Accessories:
GEN-980 General Coverage Kit
XF 8.9 HC 600 HzCW Filter
XF 455.8 MCN 300 Hz CW Filter
SP-980 Speaker
SP-98P Speaker Patch
MD-1B8 Desk Microphone



FT ONE
General Coverage Transceiver
The all-mode Super Radio

FT 77
Compact Transceiver

Accessories:
FP-700 Power Supply
FC-700 Antenna Tuner
FM-77 FM Unit
MK-77 Marker Unit
FV-700DM External VFO
XF 8.9 KC 600 Hz CW Filter

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Handy Handful...

TR-2600A/3600A

Kenwood's TR-2600A and TR-3600A feature DCS (Digital Code Squelch), a new signalling concept developed by Kenwood. DCS allows each station to have its own "private call" code or to respond to a "group call" or "common call" code. There are 100,000 different DCS combinations possible.

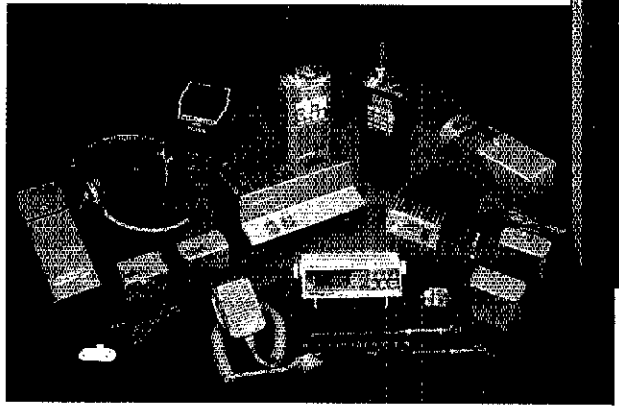
- **Simple to operate**
  Functional design is "user friendly." Built-in 16-key autopatch encoder, TX STOP switch, REVerse switch, KEYboard LOCK switch, high efficiency speaker.
- **Large LCD**
  Easy to read in direct sunlight or in the dark with convenient dial light that also illuminates the top panel S-meter.
- **Extended frequency coverage**
  Allows operation on most MARS and CAP frequencies. Receive frequency range is 140-160 MHz. (TR-3600A covers 440-450 MHz.)
- **Programmable scan**
  Channel scan or band scan, search for open or busy channels.
- **SLIDE-LOC battery case**
- **10 Channels**
  10 memories, one for non-standard repeater offsets.
- **2.5 watts high power, 350 mW low**
  TR-3600A has 1.5 watts high or 300 mW low.

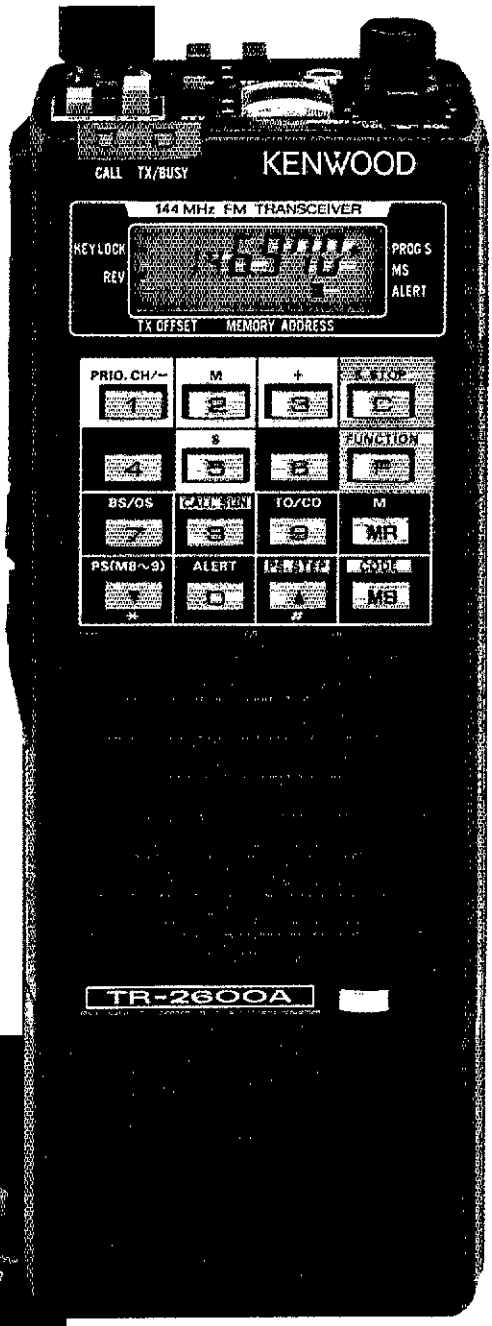
The Kenwood TR-2600A and the TR-3600A pack "big rig" features into the palm of your hand. It's really a "handy handful"!

Optional accessories:

- TU-35B built in programmable sub-tone encoder
- VB-2530 2-m 25 W RF power amp.
- ST-2 base stand/charger
- MS-1 mobile stand/charger
- PB-26 Ni-Cd battery
- DC-26 DC-DC converter
- HMC-1 headset with VOX
- SMC-30 speaker microphone
- LH-3 deluxe leather case
- SC-9 soft case with belt hook
- BT-3 AA manganese/alkaline battery case
- EB-3 external C manganese/alkaline battery case
- RA-3 2-m telescoping antenna
- RA-5 2-m/70-cm telescoping antenna
- AX-2 shoulder strap w/ant. base
- CD-10 call sign display
- BH-2A belt hook

More TR-2600A and TR-3600A information is available from authorized Kenwood dealers.





KENWOOD

TR-2600A shown. TR-3600A is available for 70 cm operation.
Complete service manuals are available for all Trio-Kenwood transceivers and most accessories.
Specifications and prices are subject to change without notice or obligation.

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1111 West Walnut Street
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AMERITRON

AL-1200

LINEAR AMPLIFIER

1500 Watts Output—All Modes
160 Through 15 Meters

The **Ameritron AL-1200** Linear Amplifier is designed for 1500 watts output (over 2500 watts input) on all modes with high efficiency and total reliability. The **AL-1200** covers the amateur radio bands 160 through 15 meters. It also features wide frequency coverage for MARS and other services authorized to operate at high power.

The **AL-1200** uses the rugged, inexpensive Eimac 3CX1200A7 high-mu ceramic/metal triode in a Class AB_2 grounded grid circuit.

The built-in ALC circuit prevents the amplifier output from exceeding 1500 watts if the exciter gain is inadvertantly set too high.

The power supply has a commercial service rated 32 lb. hypersil transformer and heavy duty rectifiers in a full wave bridge circuit with computer grade capacitors. No load voltage is 3600 V. full load voltage is 3300 V.

Two bias settings allow either high efficiency RTTY and CW operation at 1500 watts of continuous output at nearly 70% plate efficiency or low distortion 1500 watt PEP, SSB, SSTV, or AM output.

AL-1200 SPECIFICATIONS:

Frequency Coverage: 1.8, 3.5, 7, 14, 21 MHz and WARC bands. Export model also includes 28 MHz.

Input Circuit: adjustable pi-network, VSWR 1.2:1 or less at resonance.

Input Bandwidth: 20% for 2:1 VSWR or better.

Drive Requirements: 90 watts typical for 1500 watts output.

Dimensions: 18½"D. x 17"W.x10"H.
Weight: 77 lbs.

AL-80A LINEAR AMPLIFIER

The Ameritron AL-80A combines the economical 3-500Z with a heavy duty tank circuit to achieve nearly 70% efficiency from 160 to 15 meters. It has wide frequency coverage for MARS and other authorized services. Typical drive is 85 watts to give over 1000 watts PEP SSB and 850 watts CW RF output. A new Pi-L output circuit for 80 and 160 gives full band coverage and exceptionally smooth tuning.

The AL-80A will provide a signal output that is within 1/2 "S" unit of the signal output of the most expensive amplifier on the market—and at much lower cost. Size: 15½"D.x14"W.x8"H. Weight: 52 lbs.

AMERITRON, DIVISION OF PRIME INSTRUMENTS, INC.
9805 WALFORD AVENUE • CLEVELAND, OHIO 44102 • (216) 651-1740

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Master code or upgrade in a matter of days. **Code Quick** is a unique breakthrough which simplifies learning Morse Code. Instead of a confusing maze of dits and dahs, each letter will magically begin to call out its own name! Stop torturing yourself! Your amazing kit containing 5 power-packed cassettes, visual breakthrough cards and original manual is only **$39.95!** Send check or money order today to WHEELER APPLIED RESEARCH LAB, P.O. Box 3261, City of Industry, CA 91744. Ask for **Code Quick** #106 California residents add 6% sales tax.

You can't lose! Follow each simple step. You must succeed or return the kit for a total immediate refund!

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Any shape & size to fill a corner or a room. Special design features & services are:

*** Replaceable front panel, for equipment changes. * Precisely cut front panel holes by computerized equipment. * Computer aided design for: Floor plan lay-out, & console design. * Design assistance, on-site analysis & installation are available.**

Constructed from plastic laminated birch plywood & black anodized aluminum extrusions.

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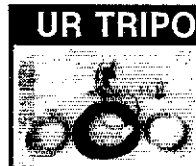
UR TRIPOLE ANTENNA



The TRIPOLE∞ covers the 160-6 m bands, including new bands, without retuning. No taps, no traps, no coils, built-in balun. A best choice for an all-around amateur antenna. Guaranteed. Kit T80-K $74.95; Assembled T80-A $84.95. Prices postpaid cash. TX residents add 5% sales tax.

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NEW Compact 45 W 2 m

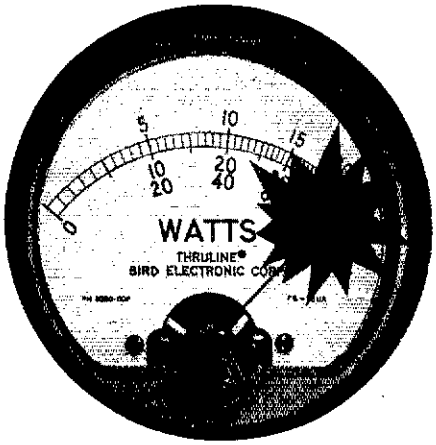
45 Affordable Watts!

TM-201B/401B

Super-compact mobile transceivers

The TM-201B boasts a powerful 45 watts output, easy-to-operate front panel controls, and ultra-compact size. The GaAsFET receiver front end provides high sensitivity and wide dynamic range. Receive and transmit characteristics are tailored for minimum distortion and excellent audio quality. Both the TM-201B and the TM-401B are supplied with a high-quality external speaker, 16-key DTMF microphone and mounting bracket.

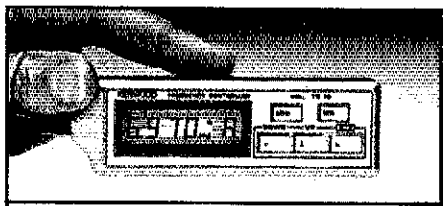
- 45 watt output, with HI/LO power switch (TM-401B has 25 watts output.) 5 W low.
- Dual digital VFOs
  TM-201B covers 142-149 MHz, includes certain MARS and CAP frequencies
  TM-401B covers 440-450 MHz
- 5 memories plus "COM" channel, with lithium battery back-up



- Programmable, multi-function scanning
- High quality external speaker supplied
- Audible beeper confirms operation

Optional accessories:

- PS-430 power supply
- TU-3 or TU-3A two frequency tone encoder
- FC-10 frequency controller
- MC-55 (8-pin) mobile microphone
- SP-40 compact mobile speaker
- SP-50 deluxe mobile speaker
- SW-100A/B SWR/power meters
- SW-200A/B SWR/power meters
- SWT-1 2 m antenna tuner
- SWT-2 70 cm antenna tuner
- PG-2K extra DC cable
- PG-3A DC line noise filter
- MB-201 extra mobile bracket



Optional FC-10 frequency controller

Convenient control keys for frequency UP/DOWN, MHz shift, VFO A/B, and MR (memory recall or change memory channel).

More information on the TM-201B/401B is available from authorized dealers.

KENWOOD

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1111 West Walnut Street
Compton, California 90220

TM-401B is similar to the TM-201B, but covers 440-450 MHz and is 25 watts
Specifications and prices subject to change without notice or obligation
Complete service manuals are available for all Trio-Kenwood transceivers and most accessories.

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Fastest Shipments in the Industry.

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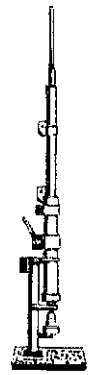


Shown w/ optional MARS 550C rotor base

MA SERIES CRANK-UP MASTS.

Will handle 10 sq. ft. antennas at 50 MPH winds.

MODEL NO.	HEIGHT MAX.	HEIGHT MIN.	NUMBER SECTIONS	WEIGHT POUNDS	SEC. OD Top	SEC. OD Bot.	SUGGESTED HAM PRICE
MA-40	40'	21'6"	2	300	3"sq.	4½"	$ 735.00
MA-550	55'	22'1"	3	525	3"sq.	6"	$1245.00
MA-770	71'	22'10"	4	925	3"sq.	8"	$2385.00
MA-850	85'	23'6"	5	1295	3"sq.	10"	$3695.00
MA-850MDP	85' section "QUADRA MAST" with heavy duty motor drive, positive pull down feature (MA-850MDP only).						$5695.00

FREE STANDING CRANK-UP TOWERS

Will handle 18 sq. ft. antennas at 50 MPH winds.

MODEL NO.	HEIGHT MAX.	HEIGHT MIN.	NUMBER SECTIONS	WEIGHT POUNDS	SEC. OD Top	SEC. OD Bot.	SUGGESTED HAM PRICE
TX-438	38'	21'6"	2	440	12⅛"	15"	$ 925.00
TX-455	55'	22' "	3	700	12⅛"	18"	$1395.00
TX-472	72'	22'8"	4	1175	12⅛"	21⅝"	$2295.00
TX-489	89'	23'4"	5	1650	12⅛"	25⅝"	$3995.00
TX-489MD*	89'	23'4"	5	1980	12⅛"	25⅝"	$5995.00

*Complete with new heavy duty motor drive unit with dual level and positive pull down feature. Limit switches are included.

FREE STANDING HEAVY-DUTY CRANK-UP TOWERS.

Will handle 30 sq. ft. antennas at 50 MPH winds.

MODEL NO.	HEIGHT MAX.	HEIGHT MIN.	NUMBER SECTIONS	WEIGHT POUNDS	SEC. OD Top	SEC. OD Bot.	SUGGESTED HAM PRICE
HDX-538	38'	21'6"	2	600	15"	18"	$1195.00
HDX-555	55'	22'	3	980	15"	21⅝"	$2095.00
HDX-572	72'	22'8"	4	1620	15"	25⅝"	$3595.00
HDX-572MD*	72'	22'8"	4	1820	15"	25⅝"	$5495.00
HDX-589MD*	89'	23'8"	5	2500	15"	30⅝"	$7195.00

*Complete with new heavy duty motor drive unit with dual level and positive pull down feature. Limit switches are included.

FREE STANDING "LOW PROFILE" COMPACT CRANK-UP TOWERS.

Will handle 12 sq. ft. of antennas at 50 MPH winds. (TMM-433HD handles 16 sq. ft.)

MODEL NO.	HEIGHT MAX.	HEIGHT MIN.	NUMBER SECTIONS	WEIGHT POUNDS	SEC. OD Top	SEC. OD Bot.	SUGGESTED HAM PRICE
TMM-433SS*	33' w/o mast	11'4"	4	300	10"	17¾"	$ 985.00
TMM-433HD*	33' w/o mast	11'4"	4	430	12¾"	20⅝"	$1195.00
TMM-541SS*	41' w/o mast	11'4"	5	480	10"	20⅝"	$1295.00

*Hy-Gain and some Alliance rotors when installed inside tower will restrict retracted height by approx. 24". Most Kenpro models allow full retraction.

STANDARD BASES INCLUDED WITH ALL TOWERS

ALSO AVAILABLE: • Motor drives for most towers • 5' to 24' antenna masts • Coax arms • Service platforms • Mast raising fixtures • Special bases

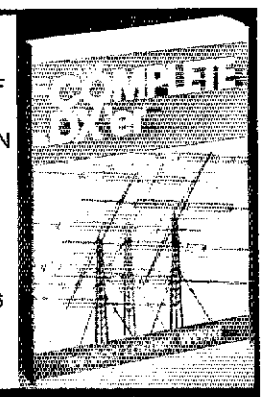
FOR ADDITIONAL INFORMATION Contact:

Amateur Electronic Supply (All Locations) • Texas Towers
Ham Radio Outlet (All Locations) • U.S. Tower (209) 733-2438

Prices are FOB factory, Visalia, CA.
Prices and specifications are subject to change without notice.

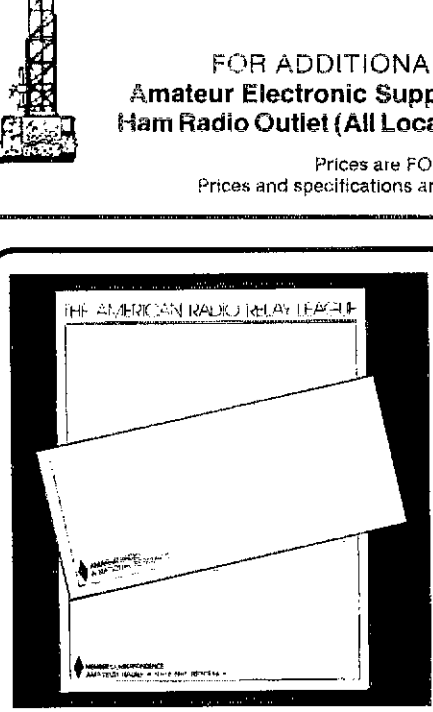
filliation. Hill Country ARC (Kerrville) bulletin reports Fredericksburg 2-meter net meets Tuesdays at 8:00 PM local time, 146.16/.76; HCARC net meets Mondays, 7:00 PM, 146.38/.98. Golden Crescent ARC (El Campo) voted club bulletin editior N8AYL the Golden Crescent award; club's ARES and RACES programs made available to Wharton County and Texas DPS Emergency Mgmt officers. Beaumont ARC officers for 1986: KA5UJC, pres; W5VEI, v. pres.; KD5TB, secy; N5GWM, treas. San Antonio ARC officers for 1986: KA5SSB, pres.; W5TQS, v. pres.; WB5QWF, secy; W5TCC, treas. ORS K5RG reports his 80-ft tower finally up with a KLM log periodic, 7-30 MHz on top. TC NZ5U reports 10 new ATC appointments made in January. DRN5 Mgr WB5YDD reports Jan traffic 568 messages in 60 sessions; STX represented 100% by W5KLV WB5EPA WB5FQU W5CTZ KD5CB NX5V KD5KQ WD5Z N5DFO NZ5U W5AC K5HZR WB5YDD. ORS NZ5J reports VE program bringing out quite a few unlicensed applicants; also reports National Weather Svc has provided rain gauges to W5UPS W5FFG WD5BEP WA7YDN KB5IW K8GCU N5DIL WD5BPP WD5DLN K5RF WA5WZX KB5NW W5EWC WA5EWS and NZ5J with reports being submitted to NWS San Antonio via toll-free telephone. CAND Mgr WA5KLV reports January traffic 689 messages in 31 sessions; DRN5 represented 100% by STX station N5DFO WB5EPA WB5FQU KD5KQ W5KLV NZ5U WB5YDD W5AC. OBS N5DFO reports 9 ARRL bulletins, 4 propagation forecasts, 5 DX bulletins, 1 CRRL bulletin, 10 satellite bulletins given 12 readings on 5 nets. OBS W5KLV reports 9 bulletins, 31 satellite bulletins, 4 propagation forecasts, 5 DX bulletins, 2 CRRL bulletins given 122 readings on 8 nets. Traffic: WB5YDD 306, NZ5U 250, W5KLV 245, W5CTZ 206, W5TFB 142, WB5EPA 80, N5DFO 75, WD5GKH 55, ND5C 54, WD5Z 48, NX5V 46, AC5V 43, WB5FQU 41, W5BGE 39, K5HZR 38, WA5WCY 34, WA2VJL 29, NZ5J 17, W5KR 12, KC5T 7, WA5UZB 5. (Dec.) KA5DQP 326, K5RG 217, KB5NP 210, K5CVD 116, WA5WCY 28.

SWITCH TO SAFETY!



187 PAGES OF THE BEST DX INFORMATION AROUND! A MUST FOR THE DX'ER! ONLY $10.00 FROM ARRL. SEE PAGE 166

DX'ers!



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Covers the 1986 conference which was held in Orlando, Florida. Over twenty topics are covered. This booklet should be of great interest to the over 10,000 amateurs interested in packet-radio. **$10.** Use the order form elsewhere in this issue.

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"Dual-Band" Leader!

TW-4000A

2-m/70-cm FM transceiver.

The first is still the best! The original FM "Dual Bander." TW-4000A delivers 25 watts output on both VHF and UHF in a single compact package.

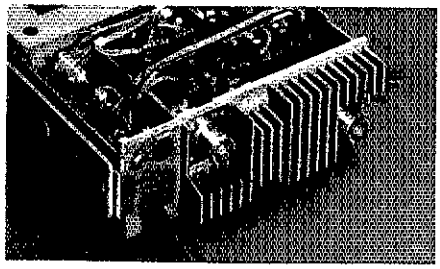
2 m and 70 cm FM in a compact package.
Covers the 2 m band (142.000-148.995 MHz), including certain MARS and CAP frequencies, plus the 70 cm FM band (440.000-449.995 MHz), all in a single compact package. Only 6-3/8 (161)W x 2-3/8 (60)H x 8-9/16 (217)D inches (mm), and 4.4 lbs. (2.0 kg.).

Single-function keys allow easy operation.

Large, easy-to-read LCD display.
A green, multi-function back-lighted LCD display for better visibility. Indicates frequency, memory channel, repeater offset, "S" or "RF" level, VFO A/B, scan, busy, and "ON AIR." Dimmer switch.

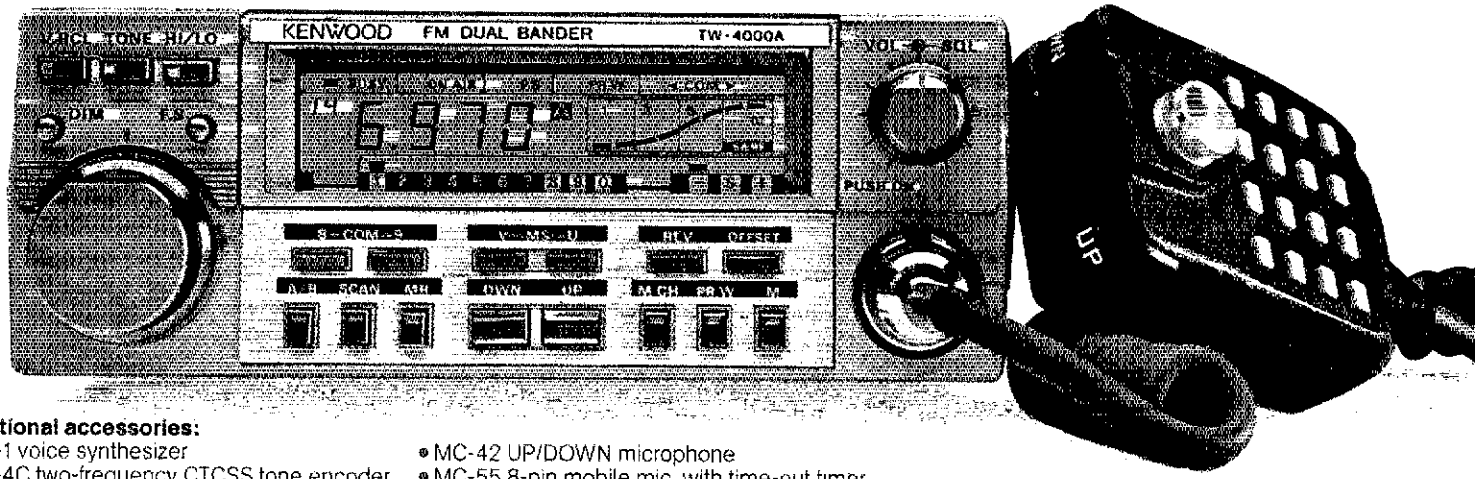
Front panel illumination.

30 memories with offset recall and lithium battery backup.
Stores frequency, band, and repeater offset. Memory 0 stores receive and transmit frequencies independently for odd repeater offsets, or cross-band (2 m/70 cm) operation.



- **Rugged die-cast chassis.**
- **Two separate antenna ports.**
  Use of separate antennas is recommended. This simplifies antenna matching and minimizes loss. However, mobile installations may require a single antenna. The optional MA-4000 dual band mobile antenna comes with an external duplexer.
- **Programmable memory scan with channel lock-out.**
  Programmable to scan all memories, or only 2 m or 70 cm memories. Also may be programmed to skip channels.
- **Band scan in selected 1-MHz segments.**
  Scans within the chosen 1-MHz segment (i.e., 144.000-144.995 or 440.000-440.995, etc.). The scanning direction may be reversed by pressing either the "UP" or "DOWN" buttons on the microphone.
- **Priority watch function.**
  Unit switches to memory 1 for 1 second every 10 seconds, to monitor the activity on the priority channel.
- **Common channel scan.**
  Memories 8 and 9 are alternately scanned every 5 seconds. Either channel may be recalled instantly.
- **High performance receiver/transmitter.**
  GaAs FET RF amplifiers on both 2 m and 70 cm, high performance monolithic crystal filters in the 1st IF section, provide high receive sensitivity and excellent dynamic range. The high reliability RF power modules assure clean and dependable transmissions on either band.
- **Optional "voice synthesizer unit."**
  Installs inside the TW-4000A. Voice announces frequency, band, VFO A or B, repeater offset, and memory channel number.
- **Repeater reverse switch.**

More TW-4000A information is available from authorized Kenwood dealers.



Optional accessories:

- VS-1 voice synthesizer
- TU-4C two-frequency CTCSS tone encoder
- PS-430 DC power supply
- KPS-7A fixed station power supply
- MA-4000 dual band mobile antenna with duplexer
- SP-40 compact mobile speaker
- SP-50 mobile speaker
- MC-42 UP/DOWN microphone
- MC-55 8-pin mobile mic. with time-out timer
- SW-100B SWR/power meter
- SW-200B SWR/power meter
- SWT-1/SWT-2 2 m/70 cm antenna tuners
- PG-3A noise filter
- MB-4000 extra mounting bracket

Complete service manuals are available for all Trio-Kenwood transceivers and most accessories.
Specifications and prices are subject to change without notice or obligation.
Antenna mag mount is not Kenwood supplied.

KENWOOD

TRIO-KENWOOD COMMUNICATIONS
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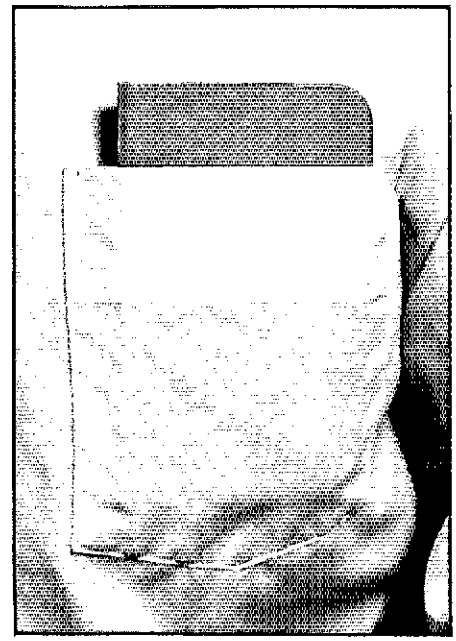
Compton, California 90220

WHAT'S IN BOB'S POCKET?



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We've made the **ARRL Repeater Directory** even more practical to use. Now you can carry it around in your pocket and it will fit in most glove compartments. Even though we shrunk the size of the book to 3¼ x 5¼ inches, the listings appear in the same size as the previous editions. In this handy book, you'll find much useful information including: CTCSS (PL) Tone Frequency Chart, Addresses of members of both the ARRL VHF-UHF and Repeater Advisory Committees, separate listings of digipeaters and other special mode repeaters, band plans, repeater operating practices and a compilation of frequency coordinators and ARRL Special Service Clubs. 15th Edition, copyright 1986. Still only $3.00. Please add $2.50 for shipping by parcel post or $3.50 for UPS for each order or available from ARRL dealers.

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THE AMERICAN RADIO RELAY LEAGUE, INC.
225 Main Street
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29.5 — 29.7 MHz

TYPICAL LISTINGS

Location	Input	Output	Call	Notes	Sponsor	Source
ALABAMA						
Bessemer	29.60	145.15	N4AHN	oal	K4GTQ	ARC
Birmingham	29.56	29.66	K4GTQ	o		ARC
Mobile	29.54	29.64	KE4QC	o	KE4QC	ARC
Tuscaloosa	29.58	29.68	KX4I	o		ARC
CALIFORNIA						
MONTEREY BAY AREA						
#MONTEREY	29.52	145.64	N6AHW	ol	MRRBG	N6AHW
#MONTEREY	146.91	29.60	WB6CAN	o	MontBay	NARC
SANTA CLARA	29.54	29.64	K6GZK			
#SANTA CRUZ	29.52	29.62	N6AHW	ol	MRRBC	
SOLANO	29.56	29.66	N6BPK	o		
Hollywood Hls	29.56	29.66	W6ORD	o		
Johnstone Pk	29.58	29.68	WB6IGH			
Monrovia	29.54	29.64	W6OE			ARC
Newbury Park	29.52	29.62	W			N6AHW
Palomar Mt.	29.56	29.66				NARC
COLORADO						SCRRBA
Boulder				oPL 1B		SCRRBA
CONNEC			K	oPL 1B	SGVARC	SCRRBA
Bl			WB6WGE	PL XB		SCRRBA
			N9PL	o		SCRRBA
	29.56	29.66	W0IA	o	RMVHFS	CCARC
ICUT						
omfield	29.58	29.68	KB1GA		KB1GA	TSARC
Columbia	29.55	29.65	WA1CBY			TSARC
Glastonbury	29.68	147.69	K1NQJ	PL		TSARC
Montville	29.57	29.67	KA1DFI	o		TSARC
N Coventry	29.54	29.64	K1JCL	o(ca)e	K1JCL	TSARC
DELAWARE						
Claymont	29.58	29.68	KC3AM	o	KC3AM	TMARC
DISTRICT OF COLUMBIA						
Fairfax, VA	29.58	448.725	KD4DN	ol	KD4DN	TMARC
Gaithrsbrg MD	29.56	29.66	N3AUY	o	KD3R	TMARC
Sterling, VA	29.58	29.68	KD4DN	ol	KD4DN	TMARC
FLORIDA						
Clearwater	29.58	29.68	KF4ZC	oPL 1Z	KF4ZC	FRC

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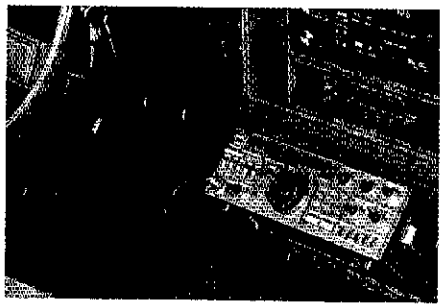
"Digital DX-terity!"

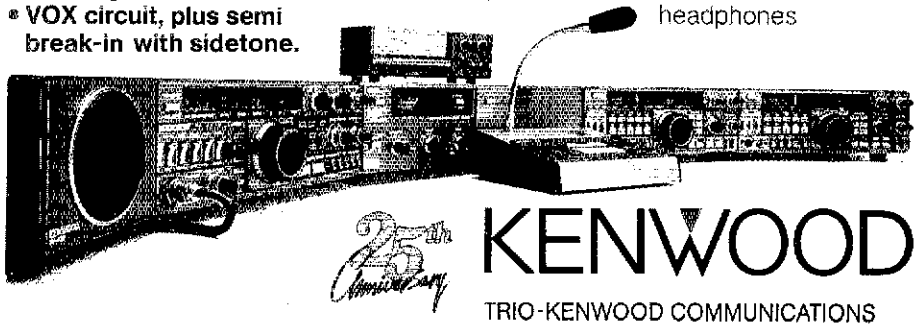
TS-430S

Digital DX-terity—that outstanding attribute built into every Kenwood TS-430S lets you QSY from band to band, frequency to frequency and mode to mode with the speed and ease that will help you earn that dominant DX position from the shack or from the mobile!



- **Covers all Amateur bands** 160 through 10 meters, as well as the new 30, 17, and 12 meter WARC bands. High dynamic range, general coverage receiver tunes from 150 kHz to 30 MHz. Easily modified for HF MARS operation.
- **Superb interference reduction** Eliminate QRM with the IF shift and tuneable notch filter. A noise blanker supresses ignition noise. Squelch, RF attenuator, and RIT are also provided. Optional IF filters may be added for optimum interference reduction.
- **Reliable, all solid state design.** Solid state design permits input power of 250 watts PEP on SSB, 200 watts DC on CW, 120 watts on FM (optional), or 60 watts on AM. Final amplifier protection circuits and a cooling fan are built-in.
- **Memory channels.** Eight memory channels store frequency, mode and band data. Channel 8 may be programmed for split-frequency operation. A front panel switch allows each memory channel to operate as an independent VFO or as a fixed frequency. A lithium battery backs up stored information.
- **Programmable, multi-function scan.**
- **Speech processor built-in.**
- **Dual digital VFOs.**
- **VOX circuit, plus semi break-in with sidetone.**

Optional accessories: • PS-430 compact AC power supply • SP-430 external speaker • MB-430 mobile mounting bracket • AT-130 compact antenna tuner covers 80-10 meters, incl. WARC bands • AT-250 automatic antenna tuner covers 160-10 meters, incl. WARC bands • TL-922A 2 kW PEP linear amplifier • FM-430 FM unit • YK-88C (500 Hz) or YK-88CN (270 Hz) CW filters • YK-88SN (1.8 kHz) narrow SSB filter • YK-88A (6 kHz) AM filter • MC-42S UP/DOWN hand mic. • MC-60A/80/85 deluxe desk mics. • SW-2000/200A SWR/power meters • SW-100A SWR/power/volt meter • PC-1A phone patch • HS-4, HS-5, HS-6, HS-7 headphones



25th Anniversary

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Alpha (ETO)	List-15%
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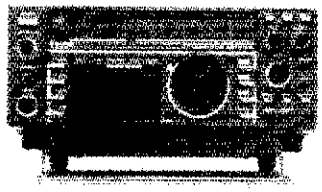
Santec ST20T Handi Talkie	289.00
Regency UC102 VHF 2 Channel Handi Talkie	150.00
Icom IC735	749.00
Ten-Tec 2510 (Easy OSCAR)	489.00



ACCESSORIES

B&W VIEWSTAR ANTENNA TUNER	89.95
Heil HC3/HC4/HC5	Stock
Heil BM10 Boom Mike headset	53.95
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Bird 43 Wattmeter	Call
Bird Elements, H/59.00 A-E/48.00	In Stock
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Daiwa CN630 140-450,20 200W	129.00
Stabylex 35SR, 35 amp 12VDC, 25 amp cont overvoltage protected	149.00
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3 element only	249.00
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Prepaid freight when you order other Hy-Gain items with tower

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Philly Stran	Call

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82-98 N elbow	9.00
New 82-202-1006 N-Male fits 9913	5.00

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1/4" E.H.S. Guy cable, Rohn US, 1000 ft	250.00
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1/4" Guy Cable, 6100 #7 x 7 strand, import	15¢/ft.
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3/8 x 6 E&J Turnbuckle	7.95
3/16" Wire Rope Clips	40
1/4" wire clips	50
1/4 Thimbles	45
Porcelain 500D Guy Insulator (3/16)	1.99
Porcelain 502 Guy insulators (1/4)	3.39

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Kantronics UTU-XT	319.00
Fits any computer (even yours!)	
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Minimum order $10.00. Mastercard, VISA, or C.O.D. All prices FOB Houston, except as noted. Prices subject to change without notice. Items subject to prior sale. Call anytime to check the status of your order. Texas residents add sales tax. All items full factory warranty plus Madison warranty.

KS6Q is January's Winner.

CLOSE OUT CORNER

AEA KT-3 $99
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DON'S CORNER

80 meter CW is fun for me again with my new ORION rotatable dipole with remote tuner, model CD080. It also covers 75 meters for you phone fanatics. It's priced at $439 and is UPS shippable. The antenna is 48 feet long and weighs 25 lbs. The major advantage of this antenna is the ends are off the ground and you get lower noise reception.

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TR-9130

TR-9130 2 meter all mode

The TR-9130 is a compact rig that gives you 25 watts of RF power on all modes!! You can select your tuning steps from 100-Hz, 1-kHz, 5-kHz or 10-kHz. With six memories, you can program your favorite frequencies! (FM 1-5 Simplex or ±600-kHz offset, memory 6 non-standard offset, all six for simplex, any mode!) Dual digital VFO's, and transmit frequency tuning enhance MSCAR operations.

Internal battery back-up (9 V Ni-Cd not Kenwood supplied) retains memories for approximately 24 hours, in case you operate mobile and base!

Other convenient features such as automatic band scan, squelch circuit for FM/SSB/CW, tone switch, repeater reverse switch, CW semi break-in; sidetone, high performance noise blanker HI (25) LOW (5) power switch (FM/CW) RF gain control, and RIT circuit further enhance this expressive package!

Optional accessories:

- KPS-7A AC power supply.
- PS-20 AC power supply (TR-9500 only).
- BO-9A system base with memory back-up supply.
- SP-120 external speaker.
- TK-1 AC adapter for memory back-up.
- SP-40 mobile speaker.
- SP-50 mobile speaker.
- SW-100 A/B power meters.
- MC-55 Mobile Mic w/time-out timer.

TR-9500

70 CM SSB/CW/FM transceiver

- Covers 430-440 MHz, in steps of 100-Hz, 1-kHz, 5-kHz, 25-kHz or 1-MHz.
- CW-FM Hi—10 W, Low—1 W, SSB 10 W.
- Automatic band/memory scan Search of selected 10-kHz segments on SSB/CW.
- 6 memory channels.

TS-711A/TS-811A

Multi-function all-mode 2 m and 70 cm transceivers.

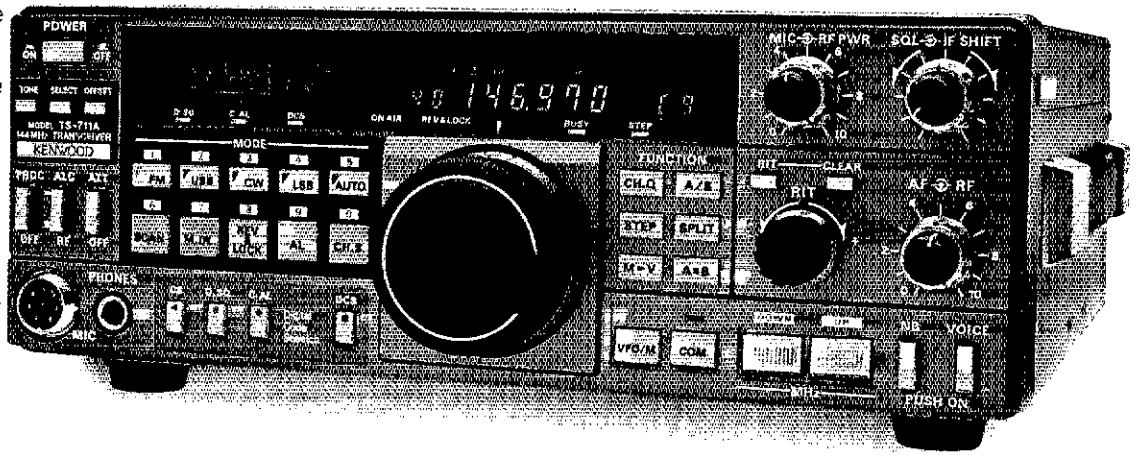
The TS-711A 2 m (142-149 MHz) and TS-811A 70 cm (430-450 MHz) all-mode transceivers are perfect base station units, designed to complement your present HF station. Both feature Kenwood's innovative D.C.S. circuitry. Built-in dual digital VFO's provide commercial-grade frequency stability through the use of a TCXO (Temperature Compensated Crystal Oscillator). The new fluorescent multi-function display shows frequency, RIT shift, VFO A/B, SPLIT, ALERT, repeater offset, digital code, call sign code, and memory channel. 40 multi-function memories store frequency, mode, repeater offset and tone. They have programmable scan, memory scan, and mode scan. The Auto-mode function automatically selects the correct mode for the frequency being used. When a mode key is depressed, an audible "beeper" announces mode identification in International Morse Code.

The TS-711A/TS-811A also feature all-mode squelch, noise blanker, speech processor (SSB, FM), IF shift, RF power control, alert, and a unique channel Quick-Step tuning that varies tuning characteristics from conventional VFO feel, to stepping action when CH.Q switch is depressed.

Combine all these features with built-in AC power supply and a hefty 25 watts RF output power and you have your ideal base station.

Optional accessories:

• CD-10 Call sign Display • TU-5 CTCSS Tone Unit • VS-1 Voice Synthesizer • MC-60A Deluxe Desk Mic • MC-80 Desk Mic • MC-85 Desk Mic
• SP-430 External Speakers
• MB-430 Mobile Mount
• PG-2J DC Cable



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1111 West Walnut Street
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Complete service manuals are available for all Trio-Kenwood transceivers and most accessories
Specifications and prices are subject to change without notice or obligation

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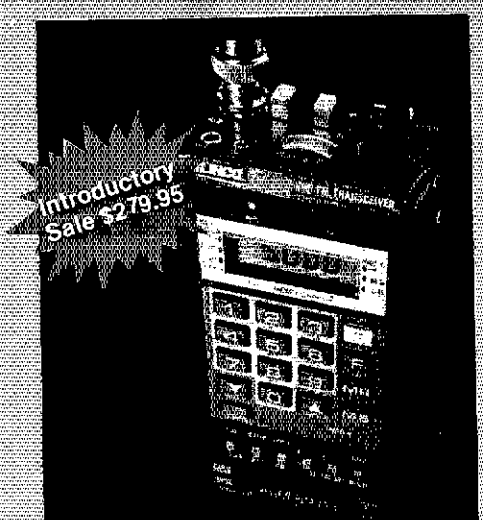
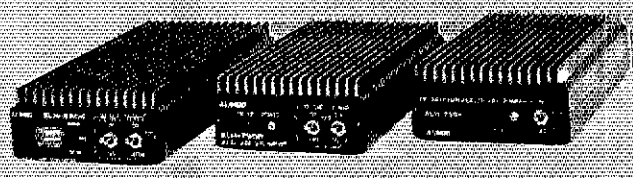


ALM-203T List $345.00
2m FM Handheld Transceiver
Don't decide on a handheld until you have seen Alinco's newest!
Lightweight, low spurious emission and powerful.
Transmit RF at 9.6V-Low Power = .4 watt
at 9.6V-High Power = 3. watt
at 13.8 V-Low Power = .5 watt
at 13.8 V-High Power = 5. watt

ALR-206T
List $345.00

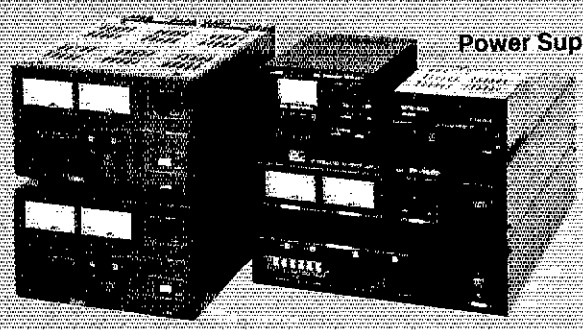
- Unique Control Knob
- Completely Programmable From Microphone
- 25 Watt High - 5 Watt Low • 10 Channel Memory
- Built In Lithium Back Up Battery
- Up/Down Control On Microphone
- Built in Sub Audible Control
- Many Features, See Your Dealer



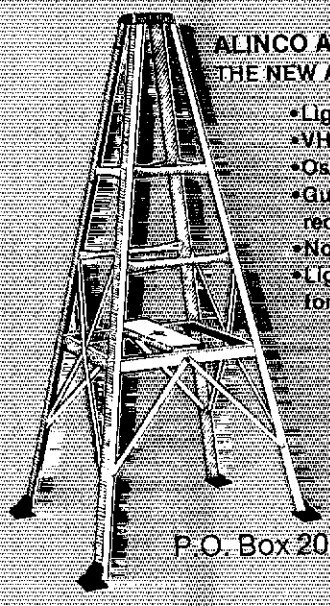
Linear Amps

2m and 70cm Micro Linear Amplifiers. Each of these amps include a heavy duty heat sink, a protection circuit and low pass filter for a clean signal. On one you get a GaAsFET RX preamp and even an RF meter on one. List Prices From $69.95 to $156.00.

Power Supplies



Affordable performance is the final output of these workhorses. These high efficiency, high output, regulated supplies each comes with automatic current limit and shut down protection. Choose from 4.5 to 55 amps of output. List Prices From $69 to $333.



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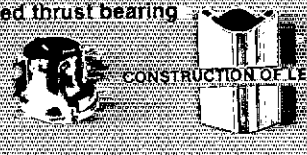
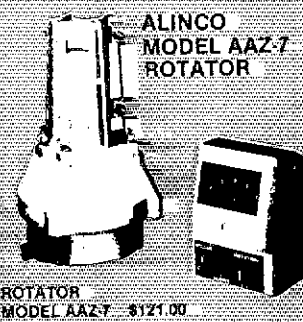
THE NEW ALINCO TOWERS ARE IDEAL FOR MOUNTING:

- Light-Weight Beams
- VHF UHF Antennas
- Oscar Antenna Systems
- Guy points when added support is required
- No rivets - all steel bolts
- Light-weight aluminum construction for easy installation and durability

- All towers have *four* legs for easy mounting. Along with ALINCO's unique dual wall construction for unparalled strength
- Rotor mounts inside the ALINCO Tower with provisions for top mounted thrust bearing



THRUST BEARING
MODEL AAZ-7A
$36.00



ROTATOR
MODEL AAZ-7 $121.00

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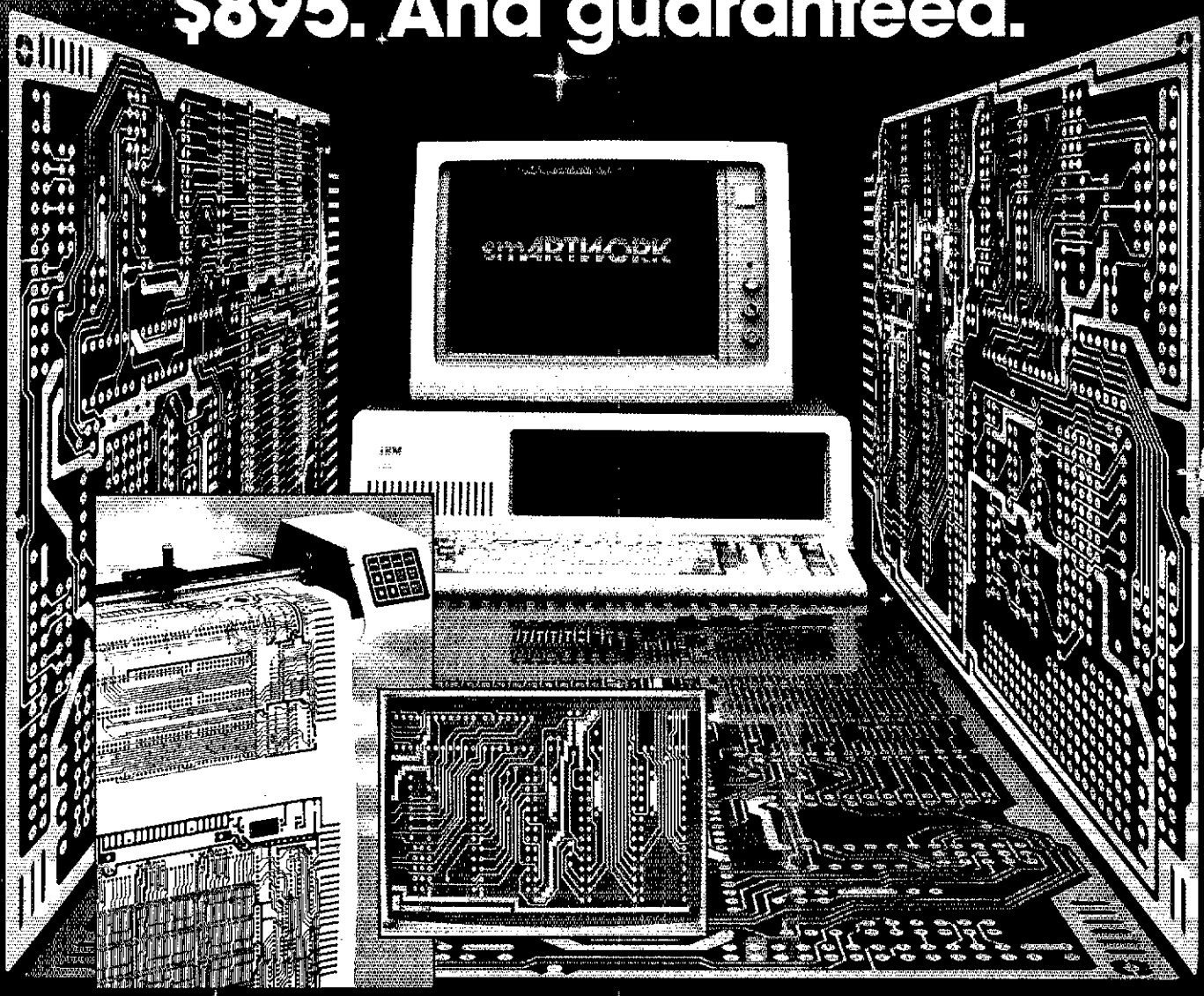

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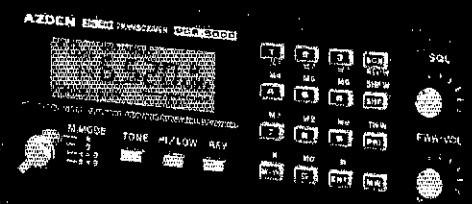

UNPRECEDENTED WIDE FREQUENCY RANGE: Covers 140.000-153.000 MHz in steps that can be set to any multiple of 5 kHz up to 50 kHz.

CAP/MARS/NAVY MARS, BUILT IN: The wide frequency range facilitates use of CAP and ALL MARS FREQUENCIES including NAVY MARS. ***COMPARE!***

TINY SIZE: Only 2 inches high, 5¼ inches wide and 7¼ inches deep!

MICROCOMPUTER CONTROL: Gives you the most advanced operating features available.

UP TO 11 NONSTANDARD SPLITS: ***COMPARE*** this with other units!

20 CHANNELS OF MEMORY IN TWO SEPARATE BANKS: Retains frequency, offset information, PL tone frequency.

DUAL MEMORY SCAN: Scan memory banks separately or together. ***ALL*** memory channels are tunable independently. ***COMPARE!***

MEMORY SCAN LOCKOUT: Allows you to skip over channels you don't want to scan.

TWO RANGES OF PROGRAMMABLE BAND SCANNING: Limits are quickly reset. Scan ranges separately or together with independently selective steps in each range. ***COMPARE!***

BUSY SCAN AND DELAY SCAN: Busy scan stops on an occupied channel. Delay scan provides automatic auto-resume.

DISCRIMINATOR CENTERING (AZDEN EXCLUSIVE PATENT): Always stops on frequency desired when scanning.

PRIORITY MEMORY AND ALERT: Unit constantly monitors one memory channel for signals, alerting you when channel is occupied.

LITHIUM BATTERY BACKUP: Memory information can be stored for up to 5 years even if power is removed.

FREQUENCY REVERSE: Allows you to listen to repeater input frequency.

ILLUMINATED KEYBOARD WITH ACQUISITION TONE: Keys are easily seen in the dark, and actuation is positively verified audibly.

CRISP, BACKLIGHTED LCD DISPLAY: Easily read no matter what the lighting conditions!

DIGITAL S/RF METER: Shows incoming signal strength and relative transmitter power.

MULTI-FUNCTION INDICATOR: Shows a variety of operating parameters on the display.

FULL 16-KEY TOUCHTONE PAD: Keyboard functions as autopatch when transmitting.

MICROPHONE CONTROLS: Up/down frequency control and priority channel recall.

PL TONE GENERATOR BUILT IN: Instantly program any of the standard PL frequencies into the microcomputer. ***COMPARE!***

TRUE FM, NOT PHASE MODULATION: Unsurpassed intelligibility and audio fidelity. ***COMPARE!***

HIGH/LOW POWER: Select 25 watts or 5 watts output — fully adjustable.

SUPERIOR RECEIVER: Sensitivity is better than 0.15 microvolt for 20-db quieting. Commercial-grade design assures optimum dynamic range and noise suppression. ***COMPARE!***

DIRECT FREQUENCY ENTRY: Streamlines channel selection and programming.

OTHER FEATURES: Rugged dynamic microphone, built-in speaker, mobile mounting bracket, remote speaker jack, and all cords, plugs, fuses and hardware are included.

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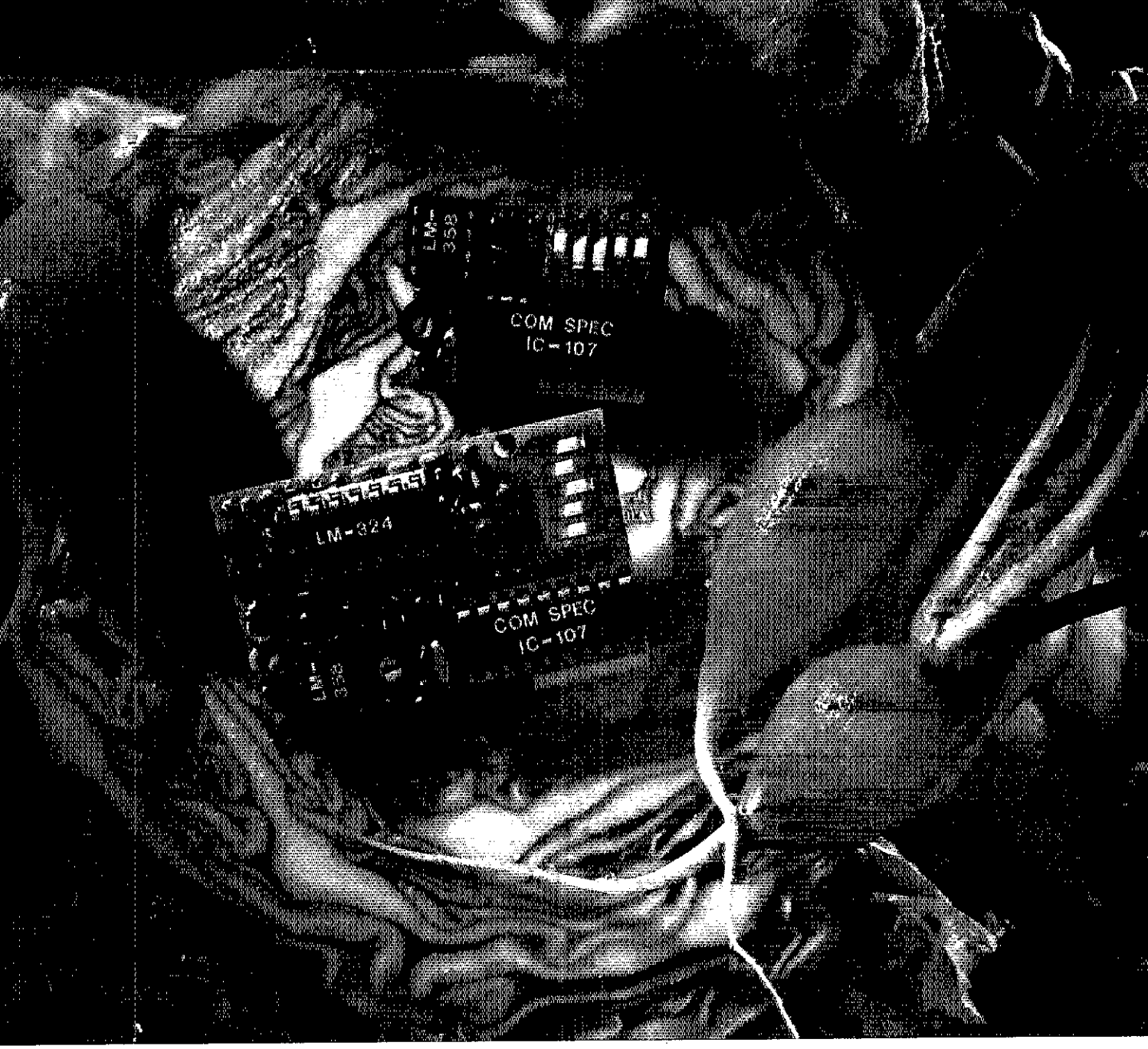
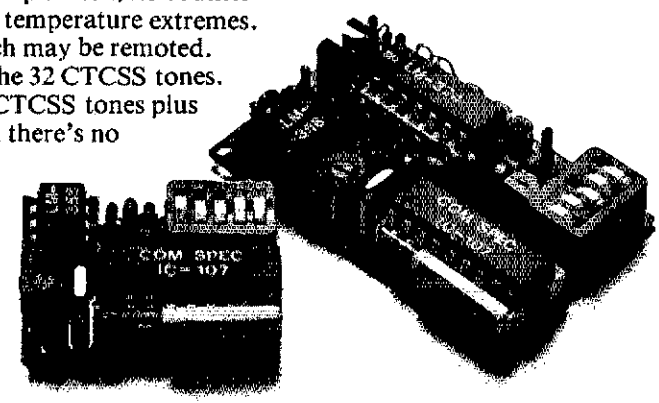


A fresh idea!

Our new crop of tone equipment is the freshest thing growing in the encoder/decoder field today. All tones are instantly programmable by setting a dip switch; no counter is required. Frequency accuracy is astonishing ±.1 Hz over all temperature extremes. Multiple tone frequency operation is a snap since the dip switch may be remoted. Our TS-32 encoder/decoder may be programmed for any of the 32 CTCSS tones. The SS-32 encode only model may be programmed for all 32 CTCSS tones plus 19 burst tones, 8 touch-tones, and 5 test tones. And, of course, there's no need to mention our one day delivery and one year warranty.



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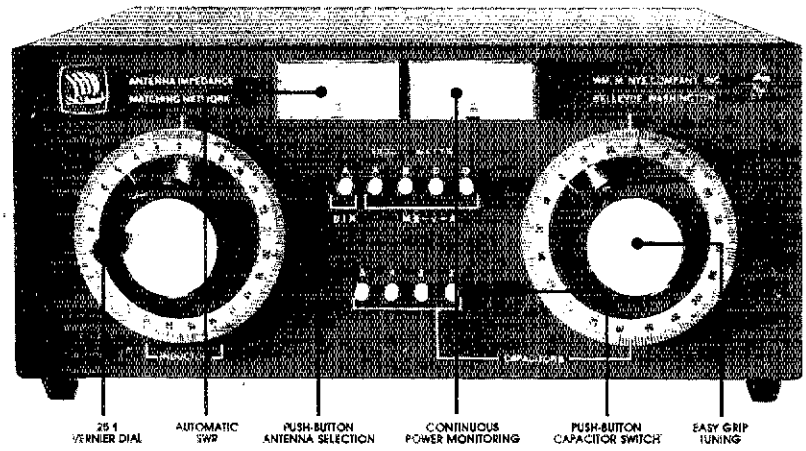
(800) 854-0547 / California: (714) 998-3021

SS-32 **$29.95**, TS-32 **$59.95**



MB-V-A: NYE VIKING RUGGED 3KW ANTENNA TUNER

Discover this durably built, feature packed MB-V-A Antenna tuner. You'll find operating conveniences that make antenna tuning a snap. The MB-V-A is value engineered to do the job over wide operating ranges. Compare quality, features and the exclusive NYE VIKING TWO YEAR WARRANTY!

Maximize Power Transfer. Match your transmitter output impedance to almost any antenna system for maximum power transfer.

PI Network. Low Pass PI Network tuning — 1.8 to 30MHz. Heavy duty silver plated continuously variable inductor with 25:1 vernier dial. 7500 volt variable capacitor and 15,000v switch selected fixed capacitors on output side. Tunes 40 to 2000 ohm antennas. Also provides harmonic suppression.

Automatic SWR. Hands free metering of SWR. No reset or calibration needed. Separate power meter — 300 or 3000 watts — automatically switched. Easy to read 2½" recessed backlighted meters show SWR and power continuously. Precision Jewel meters.

Antenna Switch. New!! PUSH-BUTTON antenna switching to 4 antennas (2 coax, single wire and twin lead). Tuner bypass on first coax output. We designed this rugged switch to handle the power.

3KW Balun. Bifilar wound triple core toroid gives balanced output to twin feeders from 200 to 1000 ohms and unbalanced output down to 20 ohms.

Model Options. MB-IV-A1 includes all MB-V-A features less antenna switch and balun. MB-IV-A2 is identical to MB-IV-A1 with the addition of a triple core balun.

OTHER NYE VIKING PRODUCTS: Straight Keys, Squeeze Keys, Code Practice Sets, Electronic and Memory Keyers, Phone Patches, 2KW Low Pass Filters, Automatic SWR and Power Meters for HF and 2m (plus a model for the blind), 200w PEP antenna Tuner, All-Band Antenna and more!

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FEATURES:

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- Ultra high speed PIN diode switching.
- Rated 1500 watts output CW @ 40 WPM into 50 OHM load.
- No modifications needed to either your transceiver or amplifier.
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(1) Advertising must pertain to products and services which are related to Amateur Radio.

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3) Remittance in full must accompany copy since Ham-Ads are not carried on our books. Each word, abbreviation, model number, and group of numbers counts as one word. Entire telephone numbers count as one word. No charge for postal Zip code. No cash or contract discounts or agency commission will be allowed. Tear sheets or proofs of Ham Ads cannot be supplied. Submitted ads should be typed or clearly printed on an 8-1/2" × 11" sheet of paper.

(4) Closing date for Ham-Ads is the 13th of the second month preceding publication date. No cancellations or changes will be accepted after this closing date. Example: Ads received August 14 through September 13 will appear in November *QST*. If the 20th falls on a weekend or holiday, the Ham-Ad deadline is the previous working day.

(5) No Ham-Ad may use more than 100 words. No advertiser may use more than two ads in one issue. A last name or call must appear in each ad. Mention of lotteries, prize drawings, games of chance, etc. is not permitted in *QST* advertising.

(6) New firms or individuals offering products or services for sale must submit a production sample (which will be returned) for our examination. Dealers are exempted, unless the product is unknown to us. Check with us if you are in doubt. You must furnish a statement in writing that you will stand by and support all claims and specifications mentioned in their advertising before their ad can appear.

The publisher of *QST* will vouch for the integrity of advertisers who are obviously commercial in character, and for the grade or characters of their products and services. Individual advertisers are not subject to scrutiny.

The League reserves the right to decline or discontinue advertising for any reason.

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QCWA Quarter Century Wireless Association is an international nonprofit organization founded in 1947. You are eligible for membership if licensed 25 or more years ago, and presently licensed. It is not necessary to have been licensed the entire 25 years. Members receive QCWA publications and participate in QCWA activities. Come grow with us! Write QCWA, Inc., 1409 Cooper Drive, Irving, TX 75061.

PROFESSIONAL CW operators, retired or active, commercial, military, gov't., police etc. invited to join Society of Wireless Pioneers — W7GAQ/6 Box 530, Santa Rosa CA 95402.

IMRA-International Mission Radio Association Helps missionaries by supplying equipment and running a net for them daily except Sunday, 14.280 MHz, 1900-2000 GMT. Br. Bernard Frey, 1 Pryer Manor Rd., Larchmont, NY 10538.

THE Veteran Wireless Operators Association, a non-profit organization of communications people founded in 1925, invites your inquiries and application for membership. Write VWOA, Ed. F. Pleuler, Jr., Secretary, 46 Murdock Street, Fords, NJ 08863.

JOIN the Old Old Timers Club, an international non-profit organization. If you operated a radio station, commercial, amateur or Armed Forces 40 or more years ago, and have an Amateur license at present you are eligible. Join the real pioneers of ham radio. Write O.O.T.C. 1417 Stoneybrook, Mamaroneck, NY 10543.

HAVE A-M capability? Join S.P.A.M. (Society for Promotion A-M) Membership is free. Write: F.A. Dunlap (S.P.A.M.), 14113 Stoneshire, Houston, TX 77060 (S.A.S.E. please).

MORSE TELEGRAPH CLUB, established 1942, seeks landline and radio operators interested in telegraphy and Morse history. 46 chapters USA & Canada. For information and sample paper contact W. K. Dunbar, AD9E, 1101 Maplewood Dr., Normal, IL 61761 309-454-2029.

THE FLORIDA Amateur Digital Communications Association (FADCA) publishes a monthly newsletter, the FADCA Beacon, about Packet Radio. Write for a sample copy, FADCA, 812 Childers Loop, Brandon, FL 33511.

FCC EXAMS, Novice-Extra. Sunnyvale VEC ARC. 408-255-9000, 24 hour. 73, Gordon, W6NLG, VEC.

THANK YOU for attending Warren Ohio Hamfest. See you August 17, 1986.

THE ALL NEW 17th Annual B*A*S*H—New location, New entertainment, New food—will be held on Friday Night of the Hamvention, April 25, 1986. The new location is in the Conference Center at the HARA Arena and Exhibition Center (the same location as the Hamvention) starting at 7:00 P.M. There is no admission charge, and free continuous entertainment. Food and beverages are available. Two exciting top awards, and many others. Stay right at HARA when the Hamvention closes on Friday evening and meet your friends and join us for an evening of fun and entertainment. Sponsored by the Miami Valley F.M. Association, P.O. Box 283, Dayton, OH 45401.

LONG ISLAND, NY—Computer and Electronics Fleamarket, Saturday April 12—10 AM to 4 PM, 250 vendor tables (advance sale only) priced at $70 each. All indoors at Colonie Hill, 1717 Motor Parkway, Hauppauge, Exit #57 off L.I.E. Admission (with this ad) $5. For vendor reservations call 800-631-0062 or in NJ 201-297-2526. Ken Gordon Productions, Inc.

Presenting two small cases for a lot of mobile power.

You won't find a 45-watt, 2-meter FM mobile rig that's built smaller than the Yaesu FT-270RH.

Nor will you find a dual-band FM mobile that offers the crossband full-duplex capability found in the 25-watt Yaesu FT-2700RH.

It shouldn't be surprising. We've been coming up with a lot of innovative concepts lately.

The FT-270RH measures just 2 x 6 x 7 inches. Conveniently fitting its high-power punch into many small spaces of your car. Places where other 45-watt mobiles just won't fit.

The FT-2700RH is small too. Smaller than other dual-banders. But with one big difference: a "DUP" button. Push it, and you're operating full duplex, 2 meters on one VFO, 440 MHz on the other. Each at 25 watts. So you can simultaneously transmit and receive in true telephone style.

Once installed, you'll find the FT-270RH and the FT-2700RH equally simple to operate. Just turn the rig on, dial up a frequency, select offset or duplex split, and you're on the air.

Each rig gives you 10 memories for storing your favorite frequencies. Dual VFO capability. A clean, uncluttered LCD display for easy readout. Push-button jumps through the band in 1 MHz steps. Band scanning with programmable upper and lower limits. And priority channel operation.

You don't even have to take your eyes off the road to determine your operating frequency and memory channel. An optional voice synthesizer announces them both at the push of a button on the microphone. The FT-2700RH announces both your 2-meter and 440 MHz operating frequencies.

Also, tone encode and encode/decode capability is programmable from the front panel, using an optional plug-in board.

So when you need a lot of power in a compact mobile radio, discover Yaesu's FT-270RH and FT-2700RH. There's nothing else like them on the road.

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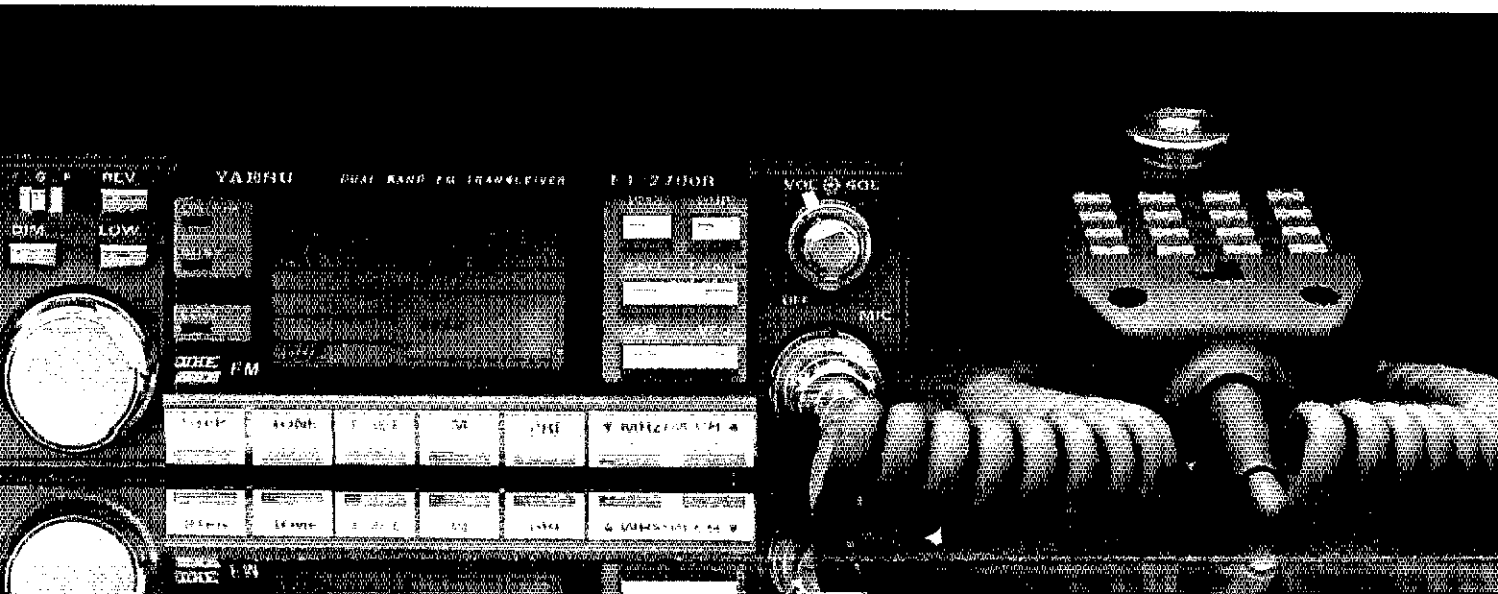
Prices and specifications subject to change without notice.



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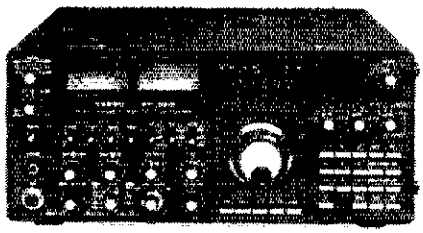
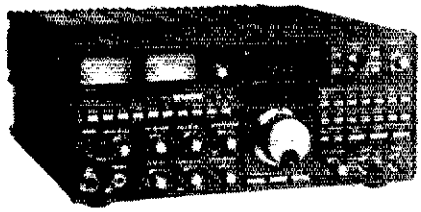
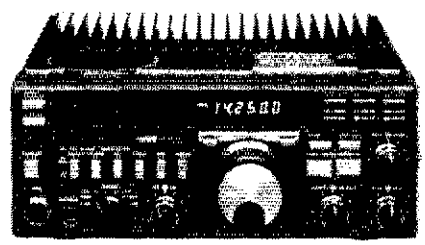


HF Equipment	LIST
FT-ONE Xcvr/Rcvr/4 filters/RAM/FM	$2859.00
KY-ONE Keyer unit	45.00
DC-ONE DC cable for FT-ONE	15.00
SP-102 Speaker with audio filter	59.95
SP-102P Speaker/patch	99.95
MD-1B8 Desk microphone	69.00
MH-1B8 Mobile microphone	20.00



HF Equipment	LIST
FT-980 9-band CAT Xcvr/SW Rcvr	$1795.00
SP-980 Speaker with audio filter	89.95
SP-980P Speaker/patch	99.95
FC-757AT Automatic ant. tuner w/memory	289.95
FAS-1-4R Remote antenna selector	49.00
E-980 Interface cable; FT-980/757AT	46.50
XF-8.9HC 600 Hz CW filter (1st IF)	45.95
XF455.8MCN 300 Hz CW filter (2nd IF)	59.95
XF8.9B/XF8.9GA AM filter	45.00
KY-ONE Keyer unit	45.00
MD-1B8 Desk microphone	69.00
MH-1B8 Mobile microphone	20.00
FIF-65 Computer interface; Apple IIe	59.00
FIF-80 Interface; NEC PC-8001	119.00
FIF-232C for VIC-20/TI/most RS-232	69.95
FRB-1 External relay box	19.95
GC-980 General coverage kit	12.95



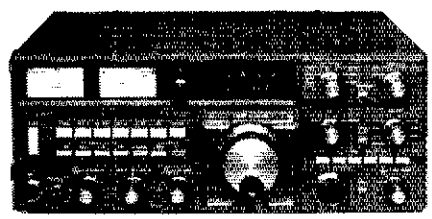
HF Equipment	LIST
FT-757GX 9-band Xcvr/SW Rcvr/mic	$899.95
FP-757GX Compact power supply	189.95
FP-757HD Heavy duty supply with fan	199.95
FP-700 Power supply	179.95
FC-757AT Automatic ant. tuner w/memory	289.95
FAS-1-4R Remote antenna selector	49.00

FT-757GX accessories	LIST
SP-102 Speaker with audio filter	$ 59.95
SP-102P Speaker/patch	99.95
MD-1B8 Desk microphone	69.00
FRB-757 External relay box	10.95
MMB-20 Mobile mount	24.00
FTV-707 VHF/UHF Transverter, no module	129.00
2M/FTV 2m module only	154.00
6M/FTV 6m module only	110.00
70 cm/FTV 430 module only	255.00
FIF-65A Interface; Apple IIe	55.00
FIF-232C for VIC-20/TI/most RS-232	69.00

Misc. Accessories	LIST
YS-60 1.8-60 MHz 2kw PEP wattmeter	$ 84.95
YS-500 140-520 MHz 200w wattmeter	69.95
YH-55 Lo-Z headphones	19.00
YH-77 Lightweight headphones	19.00
FF-501DX Low pass filter	34.00

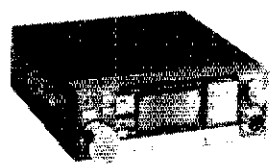
Call TOLL FREE for DISCOUNT PRICES

All items are shown with the Manufacturer's Suggested LIST Prices. On Major items and some accessories, we can offer a Substantial Savings.



VHF/UHF Equipment	LIST
FT-726R VHF/UHF Xcvr w/2m, TTP mic	$925.00
HF/726 10-12-15m unit	225.95
6M/726 6m unit	215.95
430/726 430-440 MHz unit (OSCAR)	299.95
440/726 440-450 MHz unit (FM band)	299.95
SU-726 Satellite duplex module	109.95
XF-455MC 600 Hz CW filter	60.00
MD-1B8 Desk microphone	69.00
SP-102 Speaker w/audio filter	59.95
DC-726 DC cable for FT-726R	10.05

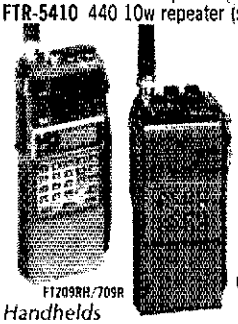
FT-270RH* 45w 2m FM Xcvr w/TTP mic 439.95



* FTS-8 encoder/decoder **FREE** with purchase of FT-270RH or FT-2700RH

FT-2700RH* 25w 2m/440 FM w/TTP mic	599.95
FTS-8* Encoder/decoder	49.00
FVS-1 Voice synthesizer	29.00
FSP-2 4 ohm remote speaker	21.00
SP-55 Compact remote speaker	25.00

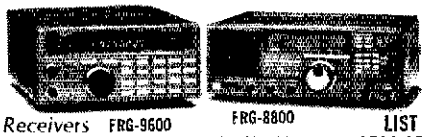
VHF/UHF - continued	LIST
YH-1 Headset with boom mic only	$ 19.00
SB Switchbox only	20.00
YH-1SB Headset/mic/switchbox combination	39.00
MF-1A3B Flexible visor mount mic only	25.00
SB Switchbox only	20.00
FTR-2410 2m 10w repeater (special order)	1075.00
FTR-5410 440 10w repeater (special order)	1249.00



FT209RH/709R FT-103R/203R/703R

* FTS-6 encoder/decoder **FREE** with purchase of FT-209RH or FT-709R

Handhelds	LIST
FT-209RH* 5w 2m FM HT/TTP/batt/cgr	$359.95
FT-709R* 4w 440 FM HT/TTP/batt/cgr	349.95
FT-103R/TTP 2.5w 220 FM HT/batt/cgr/TTP	279.95
FT-203R/TTP 2.5w 2m FM HT/batt/cgr/TTP	259.95
FT-703R/TTP 2.5w 440 FM HT/batt/cgr/TTP	299.95
Accessories for 09-series/03-series	
FTS-6* Encoder/decoder	49.00
FBA-5 Alkaline battery holder	12.00
FNB-3 425ma 10.8v battery	49.00
FNB-4 extra 500ma 12v battery	59.00
NC-9B Wall charger for FNB-3	10.00
NC-15 Desk quick charger/AC ps	79.00
NC-18B Wall charger for FNB-4	10.00
MH-12A2B Speaker/microphone	35.00
MMB-21 Mobile bracket	15.00
PA-3 Mobile adapter and charger	39.00
TA-2 2m 19" telescoping whip ant	11.00
YH-2 VOX headset	20.00



FRG-9600 FRG-8800

Receivers	LIST
FRG-8800 150 KHz-29.999 MHz Shortwave	$599.95
FRA-7700 Indoor active receive antenna	49.00
FRT-7700 Antenna tuner	59.00
FRV-8800 118-174 MHz VHF converter	99.00
FIF-232C Interface; VIC-20/TI/RS-232	69.00
SP-102 Speaker with audio filter	59.95
FF-5 500 KHz low-pass filter (for VLF)	20.00
DC-8800 DC kit for FRG-8800	3.50
FRG-9600 60-905 MHz receiver	679.95
VU-9600 NTSC video unit	25.00
SP-55 Compact remote speaker	25.00

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ANNUAL FLEMINGTON, NJ Hamfest by Cherryville Repeater Association II, Inc. will be held Saturday April 12 at Hunterdon Central High School Field House on Route 31. Doors open at 8:00 AM, with breakfast served on site starting at 6:30 AM. Talk-in: 146.52, 147.975/.375, 147.615/.015, 222.52/224.12 and 449.850/444.850. For table reservations, call 201-788-4080 or write Bill Inkrote, K2NJ, RD-10 Box-294 Quakertown-Croton Road, Flemington, NJ 08822. FCC Exams will be given; send FCC 610 Form, copy of current license and $4.25 (checks to ARRL/VEC) to Cherryville Repeater Association II, Inc., Box-308 Quakertown, NJ 08822.

TCRA HAMFEST Tri-County Radio Association rain or shine, Sunday, May 4 Passaic Valley Community Center off Valley Road, Stirling, NJ 9 AM to 3 PM. Indoors, refreshments, rest rooms, free parking. Tables $7 AC $10. Registration $2 Limited tail-gating by reservation only please. All reservations W2EUF Dick Franklin, 201-232-5955 Box 182, Westfield, NJ 07090.

SUNDAY MAY 18, LIMARC sponsors ARRL outdoor Hamfest at the NY Institute of Technology, Northern Blvd., Rte. 25A, 1 mile East of Glen Cove Road in Old Westbury (Exit 39N Rte 495). General admission for Hams $3 at 9 AM to 3 PM. Sellers car space $5. 7:30 AM no reservations. Call Hank WB2ALW nites for additional info or LIMARC INFOLINE 536-796-2366. Loads of parking. Catered food.

JUNE 1, 1986 - STARVED ROCK Radio Club Hamfest Princeton, Illinois - Same place as last year. SASE, please, for complete registration materials, map, etc. - SRRC, W9MKS, RFD #1, Box 171, Oglesby, IL 61348 - 815-667-4614.

FLEA MARKET/Bone Yard Sale Foothill College, Los Altos Hills, CA March-Sept, 2nd Saturday of every month. 7:00 AM Sellers, 7:15 AM Buyers. Talk-in 145.27(-) or 147.570 simplex. FCC Exams 408-255-9000 W6NLG.

KANKAKEE HAMFEST - The annual Kankakee Hamfest will be held at the Kankakee County Fairgrounds on May 4, 8 AM-4 PM. FCC and ARRL booths. Large flea market and many exhibitors. $2.50 in advance and $3 at the gate. Take Exit 308 off I-57 to Rt. 45 South 1 mile. For further info contact Don Kerouac, K9NR, 1377 Circle Dr. NW, Kankakee, IL 60901.

QSL Cards/Rubber Stamps/Engraving

POST CARD QSL Kit - Converts Post Cards, Photos, to QSLs! Stamp brings circular. Labelcraft, P.O. Box 412, West Sand Lake, NY 12196.

DON'T buy QSL cards until you see my free samples — or draw your own design. I specialize in custom cards. Send black and white sketch: will give quote. Little Print Shop, Box 9848, Austin, TX 78766.

FREE samples — stamp appreciated. Conner, 522 Notre Dame Ave., Chattanooga, TN 37412.

QSLs & rubber stamps. Top quality. QSL samples and stamp information 50c. Ebbert Graphics D-3, Box 70, Westerville, OH 43081.

EMBROIDERED emblems, custom designed club pins, medallions, trophies, ribbons. Highest quality, fastest delivery, lowest prices anywhere. Free info: NDI, Box 6665 M, Marietta, GA 30065.

QSLs — 1) Famous KØAAB custom collection. 2) Railroad employees and railfan's specials. 3) Front report styles. 4) Multiple callsigns. 5) Ham "business cards." State your sample wants. 39¢ self addressed business size envelope required. Marv Mahre, WØMGI, 2095 Prosperity Ave., St. Paul, MN 55109-3621.

QSLs Samples 40¢ (stamps OK) Fred Leyden, W1NZJ, 454 Proctor Ave., Revere, MA 02151.

BE SURPRISED - get a variety of cards - 100 for $8 or 200 for $13. Samples $1 refundable. All three colors, fast service, satisfaction guaranteed. Constantine, 1219 Ellington, Myrtle Beach, SC 29577.

FINEST CUSTOM QSLs AND RUBBER STAMPS: Large cut catalog and samples $1 refundable on first order. Ritz Print Shop, P.O. Box 45018, Westlake, OH 44145.

QSL's — since 1956, free samples, Rusprint, Box 7575, Kansas City, MO 64116.

FREE, 100 QSLs with first order. Samples 50¢. Gazebo Press, Rt. 4, Box 4148, LaPlata, MD 20646.

ENGRAVING. CALLSIGN/name badges by WØLQV. SASE for price sheet. Box 4133, Overland Park, KS 66204.

CADILLAC of QSLs — Completely different! Samples $1, (refundable) Mac's Shack, P.O. Box No. 43175, Seven Points, TX 75143.

PICTURE QSL cards of your shack, etc. from your photograph or black ink art work. 500 $24.00; 1000 $36.50. Also unusual non-picture designs. Send stamp for illustrated literature. Generous sample pack $1.00; half pound of samples $2.00. Custom printed cards, send specifications for estimate. Raum's, RD 2, Orchard Road, Coopersburg, PA 18036 (Formerly of Philadelphia).

QSLs, QUALITY and Fast Service for 25 Years. Include Call for Decal. Samples 50¢. Ray, K7HLR, Box 331, Clearfield, UT 84015.

BROWNIE QSLs since 1939. Catalog & Samples $1 (refundable with order) 3035 Lehigh Street, Allentown, PA 18103.

QUALITY QSLs, Samples 50¢. Olde Press, WB9MPP, Box 252, Kankakee, IL 60901.

QSL CARDS for Computer Printers - Your computer prints your call sign, name, address and contact information on blank continuous form cards. For card samples and printed listing of a sample menu driven program to fill out the QSL's: Send your name, address and $1 to George Morris, W6ABW, 2106 Earnslow Drive, La Canada, CA 91011.

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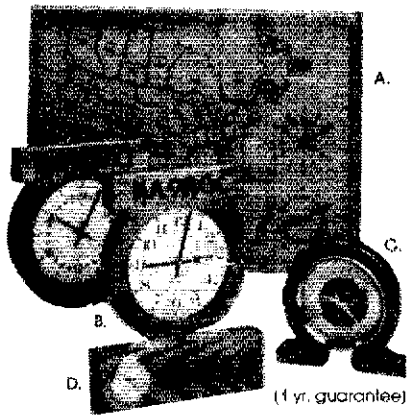

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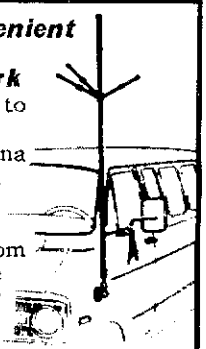

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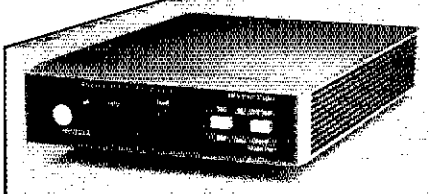

$169.95 Suggested Amateur Net Price

Virtually all existing Packet Terminal Node Controllers (TNC's) use phase-locked-loop detection or a "World Chip" decoder intended for telephone quality circuits. These schemes work well for VHF FM radio operation, but leave a lot of room for improvement in H.F. radio environments.

The new AEA Model PM-1 Packet Modem is designed to interface between your existing TNC and your radio. **No internal modifications** to your TNC or radio are necessary. The PM-1 contains independent dual channel filtering with A.M. detection for maximum sensitivity and selectivity under poor H.F. conditions. The PM-1 is optimized for 300 baud operation. A shift frequency of 200 Hz or 600 Hz may be selected from the front panel.

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Enjoy Packet Radio to its fullest with the new AEA model PM-1 Packet Modem. Work DX on the low bands and monitor packet mail boxes from the other side of the country. See the PM-1 at your favorite dealer now.

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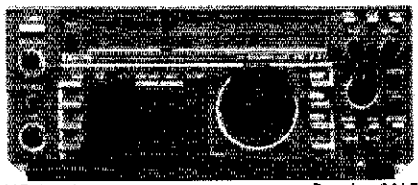
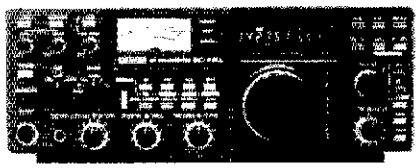


HF Equipment	Regular	SALE
IC-735 HF transceiver/SW rcvr/mic	849.00	729.95
PS-55 External power supply	160.00	144.95
AT-150 Automatic antenna tuner	349.00	314.95
FL-32 500 Hz CW filter	59.50	
EX-243 Electronic keyer unit	50.00	
IC-745 9-band xcvr w/.1-30 MHz rcvr	999.00	769.95
PS-35 Internal power supply	160.00	144.95
EX-241 Marker unit	20.00	
EX-242 FM unit	39.00	
EX-243 Electronic keyer unit	50.00	
FL-45 500 Hz CW filter (1st IF)	59.50	
FL-54 270 Hz CW filter (1st IF)	47.50	
FL-52A 500 Hz CW filter (2nd IF)	96.50	89.95
FL-53A 250 Hz CW filter (2nd IF)	96.50	89.95
FL-44A SSB filter (2nd IF)	159.00	144.95
HM-10 Scanning mobile microphone	39.50	
SM-6 Desk microphone	39.00	
HM-12 Extra hand microphone	39.50	
MB-12 Mobile mount	19.50	



IC-751 9-band xcvr/.1-30 MHz rcvr	1399.00	999.00
PS-35 Internal power supply	160.00	144.95
FL-32 500 Hz CW filter (1st IF)	59.50	
FL-63 250 Hz CW filter (1st IF)	48.50	
FL-52A 500 Hz CW filter (2nd IF)	96.50	89.95
FL-53A 250 Hz CW filter (2nd IF)	96.50	89.95
FL-33 AM filter	31.50	
FL-70 2.8 kHz wide SSB filter	46.50	
HM-12 Extra hand microphone	39.50	
SM-6 Desk microphone	39.00	
RC-10 External frequency controller	35.00	
MB-18 Mobile mount	19.50	

IC-720A 9-band xcvr • (CLOSEOUT) •	1349.00	699.95
PS-15 20A external power supply	149.00	134.95
FL-32 500 Hz CW filter	59.50	
FL-34 5.2 kHz AM filter	49.50	
BC-10A Memory back-up	8.50	
SM-5 8-pin electret desk mic	39.00	
MB-5 Mobile mount	19.50	

Other Accessories:	Regular	SALE
PS-15 20A external power supply	149.00	134.95
CF-1 Cooling fan for PS-15	45.00	
EX-144 Adaptor for CF-1/PS-15	6.50	
PS-30 Systems p/s w/cord, 6-pin plug	259.95	234.95
OPC Opt. cord, specify 2, 4 or 6-pin	5.50	
SP-3 External base station speaker	49.50	
SP-5 Remote speaker for mobiles	25.00	
CR-64 High stab. ref. xtal (745/751)	56.00	
PP-1 Speaker/patch (specify radio)	139.00	129.95
SM-8 Desk mic - two cables, Scan	69.95	
SM-10 Compressor/graph EQ, 8 pin mic	119.00	
AT-100 100W 8-band auto antenna tuner	349.00	314.95
AT-500 500W 9-band auto. antenna tuner	449.00	399.95
AH-1 5-band mobile antenna w/tuner	289.00	259.95

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Other Accessories cont.	Regular	SALE
AH-2 8-band tuner w/mount & whip	549.00	
GC-4 World clock • (CLOSEOUT) •	99.95	79.95

HF linear amplifier	Regular	SALE
IC-2KL 160-15m solid state amp w/ps	1795.00	1299

6-meter VHF Portable	Regular	SALE
IC-505 3/10W 6m SSB/CW portable	449.00	399.95
BP-10 Internal Nicad battery pack	79.50	
BP-15 AC charger	12.50	
EX-248 FM unit	49.50	
LC-10 Leather case	34.95	

VHF/UHF base multi-modes	Regular	SALE
IC-551D 80W 6-meter SSB/CW	699.00	599.95
EX-106 FM option	125.00	112.95
BC-10A Memory back-up	8.50	
SM-2 Electret desk microphone	39.00	
IC-271A 25W 2m FM/SSB/CW	699.00	569.95
AG-20 Internal preamplifier*	56.95	
IC-271H 100W 2m FM/SSB/CW	899.00	759.95
AG-25 Mast mounted preamplifier*	84.95	
IC-471A 25W 430-450 SSB/CW/FM xcvr	799.00	699.95
AG-1 Mast mounted preamplifier*	89.00	
IC-471H 75W 430-450 SSB/CW/FM	1099.00	969.95
AG-35 Mast mounted preamplifier*	84.95	

Limiter Offer! • Matching preamp* only **$100** extra with purchase of **IC-271A/H** or **IC-471A/H.**

Accessories common to 271A/H and 471A/H		
PS-25 Internal power supply for (A)	99.00	89.95
PS-35 Internal power supply for (H)	160.00	144.95
PS-15 External power supply	149.00	134.95
SM-6 Desk microphone	39.00	
EX-310 Voice synthesizer	39.95	
TS-32 CommSpec encode/decoder	59.95	
UT-15 Encoder/decoder interface	12.50	
UT-15S UT-15S w/TS-32 installed	79.95	

VHF/UHF mobile multi-modes	Regular	SALE
IC-290H 25W 2m SSB/FM, TTP mic	549.00	479.95
IC-490A 10W 430-440 SSB/FM/CW	649.00	579.95

VHF/UHF/1.2 GHz FM	Regular	SALE
IC-27A Compact 25W 2m FM w/TTP mic	369.00	329.95
IC-27H Compact 45W 2m FM w/TTP mic	409.00	359.95
IC-37A Compact 25W 220 FM, TTP mic	449.00	329.95
IC-47A Compact 25W 440 FM, TTP mic	469.00	399.95
PS-45 Compact 8A power supply	112.95	99.95
UT-16/EX-388 Voice synthesizer	29.95	
SP-10 Slim-line external speaker	29.95	
IC-3200A 25W 2m/440 FM w/TTP	549.00	489.95
UT-23 Voice synthesizer	29.95	
AH-32 2m/440 Dual Band antenna	32.95	
Larsen PO-K Roof mount	20.00	
Larsen PO-TLM Trunk-lip mount	20.18	
Larsen PO-MM Magnetic mount	19.63	
IC-1271A 10W 1.2 GHz SSB/CW Base	999.00	889.95
ATV-1200 ATV interface unit	TBA	
PS-25 Internal power supply	99.00	89.95
EX-310 Voice synthesizer	39.95	
UT-15S CTCSS encoder/decoder	79.95	
IC-120 1W 1.2 GHz FM Mobile	499.00	449.95
ML-12 1.2 GHz 10W amplifier	339.00	299.95

Repeaters	Regular	SALE
RP-3010 440 MHz, 10W FM, xtal cont.	999.00	899.95
RP-1210 1.2 GHz, 10W FM, 99 ch. synth	1199.00	1089
Duplexer 1210 1.2 GHz duplexer	1199.00	1089
Cabinet for RP-1210	249.00	

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Hand-held Transceivers		
Deluxe models	**Regular**	**SALE**
IC-02AT for 2m	349.00	289.95
IC-04AT for 440 MHz	379.00	319.95
Standard models	**Regular**	**SALE**
IC-2A for 2m	239.50	189.95
IC-2AT with TTP	269.50	199.95
IC-3AT 220 MHz, TTP	299.95	239.95
IC-4AT 440 MHz, TTP	299.95	239.95

Accessories for Deluxe models	Regular
BP-7 425mah/13.2V Nicad Pak - use BC-35	67.50
BP-8 800mah/8.4V Nicad Pak - use BC-35	62.50
BC-35 Drop in desk charger for all batteries	69.00
BC-60 6-position gang charger, all batts SALE	359.95
BC-16U Wall charger for BP7/BP8	10.00
LC-11 Vinyl case	17.95
LC-14 Vinyl case for Dlx using BP-7/8	17.95
LC-02AT Leather case for Dlx models w/BP-7/8	39.95

Accessories for both models	Regular
BP-2 425mah/7.2V Nicad Pak - use BC35	39.50
BP-3 Extra Std. 250 mah/8.4V Nicad Pak	29.50
BP-4 Alkaline battery case	12.50
BP-5 425mah/10.8V Nicad Pak - use BC35	49.50
CA-2 Telescoping 2m antenna	10.00
CA-5 5/8-wave telescoping 2m antenna	18.95
FA-2 Extra 2m flexible antenna	10.00
CP-1 Cig. lighter plug/cord for BP3 or Dlx	9.50
DC-1 DC operation pak for standard models	17.50
LC-2AT Leather case for standard models	34.95
RB-1 Vinyl waterproof radio bag	30.00
HH-SS Handheld shoulder strap	14.95
HM-9 Speaker microphone	34.50
HS10 Boom microphone/headset	19.50
HS-10SA Vox unit for HS-10 & Deluxe only	19.50
HS-10SB PTT unit for HS-10	19.50
ML-1 2m 2.3w in/10w out amplifier SALE	79.95
SS-32M Commspec 32-tone encoder	29.95

Receivers	Regular	SALE
R-7000 25-2000 MHz, 117V AC	899.00	789.95
RC-12 Infrared remote controller	TBA	
R-71A 100 kHz-30 MHz, 117V AC	$799.00	649.95
RC-11 Infrared remote controller	59.95	49.95
FL-32 500 Hz CW filter	59.50	
FL-63 250 Hz CW filter (1st IF)	48.50	
FL-44A SSB filter (2nd IF)	159.00	144.95
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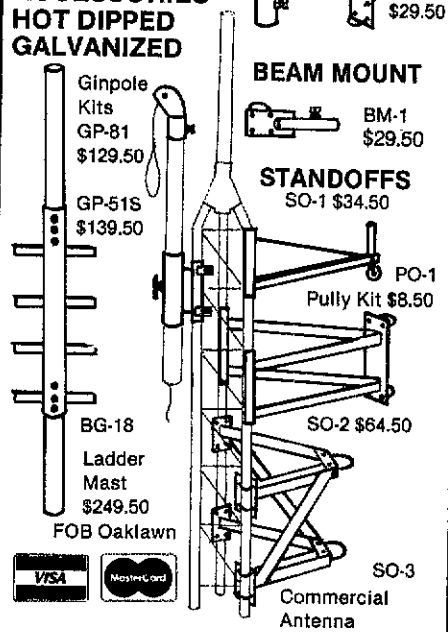

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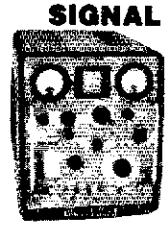

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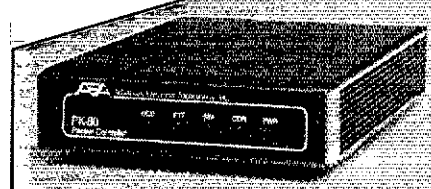

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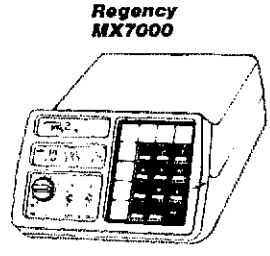

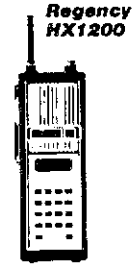

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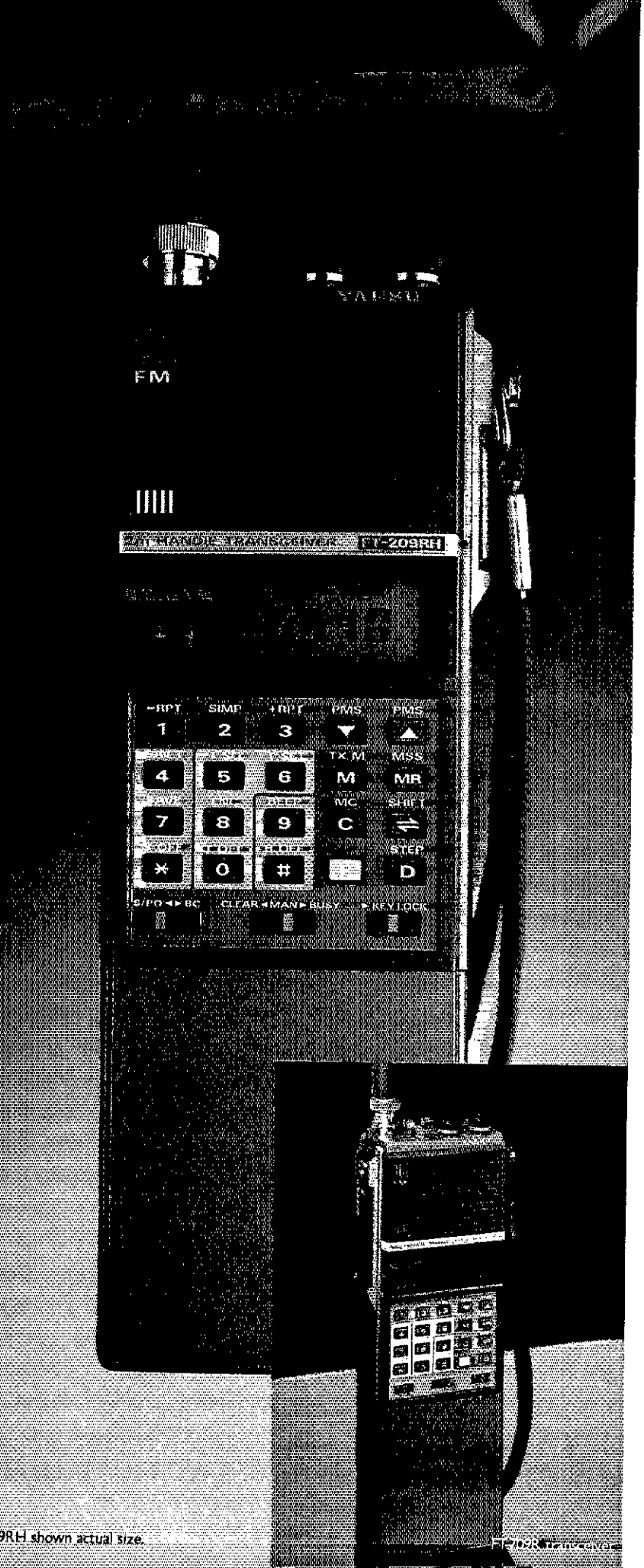

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• **Giant Flea Market**	Starting at noon Friday, all day Saturday and Sunday. All spaces are **SOLD OUT.**
• **License Exams**	Novice through Extra, by reservation only. Send a completed form 610, a copy of your present license and a check or money order for $4.25 payable to ARRL/VEC. Indicate the desired time. Send to: License Exam, Attn. Tom Holmes, 8830 Windbluff Pt., Dayton, OH 45459. **Deadline: March 29.**
• **Alternate Activities**	HAMVENTION is for everyone. We have planned activities for the YL or your non-ham family members.
• **Special Awards**	Nominations are requested for "Radio Amateur of the Year," "Special Achievement" and "Technical Achievement" Awards. Contact: Awards Chairman, Box 44, Dayton, OH 45401. **Deadline: April 1.**
• **CW Awards**	See how fast you can copy the International Morse Code (World record is 72.5 WPM). All participants receive an award indicating their maximum speed.
• **Admission**	Registration: $8.00 in advance, $10.00 at the door. Banquet (Roy Neal, K6DUE, Speaker): $14 in advance, $16.00 at the door, **if available.** Ladies Luncheon: $6.75. Last Day for advance tickets: April 5 (Canada), April 12 (U.S.).
• **Housing**	Most motel rooms in the Dayton area have been set aside for the HAMVENTION. Write: Dayton HAMVENTION Housing, 1980 Kettering Tower, Dayton, OH 45423-1980. **NO RESERVATIONS WILL BE ACCEPTED BY TELEPHONE.**
• **Parking**	Free parking is available at Hara Arena. In addition, there will be free shuttle bus service from all major motels and designated parking lots. Parking and road information is available on DARA's 146.34/.94 repeater.
• **Other Information**	Special air fares are available on Piedmont and USAir. A free slide show about the HAMVENTION is available for club meetings. Wheelchairs and handicap parking are available. For more information . . . Write: Box 44, Dayton, OH 45401 or call (513) 433-7720.

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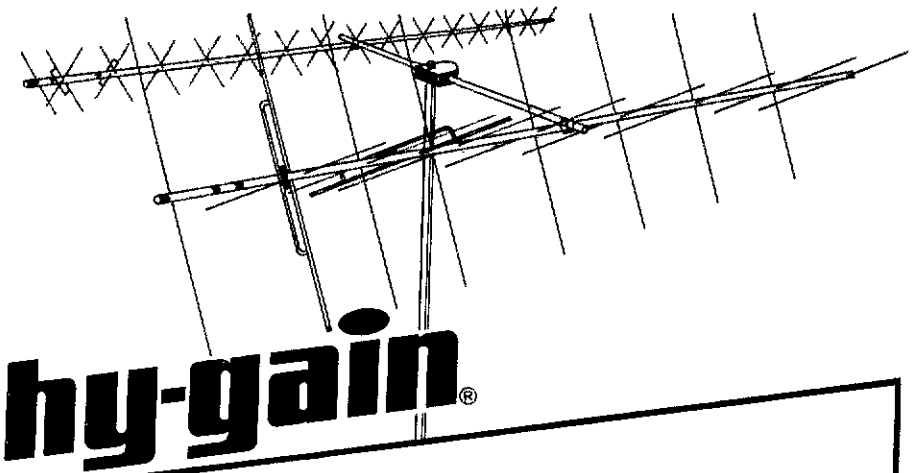

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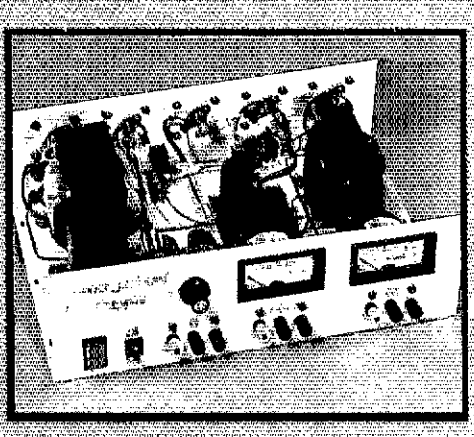

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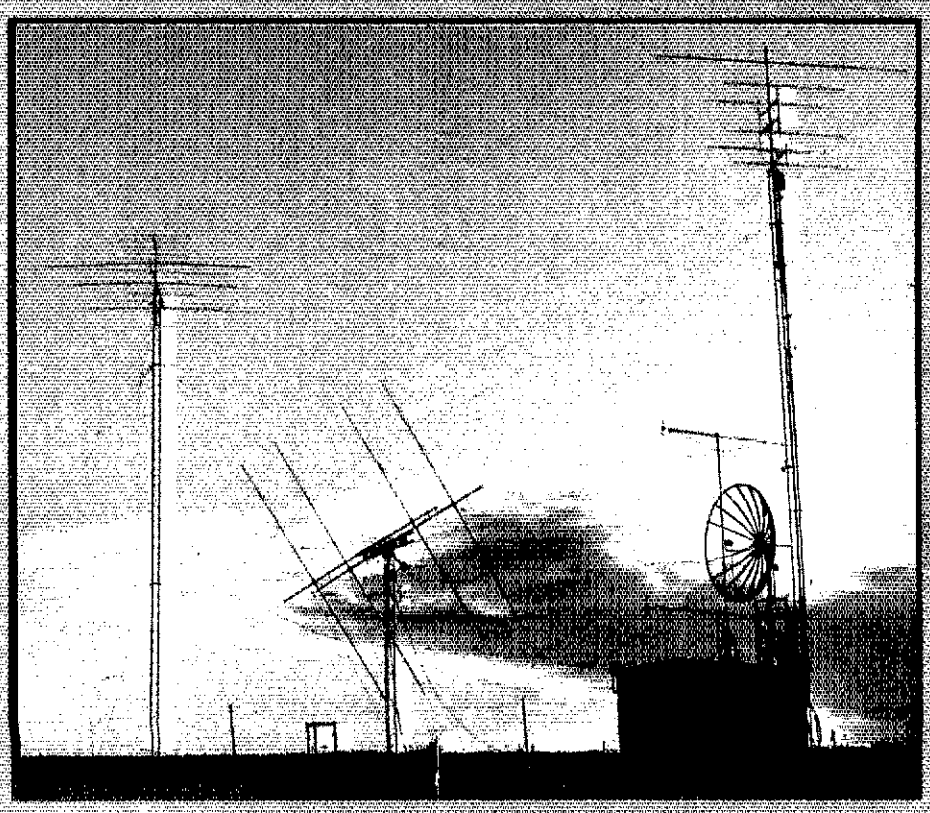
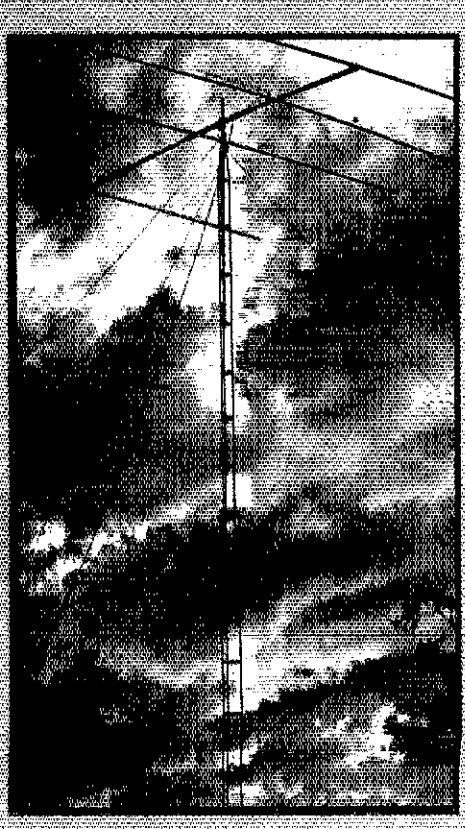

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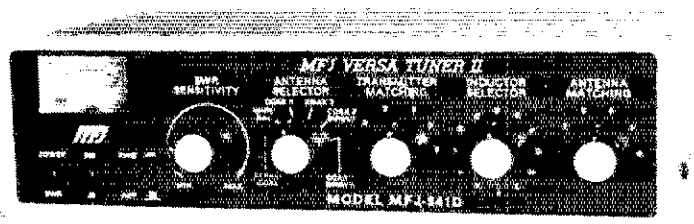

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RTTY/ASCII/CW COMPUTER INTERFACE

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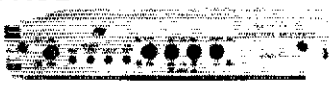


Free MFJ RTTY/ASCII/CW software on tape and cable for VIC-20 or C-64. Send and receive computerized RTTY/ASCII/CW with nearly any personal computer (VIC-20, Apple, TRS-80C, Atari, TI-99, Commodore 64, etc.). Use Kantronics or most other RTTY/CW software. Copies both mark and space, any shift (including 170, 425, 850 Hz) and any speed (5-100 WPM RTTY/CW, 300 baud ASCII). Sharp 8 pole active filter for CW and 170 Hz shift. Sends 170, 850 Hz shift. Normal/reverse switch eliminates retuning. Automatic noise limiter. Kantronics compatible socket plus exclusive general purpose socket. 8x1¼x6 in. 12-15 VDC or 110 VAC with adapter, MFJ-1312, $9.95.

RX NOISE BRIDGE

Maximize your antenna performance! **$59.95** MFJ-202B

Tells whether to shorten or lengthen antenna for minimum SWR. Measure resonant frequency, radiation resistance and reactance.

New Features: individually calibrated resistance scale, expanded capacitance range (±150 pf). Built-in range extender for measurements beyond scale readings. 1-100 MHz. Comprehensive manual. Use 9 V battery. 2x4x4 in.

INDOOR TUNED ACTIVE ANTENNA

NEW! IMPROVED! with higher gain **"World Grabber" rivals or exceeds reception of outside long wires!** Unique **tuned** Active Antenna minimizes intermode, improves selectivity, reduces noise outside tuned band, even functions as preselector with external antenna. Covers 0.3-30 MHz. Telescoping antenna. Tune, Band, Gain, On-off bypass controls. 6x2x6 in. Uses 9V battery, 9-18 VDC or 110 VAC with adapter, MFJ-1312, $9.95. **MFJ-1020A $79.95**

POLICE/FIRE/WEATHER 2 M HANDHELD CONVERTER

Turn your synthesized scanning 2 meter handheld into a hot Police/Fire/Weather band scanner! **$39.95** MFJ-313

144-148 MHz handhelds receive Police/Fire on 154-158 MHz with direct frequency readout. Hear NOAA maritime coastal plus more on 160-164 MHz. Converter mounts between handheld and rubber ducky. Feedthru allows simultaneous scanning of both 2 meters and Police/Fire bands. No missed calls. Crystal controlled. Bypass/Off switch allows transmitting (up to 5 watts). Use AAA battery. 2¼x1½x1½ in. BNC connectors.

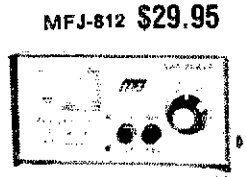
MFJ/BENCHER KEYER COMBO

MFJ-422 **$119.95**

The best of all CW worlds- a deluxe MFJ Keyer in a compact configuration that fits right on the Bencher iambic paddle! MFJ Keyer - small in size, big in features. Curtis 8044-B IC, adjustable weight and tone, front panel volume and speed controls (8-50 WPM). Built-in dot-dash memories. Speaker, sidetone, and push button selection of semi-automatic/tune or automatic modes. Solid state keying. Bencher paddle is fully adjustable; heavy steel base with non-skid feet. Uses 9 V battery or 110 VAC with optional adapter, MFJ-1305, $9.95.

VHF SWR/WATTMETER

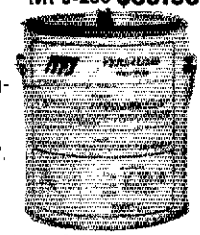
MFJ-812 **$29.95**



Low cost VHF SWR/Wattmeter! Read SWR (14 to 170 MHz) and forward/reflected power at 2 meters. Has 30 and 300 watts scales. Also read relative field strength. 4x2x3 in.

1 KW DUMMY LOAD

MFJ-250 **$39.95**



Tune up fast, extend life of finals, reduce QRM! Rated 1KW CW or 2KW PEP for 10 minutes. Half rating for 20 minutes, continuous at 200 W CW, 400 W PEP. VSWR under 1.2 to 30 MHz, 1.5:to 300 MHz. Oil contains no PCB. 50 ohm non-inductive resistor. Safety vent. Carrying handle. 7½x6¾ in.

24/12 HOUR CLOCK/ ID TIMER

MFJ-106 **$19.95** NEW

Switch to 24 hour UTC or 12 hour format! Battery backup maintains time during power outage. ID timer alerts every 9 minutes after reset. Red LED .6 inch digits. Synchronizable with WWV. Alarm with snooze function. Minute set, hour set switches. Time set switch prevents mis-setting. Power out, alarm on indicators. Gray and black cabinet. 5x2x3 inches. 110 VAC, 60 Hz.

DUAL TUNABLE SSB/CW/RTTY FILTER

MFJ-752B **$99.95**

Dual filters give unmatched performance! The primary filter lets you peak, notch, low pass or high pass with extra steep skirts. Auxiliary filter gives 70 db notch, 40 Hz peak. Both filters tune from 300 to 3000 Hz with variable bandwidth from 40 Hz to nearly flat. Constant output as bandwidth is varied; linear frequency control. Switchable noise limiter for impulse noise. Simulated stereo sound for CW lets ears and mind reject QRM. Inputs for 2 rigs. Plugs into phone jack. Two watts for speaker. Off bypasses filter. 9-18 VDC or 110 VAC with optional adapter, MFJ-1312, $9.95.

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MFJ TUNERS

This may be the world's most popular 3 KW roller inductor tuner because it's small, compact, reliable, matches virtually everything and gives you SWR/Wattmeter, antenna switch, dummy load and balun — all at a great price!

Most "Versa Tuner V". It has all the features you asked for, including the new smaller size to match new smaller rigs-only 10¾"Wx4½"Hx14 7/8"D.

Matches coax, balanced lines, random wires—1.8 to 30 MHz. 3 KW PEP —the power rating you won't outgrow (250pf-6KV caps).

Roller inductor with a 3-digit turns counter plus a spinner knob for precise inductance control to get that SWR down to minimum every time.

Built-in 300 watt, 50 ohm dummy load, built-in 4:1 ferrite balun.

MFJ-989 **$329.95**

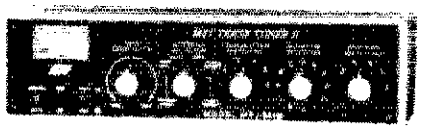
Accurate meter reads SWR plus forward and reflected power in 2 ranges (200 and 2000 watts). Meter light requires 12 VDC. Optional AC adapter, MFJ-1312 is available for $9.95.

6 position antenna switch (2 coax lines, through tuner or direct, random/balanced line or dummy load). SO-239 connectors, ceramic feed-throughs, binding post grounds.

Deluxe aluminum low-profile cabinet with sub-chassis for RFI protection, black finish, black front panel with raised letters, tilt bail.

MFJ's Fastest Selling TUNER

MFJ-941D **$99.95**



MFJ's fastest selling tuner packs in plenty of new features. New styling! Brushed aluminum front. All metal cabinet. **New SWR/Wattmeter!** More accurate. Switch selectable 300/30 watt ranges. Read forward/reflected power.

New antenna switch! Front panel mounted. Select 2 coax lines, direct or through tuner, random wire/balanced line or tuner bypass for dummy load.

New airwound inductor! Larger more efficient 12 position airwound inductor gives lower losses and more watts out. Run up to 300 RF power output.

Matches everything from 2.8 to 30 MHz! dipoles, inverted vee, random wires, verticals, mobile whips, beams, balanced and coax lines.

Built-in 4:2 balun for balanced lines. 1000 V capacitor spacing. Black. 11 x 3 x 7 inches. Works with all solid state or tube rigs. Easy to use anywhere.

MFJ's 1.5 KW VERSA TUNER III

MFJ-962 **$229.95**

Run up to 1.5 KW PEP and match any feedline continuously from 1.8 to 30 MHz: coax, balanced line or random wire.

Built-in SWR/Wattmeter has 2000 and 200 watt ranges, forward and reflected power. 2% meter movement. 6 position antenna switch handles 2 coax lines (direct or through tuner), wire and balanced lines. 4:1 balun 250 pf 6 KV variable capacitors. 12 position inductors. Ceramic rotary switch. All metal black cabinet and panel gives RFI protection, rigid construction and sleek styling. Flip stand tilts tuner for easy viewing. 5 x 14 x 14 in.

MFJ's Best VERSA TUNER

MFJ-949C **$149.95**

MFJ's best 300 watt tuner is now even better! The MFJ-949C all-in-one Deluxe Versa Tuner II gives you a tuner, cross-needle SWR/Wattmeter, dummy load, antenna switch and balun in a new compact cabinet. You get quality conveniences and a clutter-free shack at a super price.

A new cross-needle SWR/Wattmeter gives you SWR, forward and reflected power—all at a single glance. SWR is automatically computed with no controls to set. Has 30 and 300 watt scale on easy-to-read 2 color lighted meter (needs 12 V).

A handsome new black brushed aluminum cabinet matches all the new rigs. Its compact size (10 x 3 x 7 inches) takes only a little room.

You can run full transceiver power output—up to 300 watts RF output—and match coax, balanced lines or random wires from 1.8 thru 30 MHz. Use it to tune out SWR on dipoles, vees, long wires, verticals, whips, beams and quads.

A 300 watt 50 ohm dummy load gives you quick tune ups and a versatile six position antenna switch lets you select 2 coax lines (direct or thru tuner), random wire or balanced line and dummy load.

A large efficient airwound inductor—3 inches in diameter—gives you plenty of matching range and less losses for more watts out. 100 volt tuning capacitors and heavy duty switches gives you safe arc-free operation. A 4:1 balun is built-in to match balanced lines.

Order your convenience package now and enjoy.

2 KW COAX SWITCHES

MFJ-1702 **$19.95**

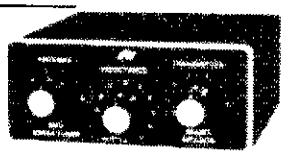
MFJ-1702, $19.95. 2 positions. 60 dB isolation at 450 MHz. Less than .2 dB loss. SWR below 1:1.2.

$29.95 MFJ-1701

MFJ-1701, $29.95. 6 positions. White markable surface for antenna positions.

MFJ's Smallest VERSA TUNER

MFJ-901B **$59.95**



MFJ's smallest 200 watt Versa Tuner matches coax, random wires and balanced lines continuously from 1.8 thru 30 MHz. Works with all solid state and tube rigs. Very popular for use between transceiver and final amplifier for proper matching. Efficient airwound inductor gives more watts out. 4:1 balun for balanced lines. 5 x 2 x 6 inches. Rugged black all aluminum cabinet.

MFJ's Random Wire TUNER

MFJ-16010 **$39.95**

MFJ's ultra compact 200 watt random wire tuner lets you operate all bands anywhere with any transceiver using a random wire. Great for apartment, motel, camping operation. Tunes 1.8-30 MHz. 2 x 3 x 4 inches.

MFJ's Mobile TUNER

MFJ-945C **$79.95**

Designed for mobile operation! Small, compact. Takes just a tiny bit of room in your car. SWR/dual range wattmeter makes tuning fast and easy. Careful placement of controls and meter makes antenna tuning safer while in motion.

Extends your antenna bandwidth so you can operate anywhere in a band with low SWR. **No need to go outside and readjust your mobile whip.** Low SWR also gives you maximum power out of your solid state rig—runs cooler for longer life.

Handles up to 300 watts PEP RF output. Has efficient airwound inductor, 1000 volt capacitor spacing and rugged aluminum cabinet. 8x2x6 inches. Mobile mounting bracket available for $5.00.

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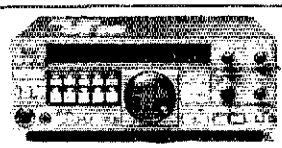

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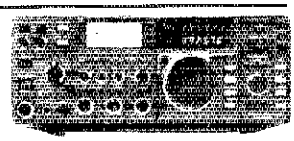

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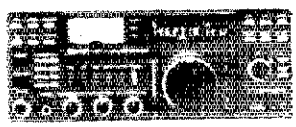

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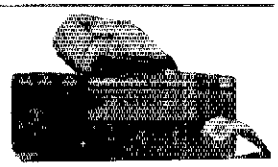

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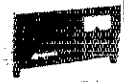

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RS20M	16	20	109
RS35A	25	35	135
RS35M	25	35	149
RS50A	37	50	199
RS50M	37	50	229

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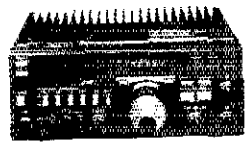

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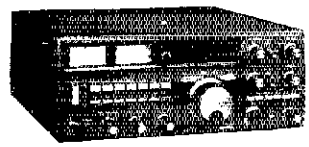

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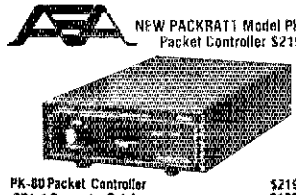

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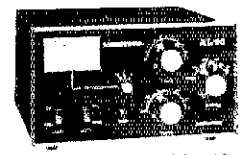

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NICAD BATTERY PACKS - Exact replacement FNB-2 NiCad packs for Yaesu FT-207/FT208 with case, $24 + $2 shipping. Kenwood, ICOM and other inserts and cells also available, send SASE for list. Periphex, 149 Palmer Road, Southbury, CT 06488, 203-264-3985.

R-390A RECEIVER, .5-30 MHz all modes, 4 mechanical filters, meters sealed (Government removed, operation unaffected): complete/checked $195, complete/reparable $115, spare parts unit (80% complete) $65. CPRC-26 Manpack Radio (described in March 1985 Ham Radio), transceivers 46-54 MHz FM, with battery box, antenna, crystal, handset: $22.50 apiece, $42.50/pair. Info SASE. CPRC-26 add $4/unit shipping. R-390A shipping charges collect. Baytronics, Dept. QST, Box 591, Sandusky, OH 44870. 419-627-0460 evenings.

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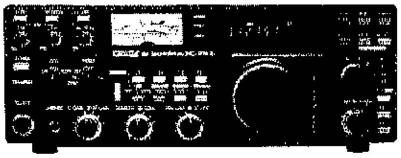

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TS-830S	949.95	Call $
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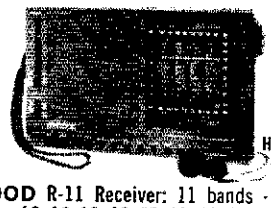

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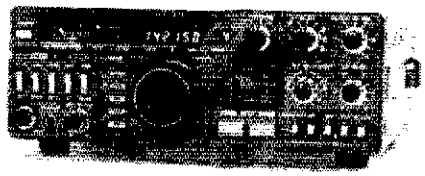

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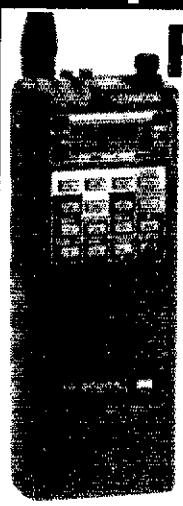

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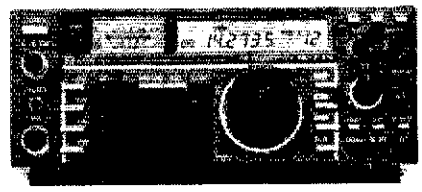

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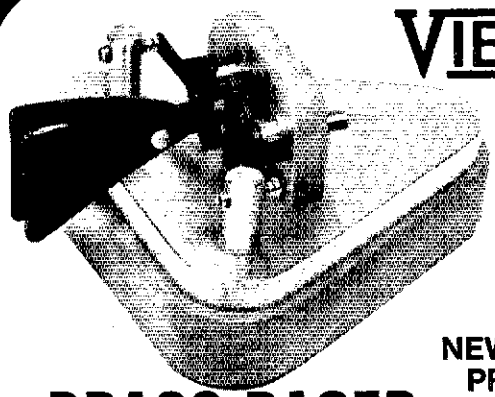

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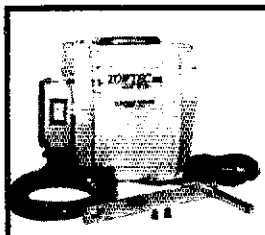

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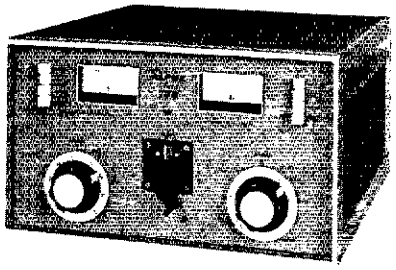

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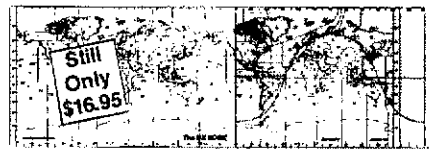

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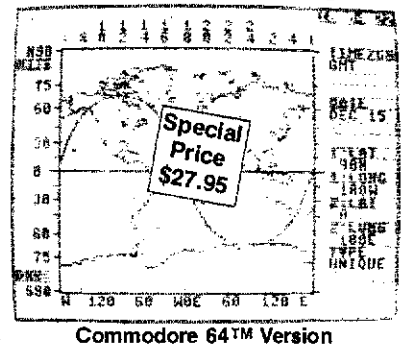

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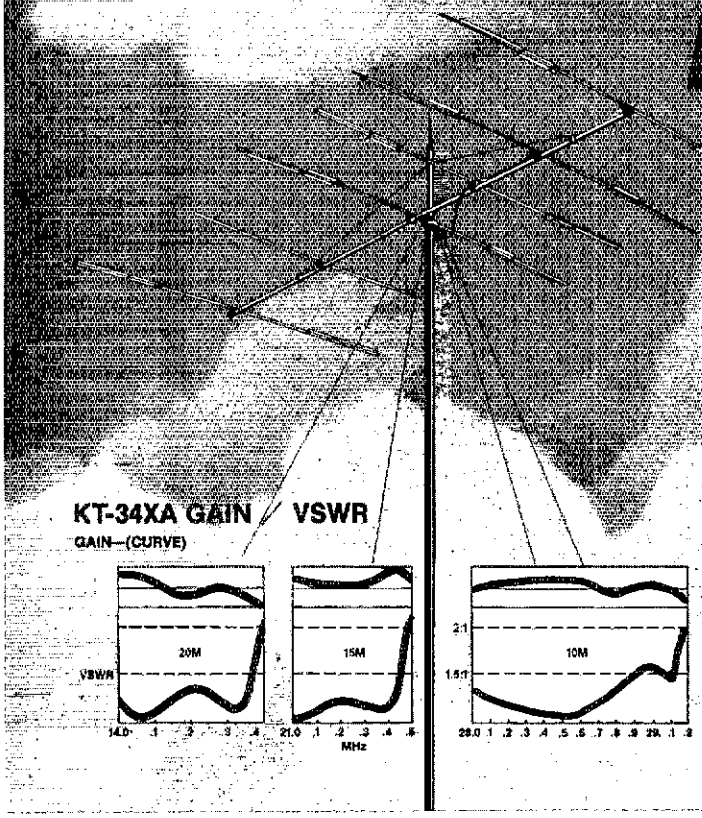

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214FB	14 element 2 mtr. FM 'Boomer'	$74.00
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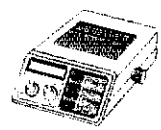
Regency



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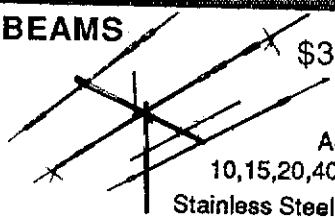

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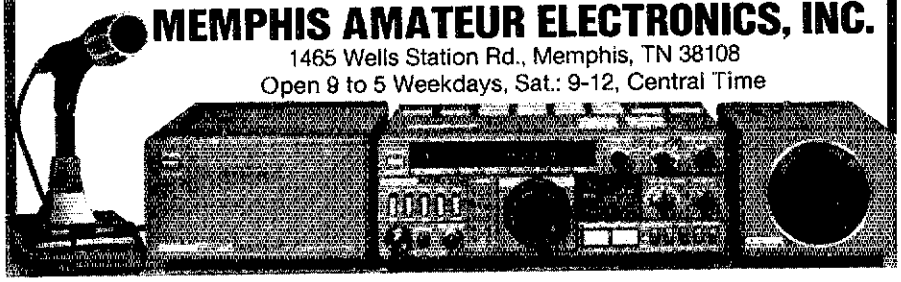

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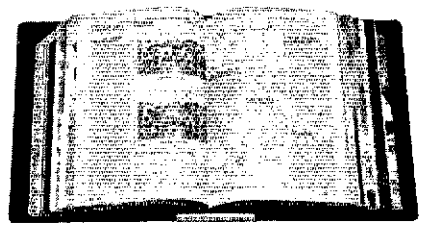

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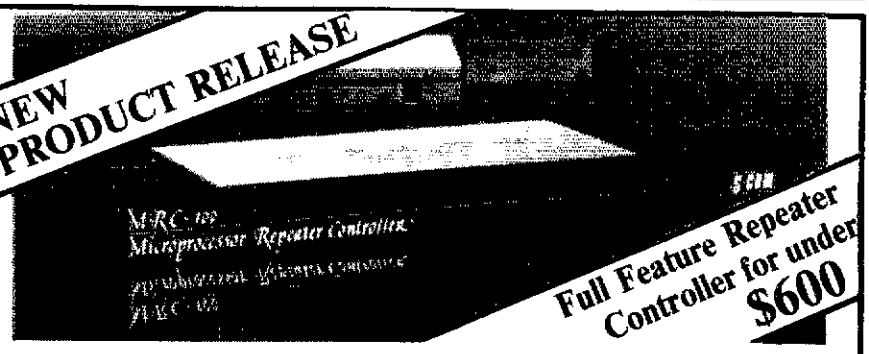

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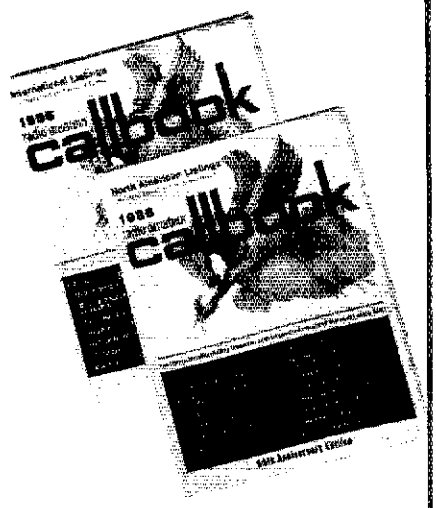

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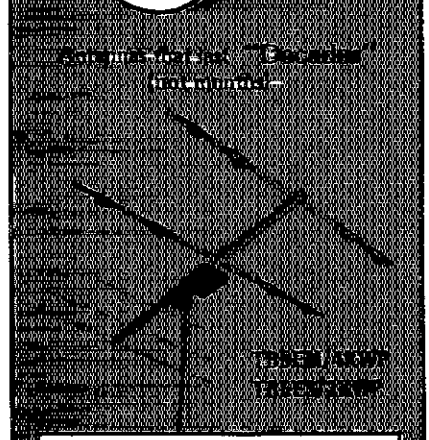

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DRAKE TR-4C Sideband plus AC4 Power Supply $300. Midland PLL Model 13-510 $150. Astatic Mike Model 10-DA UG8 $70. T. E. Nicholson, 1410 Manhattan Way, Santa Rosa, CA 95401.

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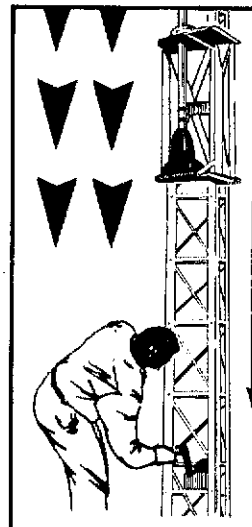

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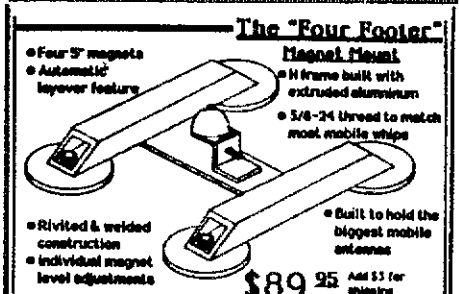

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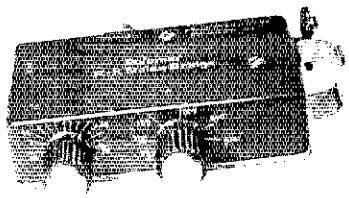

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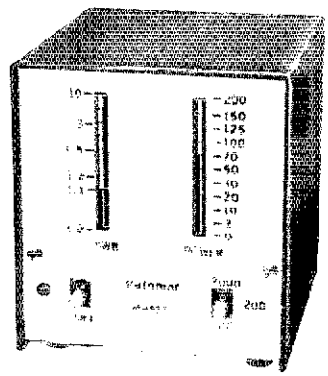

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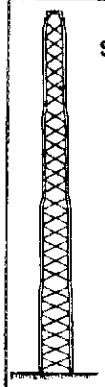

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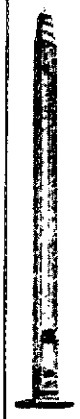
*Your Total Delivered Price Anywhere in Continental 48 States. Antenna Load Based on 70 MPH Wind.



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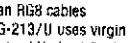
- Guaranteed Highest Quality!

RG-8X



$ 19/ft $179/1000 ft

- RG8X—95% Bare Copper Shield • Low Loss
- Non-contaminating Vinyl Jacket Foam Dielectric

Coaxial Cable Loss Characteristics (DB/100 ft)

Cable Type	Imped.	10 MHz	30 MHz	150 MHz	450 MHz
RG-213/U	50	.6	.9	2.3	5.2
RG8X	52	.8	1.2	3.5	5.8
RG-58/U	52	1.4	1.9	6.0	12.5
½" Alum	50	3	5	12	22
½" Heliax	50	2	4	9	16
⅞" Heliax	50	1	2	5	9

HARDLINE/HELIAX™

Lowest Loss for VHF/UHF!

½" Alum w/poly Jacket	$.79/ft
½" LDF4-50 Andrew Heliax™	$1.79/ft
⅞" LDF5-50 Andrew Heliax™	$3.99/ft

select connectors below.

HARDLINE & HELIAX™ CONNECTORS

Cable Type	UHF FML	UHF MALE	N FML	N MALE
½" Alum	$19	$19	$19	$25
½" Heliax™	$25	$25	$25	$25
⅞" Heliax™	$49	$49	$49	$49

AMPHENOL CONNECTORS

Silver PL259 ... $1.25
UG21B N Male ... $2.95 UG23D N Female ... $2.95

Antenna Wire & Accessories

Solid Copperweld 12 ga. $.12/ft 14 ga. $.10/ft
Stranded Copper 14 ga. $.10/ft 16 ga. $.09/ft
Stanled 14 ga. $.10/ft 16 ga. $.09/ft
¼ mile 18 ga copper-clad steel wire ... $30
6 inch heavy-duty end insulator ... $3.00/ea.
Dog-bone insulator $.79 Coax seal ... $2.50

Van Gorden

1:1 Balun $11 Center Insulator ... $6
Dipole Kits ... D80 $31/D40 $28
Short Dipole Kits ... SD80 $35/SD40 $33
All-band Dipole w/ladder line ... $29
G5RV all band antenna ... $49

ALPHA DELTA

DX-A 160-80-40 Sloper ... $49

CUSHCRAFT

A33-el Tribander Beam	$209
A743 30/40 mtr Kit for the A3	$75
A4 4-el Tribander Beam	$269
A744 30/40mtr Kit for the A4	$75
R3 20, 15, 10mtr Vertical	$259
AV5 80-10mtr Vertical	$99
D40 40mtr Dipole	$149
40-2CD 2-el 40 mtr Beam	$279
A50-5 5-el 6 mtr Beam	$79
215 WB NEW 15-el 2 mtr Beam	$75
4218 XL 18-el 2 mtr Beam	$95
3219 19-el 2mtr Beam	$89
2208 17-el 220MHz Beam	$89
4248 24-el 432MHz Beam	$75
ARX2B 2mtr Vertical	$39

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Discover 2-el 40-mtr Beam
Discover 3-el Conversion Kit
EXPLORER-14 SUPER-SPECIAL
QK710 30/40 mtr. Add-On-Kit
V2S 2-mtr Base Vertical
V4S 440MHz Base Vertical
TH5MK2S Broad Band 5-el Triband Beam
TH7DXS 7-el Triband Beam
TH3JRS 3-el Triband Beam
205BAS 5-el 20-mtr Beam
155BAS 5-el 15-mtr Beam
105BAS 5-el 10-mtr Beam
204BAS 4-el 20-mtr Beam
64BS 4-el 6-mtr Beam
12 AVQ 20-10 mtr vertical
14 AVQ 40-10 mtr vertical
18 AVT/WB 80-10mtr Vertical
18HTS 80-10 mtr Hy-Tower Vertical
23BS 3-el 2 mtr Beam
25BS 5-el 2 mtr Beam
28BS 8-el 2 mtr Beam
214BS 14-el 2-mtr Beam
2BDQ 80/40 mtr Trap Dipole
5BDQ 80-10 mtr Trap Dipole
BN86 80-10 mtr KW Balun W/Coax Seal

Limited Quantities purchased at old prices. Call for current prices.

HUSTLER

6BTV 80-10 mtr Vert $129 5BTV 80-10 mtr Vert $109
4BTV 40-10 mtr Vert. $89 G7-144 2-mtr Base $119
G6-144B 2-mtr Base $89

Mobile Resonators	10m	15m	20m	40m	75m
400W Standard	$16	$17	$19	$22	$26
2KW Super	$20	$22	$25	$29	$39

Bumper Mounts - Springs - Folding Masts in Stock!

BUTTERNUT ELECTRONICS CO

HF6V $129 Delivered (Cont. USA)

- Full Legal Power 80/10 Meters
- Optional Stub Tuned Radial Kit Model STR II $29
- Optional Roof Mounting Kit Model RMK II $49 (includes STR II)
- Optional 160 Meter Resonator Kit Model TBR 160 $49

HF2V 80/40 Meter Vertical Antenna $129 Delivered (Continental USA)

- Optional 160 Meter Resonator Kit Model TBR 160 $49

HF4B "Butterfly" $189. (del. cont. USA)
- Covers 10, 12, 15, 20M
- Compact Beam Design
- Max. Element Length of 12.5'
- Light Weight, Only 17 lbs.
- Use with TV Rotor

Free Shipping On Butternut Accessories Also When Purchased With Antenna

KLM

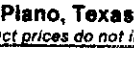
KT34A 4-el Broad Band Triband Beam	$339
KT34XA 6-el Broad Band Triband Beam	$489
2m-14C 14-el 2-mtr Satellite Antenna	$89
2m-16LBX NEW-16-el 2-mtr Beam	$99
2m 22C NEW-22-el 2-mtr Satellite Antenna	$119
432-30LBX NEW-30-el-432 MHz Antenna	$99
435-18C 435 MHz Satellite Antenna W/CS-2	$119
435-40CX 435 MHz Satellite Antenna W/CS-2	$159

ROTORS

Alliance HD73 (10.7 sq ft rating)	$119
Alliance U110 (3 sq ft rating)	$49
Telex CD 45II (8.5 sq ft rating)	$Call
Telex HAM 4 (15 sq ft rating)	$Call
Telex Tailtwister (20 sq ft rating)	$Call
Telex HDR3000 Heavy Duty (25 sq ft rating)	$Call
Kenpro KR500 Heavy Duty Elevator Rotator	$189
Kenpro KR5400 AZ/EL Rotor Package	$319

ROTOR CABLE

Standard 8 cord cables $.19/ft
(vinyl jacket 2-#18 & 6-#22 ga)
Heavy Duty 8 Cond cable $.36/ft
(vinyl jacket 2-#16 & 6-#18 ga)



ROHN GUYED TOWERS

10 ft Stack Sections

20G $39.50	45G $112.50
25G $49.50	55G $134.50

All 20G, 25G, 45G and 55G Accessories In Stock at Discount Prices - CALL!

Foldover Towers Model	Height	Ant Load*	Price
FK2548	48 ft	15.4 sq ft	$899
FK2558	58 ft	13.3 sq ft	$949
FK2568	68 ft	11.7 sq ft	$999
FK4544	44 ft	34.8 sq ft	$1199
FK4554	54 ft	29.1 sq ft	$1299
FK4564	64 ft	28.4 sq ft	$1399

25G Foldover Double Guy Kit	$249
45G Foldover Double Guy Kit	$269

*Above antenna loads for 70 MPH winds and Guys at Hinge & Apex

All Foldover Towers Shipped Freight Prepaid Continental USA! Foldover Prices 10% Higher West of Rockies

TOWER/GUY HARDWARE

3/16 EHS Guywire (3990 lb rating)	$.15/ft
1/4 EHS Guywire (6650 lb rating)	$.18/ft
5/16 EHS Guywire (11,200 lb rating)	$.29/ft
5/32 7 × 7 Aircraft Cable (2700 lb rating)	$.15/ft
3/16 CCM Cable Clamp (3/16" or 5/32")	$.45
1/4 CCM Cable Clamp (1/4" Cable)	$.55
1/4 TH Thimble (fits all sizes)	$.45
3/8EE (3/8" Eye & Eye Turnbuckle)	$6.95
3/8 EJ (3/8" Eye & Jaw Turnbuckle)	$7.95
1/2 × 9EE (1/2" × 9" Eye to Eye Turnbuckle)	$9.95
1/2 × 9EJ (1/2 × 9" Eye & Jaw Turnbuckle)	$10.95
1/2 × 12EE (1/2" 12" Eye & Eye Turnbuckle)	$12.95
1/2 × 12EJ (1/2" × 12" Eye & Jaw Turnbuckle)	$13.95
5/8 × 12EJ (5/8" × 12" Eye & Jaw Turnbuckle)	$16.95
3/16" Preformed Guy Grip	$2.49
1/4" Preformed Guy Grip	$2.99
6" Diam - 4 ft Long Earth Screw Anchor	$14.95
500 D Guy Insulator (5/32" or 3/16" Cable)	$1.69
502 Guy Insulator (1/4" Cable)	$2.99
5/8" Diam - 8 ft Copper Clad Ground Rod	$12.95

PHILLYSTRAN GUY CABLE

HPTG2100 Guy Cable (2100 lb rating)	$.29/ft
HPTG4000 Guy Cable (4000 lb rating)	$.49/ft
HPTG6700 Guy Cable (6700 lb rating)	$.69/ft
9901LD Cable End (for 2100/4000 cable)	$7.95
9902LD Cable End (for 6700 cable)	$8.95
Socketfast Potting Compound (does 6-8 ends)	$14.95

GALVANIZED STEEL MASTS

Heavy Duty Steel Masts 2 in OD - Galvanized Finish

Length	5 FT	10 FT	15 FT	20 FT
.12 in Wall	$29	$49	$59	$79
.18 in Wall	$39	$69	$99	$129
.25 in Wall	$69	$129	$189	$249

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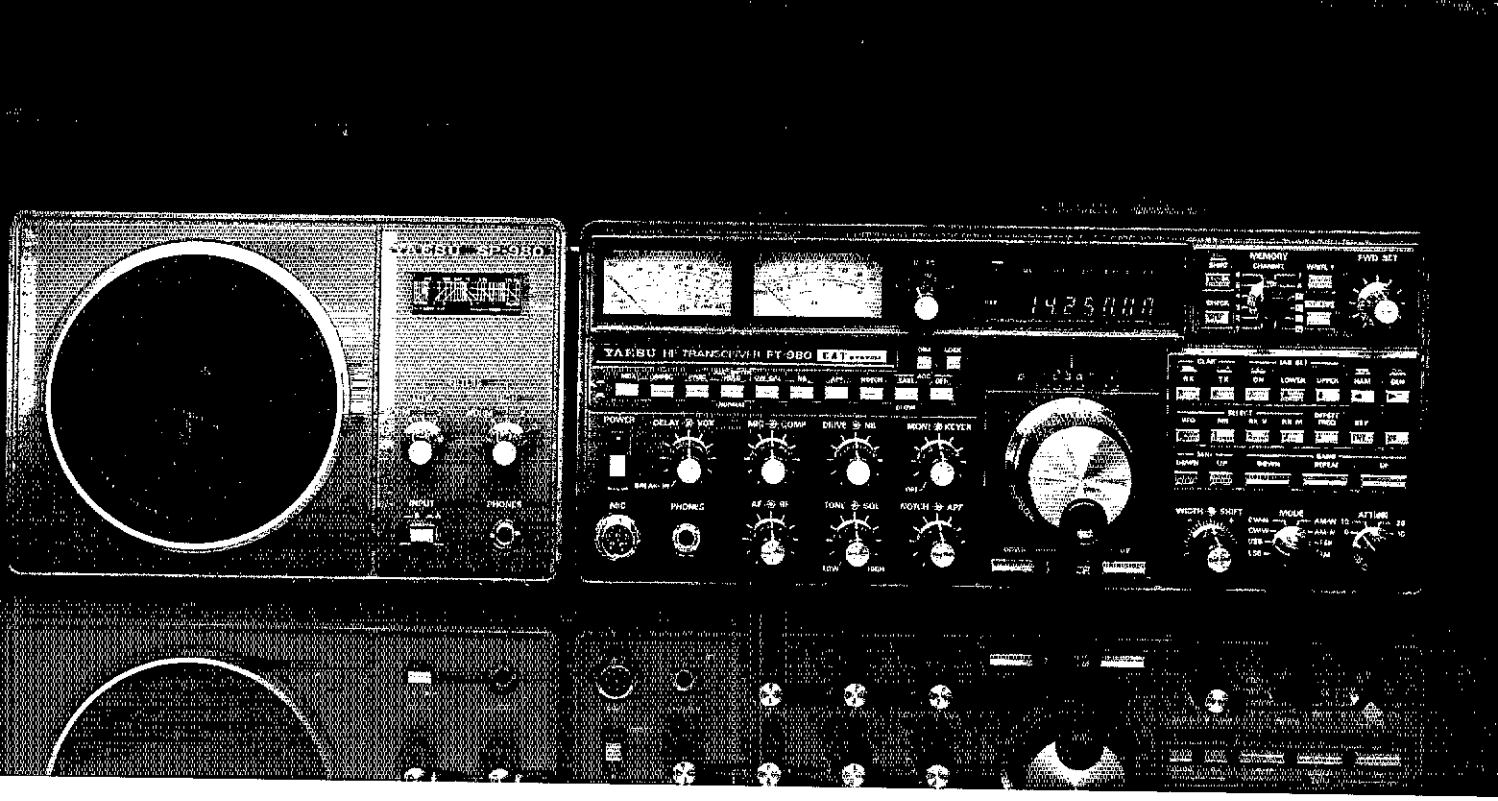

Yaesu's big gun. The FT-980.

DX and contest operation is no place for a lightweight.

That's why the FT-980 combines the latest in HF technology to give you the muscle to get you through.

To begin with, its front panel gives you unsurpassed operating flexibility.

Store your favorite frequencies and operating mode independently in each of the 12 memory channels.

Review the contents of any memory location without disturbing the QSO in progress with the checking function.

Quickly go from one programmed channel to another, or meet your buddy "five up" by simply touching a button.

And you'll be hard-pressed to find a cleaner transmitter. In fact, our conservatively designed final amplifier loafs at just a fraction of its rated output. And cuts distortion to new lows.

Then consider the receiver. A triple-conversion design with separate front ends for ham and general coverage reception. That way, ham-band operation is not compromised.

Also, cascaded IF filtering assures outstanding rejection of unwanted signals close to your operating frequency.

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Finally, if all this isn't enough, hook up the FT-980 to your personal computer for 21 advanced functions including mode, frequency and band shift. An assortment of interfaces and software are available.

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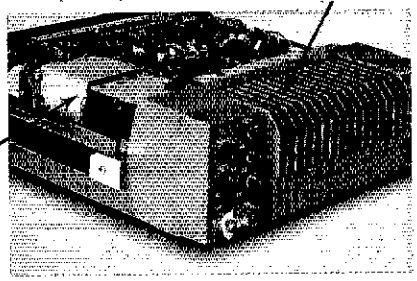
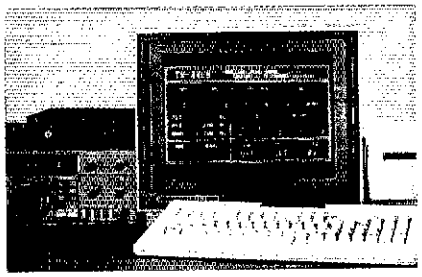
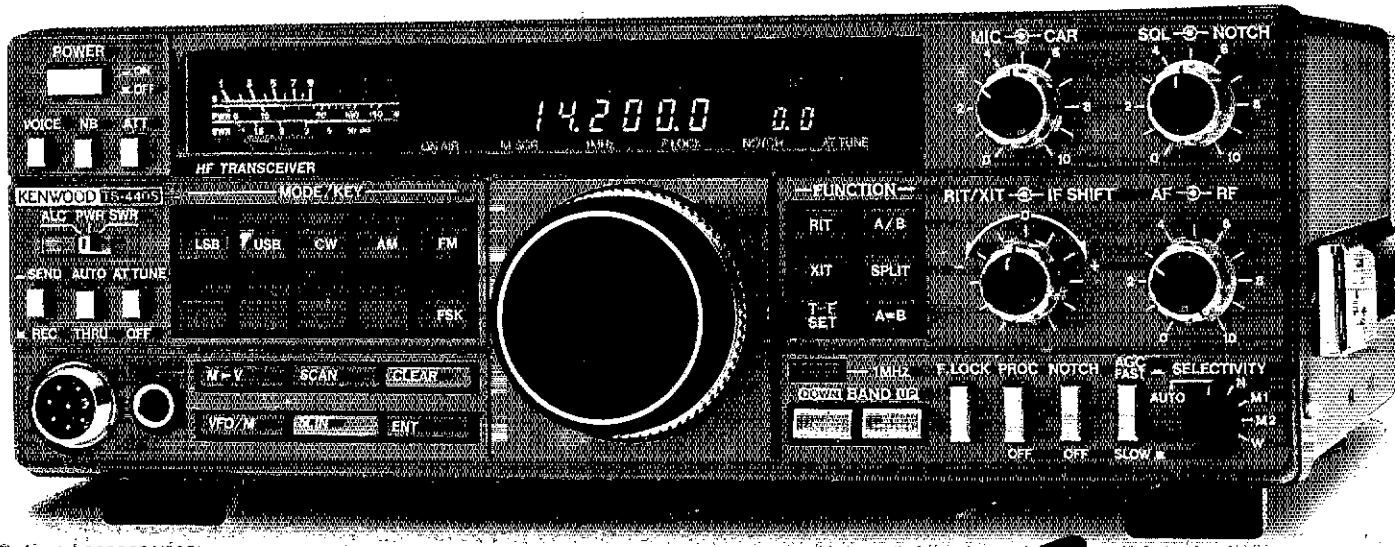
Kenwood's advanced digital know-how brings Amateurs world-wide "big-rig" performance in a compact package. We call it "Digital DX-citement"—that special feeling you get every time you turn the power on!

- **Covers All Amateur bands**
  General coverage receiver tunes from 150 kHz–30 MHz. Easily modified for HF MARS operation.
- **Direct keyboard entry of frequency**
- **All modes built-in**
  USB, LSB, CW, AM, FM, and AFSK. Mode selection is verified in Morse Code.
- **Built-in automatic antenna tuner (optional)**
  Covers 80-10 meters.
- **VS-1 voice synthesizer (optional)**
- **Superior receiver dynamic range**
  Kenwood DynaMix™ high sensitivity direct mixing system ensures true 102 dB receiver dynamic range.
- **100% duty cycle transmitter**
  Super efficient cooling permits continuous key-down for periods exceeding one hour. RF input power is rated at 200 W PEP on SSB, 200 W DC on CW, AFSK, FM, and 110 W DC AM. (The heavy duty PS-50 power supply is needed for continuous duty.)





- **100 memory channels**
  Frequency and mode may be stored in 10 groups of 10 channels each. Split frequencies may be stored in 10 channels for repeater operation.
- **TU-8 CTCSS unit (optional)**
  Subtone is memorized when TU-8 is installed.
- **Superb interference reduction**
  IF shift, tuneable notch filter, noise blanker, all-mode squelch, RF attenuator, RIT/XIT, and optional filters fight QRM in today's crowded bands.
- **MC-42S UP/DOWN mic. included**
- **Computer interface port**
- **5 IF filter functions**
- **Dual SSB IF filtering**
  A built-in SSB filter is standard. When an optional SSB filter (YK-88S or YK-88SN) is installed, **dual** filtering is provided.
- **Full or semi break-in CW; AMTOR compatible.**



Optional accessories:
- AT-440 internal auto. antenna tuner (80 m–10 m)
- AT-250 external auto. tuner (160 m–10 m)
- AT-130 compact mobile antenna tuner (160 m–10 m) • IF-232C/IC-10 level translator and modem IC kit • PS-50 heavy duty power supply • PS-430/PS-30 DC power supply • SP-430 external speaker • MB-430 mobile mounting bracket • YK-88C/88CN 500 Hz/270 Hz CW filters • YK-88S–88SN 2.4 kHz/1.8 kHz SSB filters • MC-60A/80/85 desk microphones • MC-55 (8P) mobile microphone • HS-4/5/6/7 headphones • SP-40/50 mobile speakers • MA-5/VP-1 HF 5 band mobile helical antenna and bumper mount • TL-922A 2 kw PEP linear amplifier • SM-220 station monitor • VS-1 voice synthesizer • SW-100A/200A/2000 SWR/power meters • TU-8 CTCSS tone unit • PG-2C extra DC cable.

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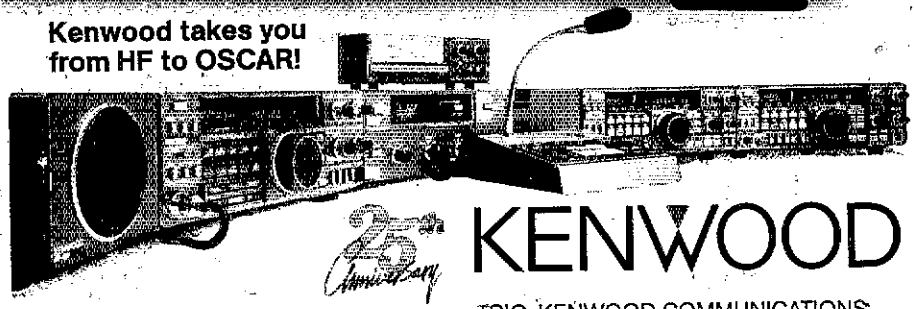

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