

QST

devoted entirely to Amateur Radio



**EME Contesters:
Masters of Moonbounce**

Page 77





the tempo S-15

...a no nonsense radio that provides more power, broader frequency range and simplicity of operation

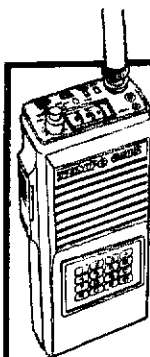
...the kind of hand held most people want...simple, rugged, reliable, easy to use. The S-15 offers a full 5 watts of power...power that extends your range and improves your talk power. Its state-of-the-art integrated circuitry provides far more reliability and ease of maintenance than conventional circuitry.

Consider these features before you decide on any hand held:

- 5 watt output (1 watt low power switchable)
- 10 MHz frequency coverage: 140-150 MHz (For export only: B version 150-160 MHz, C version 160-170 MHz)
- Electrically tuned stages. Receiving sensitivity and output power are constant over entire operating range.
- Three channel memory. (1 channel permits non-standard repeater offsets. 200 micro amp memory maintenance (standby)).
- A new "easy remove" battery pack
- One hour quick charge battery supplied (450 ma/HR)
- Plug for direct 13.8 volt operation
- Speaker/microphone connector
- BNC antenna connector and flex antenna
- Extremely small and light weight (only 17 ounces).
- Ample space for programmable encoder.
- Fully synthesized
- Extremely easy to operate
- Its low price includes a rubber antenna, standard charger, 450 ma/HR battery (quick charge type) and instruction manual.

OPTIONAL ACCESSORIES: 1 hour quick charger (ACH 15) • 16 button touch tone pad (S 15T) • DC cord • Solid state power amplifier (S-30 & S-80) • Holster (CC 15) • Speaker/mike (HM 15)

now available!



...the proven Tempo CS-15, plus three new commercial model Tempo synthesized radios

The CS-15 is a fine quality radio with 5 watt output, 10 MHz receiver coverage, is fully synthesized, and is 10 channel internally programmable. It's also sturdy, compact and affordable.

The new Tempo FMH-15S, FMH-44S & FMT-25S (mobile)

...all feature 16 channels, CPU controlled EPROM PLL, CTCSS encode/decode programmable per channel, priority scan to Channel 1, and time-out-timer.

- FMH-15S...** 138-174 MHz (10 MHz) frequency coverage
1 watt (low)/5 watts (high) RF power output
- FMH-44S...** 400-512 MHz (20 MHz) frequency coverage
1 watt (low)/4 watts (high) RF power output
- FMT-25S...** 138-174 MHz (10 MHz) frequency coverage
25 watts RF power output

Available at
your local Tempo
dealer or from..



Henry Radio

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931 N. Euclid, Anaheim, CA 92801 (714) 772-9200
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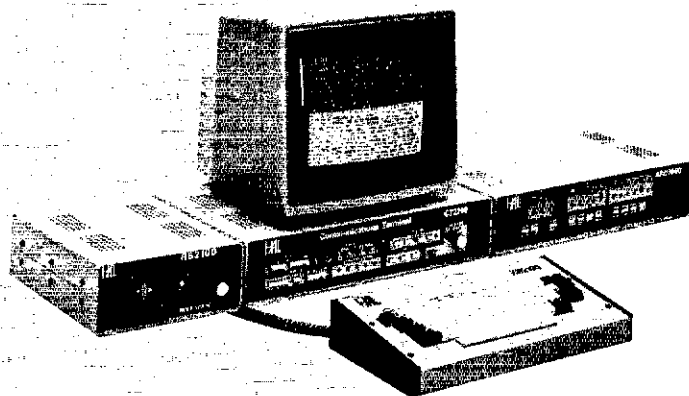


MPT3100 + DSK3100 + ST6000:

MPT3100—the acknowledged top-of-the-line system for both commercial and serious amateur RTTY and CW stations. HAL pioneered the radio mailbox technique with the MPT3100, and now the new DSK3100 disc drive option gives you 326,000 characters of message storage. The system is designed particularly for the amateur, commercial, or military operator who has to handle a large amount of traffic. You can collect, edit, and re-transmit traffic perfectly with a minimum of effort. The ST6000 is renowned for its weak-signal performance and reliability. Add the ARQ1000 for full AMTOR operations, including an AMTOR mailbox. If you are serious about your code and need high performance and reliability, this system is the proven world leader.

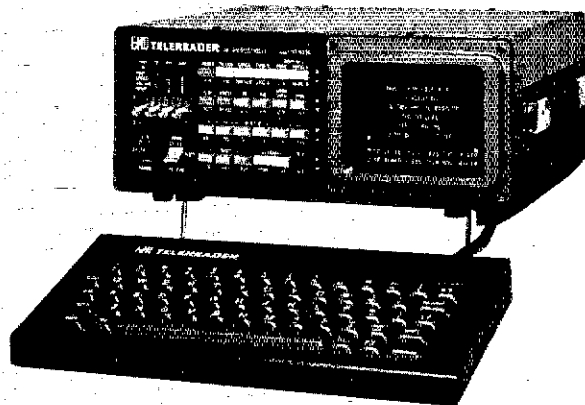
CT2200 + KB2100 + ARQ1000 + RS2100 + KG12:

The CT2200 and KB2100 give you an integrated system that includes video, RTTY demodulators (high, low, modem low, and modem high tones), and many advanced features. Operate Baudot or ASCII at 45-1200 baud and CW at 5-99 w.p.m. Add the ARQ1000 for ALL AMTOR features (not just *some* of them). The RS2100 RTTY Scope gives you the acknowledged best tuning indicator for a complete RTTY system. Also included in the CT2200 is selective-call ASCII printer output, split screen, 36 or 72 characters per line, smooth scroll, and 2 or 4 pages of display memory. In addition, the CT2200 has 2 HERE IS and 8 large "brag-tape" memories that are programmable and non-volatile. This is our most popular system, used by thousands of amateurs around the world.



CRI-200:

At last, a computer interface that *really* works and has an accurate tuning indicator. Take advantage of HAL's years of experience in RTTY and see how good computer RTTY can be. Best of all, it's universal and you can select the computer and software of your choice. Why be frustrated with computer RTTY? Hook-up the CRI-200 and work ALL the stations!



CWR6850:

Have a space problem or want portable RTTY? The CWR6850 is a one-package complete RTTY system. All you need is your transceiver and 12 VDC—the rest is in the CWR6850, including the screen. The high-performance RTTY demodulator for all shifts and either high or low tones is built-in. AND, the system is expandable! Add the ARQ1000 for AMTOR, the RS2100 RTTY Scope, and an ASCII printer, and you have a no-compromise base station for all modes.



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ICOM Dual Bander

IC-3200A



The Most Compact Dual Bander at the Smallest Price

Finally there's a compact full featured 25 watt FM dual bander that's simple in design and operation, plus very affordable...the IC-3200A.

Dual Bands. The IC-3200A covers both the 2-meter (140.000-150.000MHz) and 70cm (440.000-450.000MHz) bands. The IC-3200A also features fully programmable offsets in 5KHz steps for MARS and CAP repeater operation.

25 Watts. The IC-3200A delivers 25 watts of output on both bands. Or the low power can be adjusted to one to ten watts.

Compact. The IC-3200A is only 5½"W x 2"H x 8½"D.

Simple to Operate. With only 14 front panel controls, the IC-3200A is by far the easiest dual bander to use.

Memory Lockout. For scanning only certain memory channels, ICOM utilizes a memory skip (M SKIP) function.

10 Tunable Memories. To store your favorite frequencies, 10 memories are provided. Each memory will store the receive frequency, transmit offset, offset direction and PL tone. Each memory can be tuned up or down when

selected, yet automatically returns to the original frequency when reselected. All memories are backed up with a lithium battery.

Scanning. The IC-3200A has four scanning systems... memory scan, band scan, program scan and priority scan.

Other Outstanding Standard Features:

- New LCD display easy to read in bright sunlight
- Tone encoder (all PL/subaudible tones built-in)
- IC-HM14 mic with up/down scan and DTMF

- One antenna connector (Duplexer already installed)
- Variable tuning increments 5 and 15KHz (2-meters) 5 and 25KHz (70cm)
- Frequency dial lock
- Digital VFO's
- Mounting bracket

Optional Accessories. An optional IC-PS30 system power supply, voice synthesizer and IC-SP10 speaker are available.

See the IC-3200A at your local ICOM dealer for the best buy on a full featured dual bander.



First in Communications

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OUR COVER

This 25-ft dish, sporting dual dipole feed on 70 cm and 13 cm, helped the OE9XXI group amass a quarter-million points in the Eighth ARRL EME Competition. Read all about it on pages 77-78.

CONTENTS

TECHNICAL

- 14 A Quarter-Kilowatt 23-cm Amplifier *E. R. "Chip" Angle, N6CA*
- 21 The VE3MWM All-Mode PTT Switch *G. Stewart Beal, VE3MWM*
- 31 Beam-Antenna Pattern Measurement *Al Bry, W2MEL*
- 34 *First Steps in Radio — Part 15: Diodes and How They Are Used*
Doug DeMaw, W1FB
- 39 *Product Review: Heath SA-2500 Antenna Tuner*
- 45 Technical Correspondence

BEGINNER'S BENCH

- 26 Learning to Use Field-Strength Meters *Doug DeMaw, W1FB*

NEWS AND FEATURES

- 9 *It Seems to Us: Are the Bands Too Crowded?*
- 11 Up Front in QST
- 47 Amateur Radio Licensing: A Seven-Decade Overview
Nell D. Friedman, N3DF
- 49 Board Gives Impetus to New Programs *W. Dale Clift, WA3LNO*
- 56 *Happenings of Amateur Antennas — The Debate Continues*
- 64 *Washington Mailbox: The Dos and Don'ts of Business Communications and Third-Party Messages*
- 71 *IARU News: The Amateur Radio Service*
- 80 *Public Service: The Symbolic Public Service Baton Has Been Passed*

OPERATING

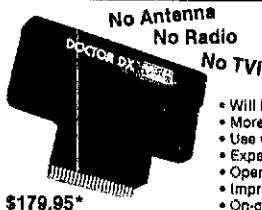
- 77 Results, Eighth ARRL International EME Competition
Edith Holsopple, N1CZC
- 79 1985 ARRL International DX Contest Awards Program

DEPARTMENTS

Amateur Satellite Program News	75	Mini Directory	64
Canadian NewsFronts	63	Moved and Seconded	51
Coming Conventions	73	The New Frontier	65
Contest Corral	83	New Products	48
Correspondence	69	Next Month in QST	30
Feedback	46	QSL Corner	61
FM/RPT	68	Section News	85
Hamfest Calendar	72	Silent Keys	70
Hints and Kinks	43	Special Events	84
How's DX?	59	The World Above 50 MHz	68
Index of Advertisers	162	W1AW Schedule (see last month)	
In Training	76	YL News and Views	74
League Lines	13	50 and 25 Years Ago	70

TIME FOR AN BREAKTHROUGH

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CW Band Simulation That Is So Real
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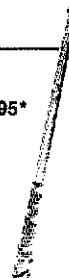
- Will improve the operating skills of ANY CW operator!
- More fun than ANY Morse Code trainer yet devised.
- Use with a C-64, TV set, and key (or keyer).
- Experience the thrill of a "DXpedition" to anywhere in the world.
- Operate anytime you want, ideal for travelers.
- Impressive award certificates available for verified performance.
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½ Wave Telescope Antenna \$24.95*

- Fewer telescopic sections than any ½ wave whips.
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- Special matching network designed by Professor D.K. Reynolds (co-inventor of Iso-pole™ antenna) makes Hot Rod competitive priced.



- Most gain attainable for length of antenna.
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- Factory-tuned matching network.
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- Documented cases of wind survival in 140+ mph hurricanes.
- Easier than any competitive antenna to assemble.

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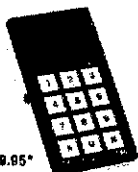
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PKT-1 Packet Controller \$589.95

- First commercially available packet controller for Amateur Radio.
- Uses TAPR circuitry and firmware.
- Digital radio communications for computer to computer.
- Easy to use—five usual commands.
- Multiple conversations on simplex channel.
- EVERY PKT-1 is a digipeater.
- Send computer files error free.
- Operates from 9-15 VDC for portable or fixed operation.

ELECTRONIC KEYS



\$109.95*
BT-1 Basic Morse Trainer

- Teaches code at 20 wpm.
- Random practice mode.
- Variable monitor tone.



\$149.95*
KT-2 Keyer/Trainer

- Proficiency Trainer.
- 01-99 WPM.
- Full-feature keyer (no memory).



\$199.95*
CK-2 Contest Keyer

- 10 soft-partitioned™ memories.
- Automatic serial number.
- Stepped variable speed.
- Two speed memories.



\$229.95*

- Memory keyer.
- Auto serial number.
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TI-1
RTTY/AMTOR
Tuning Aid \$119.95



- Spectral display of RTTY tones.
- Instant indication of shift (THREE RANGES).
- Built-in speaker with switch for quiet monitoring.

MAP-64/2
\$239.95*



- Plug-in hardware and firmware for C-64 computer.
- Dual channel filters.
- Ext. 12 VDC reduces load on computer (power supply not included).
- Morse-Baudot-ASCII-AMTOR.
- Most advanced software available.



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AEA also offers Morse, Baudot, and ASCII software for the following computers: Apple II, II+, IIe; IBM-PC.

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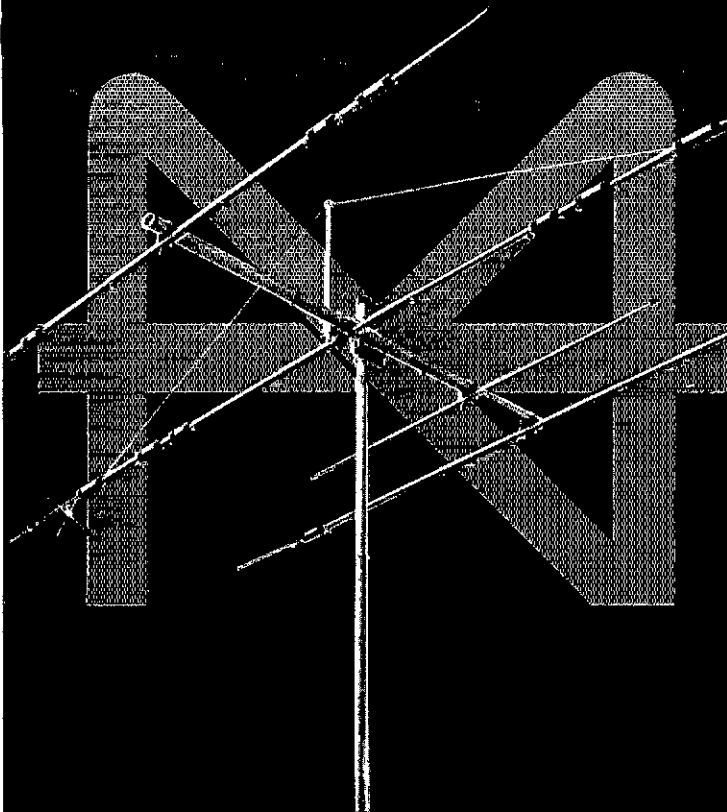
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Send 3 20¢ stamps for a flyer.
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A4, with wideband performance, easy installation, 4 band operation and moderate price will give you more enjoyment and satisfaction from your hobby. You'll like the 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**



40-2CD

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, 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
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TELEX 953-060 CUSHSIG MAN

KENWOOD

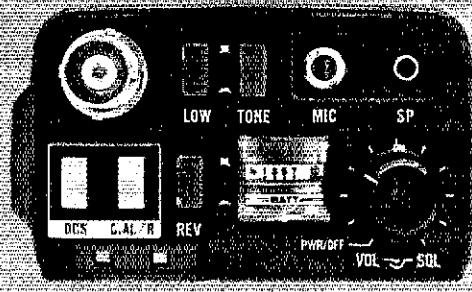
processor in amateur radio

Digital Code Squelch...

TR-2600A

Kenwood's TR-2600A introduces DCS (Digital Code Squelch) circuitry, a signaling 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 5-digit ASCII code combinations possible. You can program in call signs up to 6 digits in the ASCII code. When operating in the DCS mode, this information can then be automatically transmitted each time the transmit key is depressed. This revolutionary feature is only the beginning! The TR-2600A also sports a high impact plastic case, that is extra rugged and scuff-resistant. The molded-in color adds to the attractive appearance. The large LCD display is easy to read in direct sunlight or in the dark with a convenient lamp switch. It displays transmit/receive frequencies, memory channels, and five arrow indicators for "F LOCK" frequency lock, "REV" repeater reverse, "PROG.S" programmed scan, "MS" memory scan, "ALERT.S" alert scan. A star indicates "MEMORY-LOCK-OUT" is activated, and repeater offset indicated by "S" and "M". The TR-2600A has 10 memories, nine for simplex or transmit with frequency offset ± 600 kHz and one (memory 0) for non-standard split frequencies. Memory scan and programmable band scan have the added convenience of "Time Operated Resume" that stops on busy channel and holds for approximately 5 seconds, then resumes scanning, or "Carrier Operated Resume" that stops on busy channel and resumes when signal ceases.

Memory scan scans only those memories in which data is stored and memory lock-out allows you to skip selected memory channels



without loss of data previously stored! Manual Scanning UP/DOWN in 5-kHz steps and programmable automatic band scan are also useful features. The TR-2600A has a built-in "S" meter on the top panel which also indicates battery level when in transmit mode. Extended frequency coverage, 142,000-148,995 MHz allows transmit capability in 5-kHz steps for simplex or repeater operation on most MARS and CAP frequencies. Receive frequency coverage includes 140,000-159,995 MHz.

These features only tell part of the story. The TR-2600A also has keyboard frequency selection built-in 16-key autopatch encoder, "TX STOP" switch, HI (2.5)/LOW (300 mw) power switch, REV switch, "SLIDE-LOC" battery pack, high efficiency speaker, BNC antenna terminal, and all of this in an extremely compact and lightweight package!

Kenwood's TR-2600A, with D.C.S., leads the way in high technology handheld transceivers!

Optional accessories:

- TU-35B built-in programmable sub-tone encoder
 - ST-2 Base Stand
 - MS-1 Mobile Stand
 - 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
 - BT-3 AA Manganese/Alkaline Battery Case
 - EB-3 External C Manganese/Alkaline Battery Case
 - RA-3, 6 Telescoping Antenna
 - CD-10 Call Sign Display
- More information on the TR-2600A is available from authorized dealers or
Trio-Kenwood Communications,
1111 West Walnut Street,
Compton, CA 90220.

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

KENWOOD

passenger in amateur radio

Pocket-size performers!

TH-21AT/41AT

Kenwood's advanced electronic technology brings you a new standard in pocket/handheld transceivers! The TH-21AT/41AT features a high impact molded case and is designed to deliver convenient, reliable performance in a package so small, it will slip into your shirt pocket! It measures only 57 (2.24) W x 120 (4.72) H x 28 (1.1) D mm (inch) and only weighs 260 g (0.57 lb) with batteries. In typical Kenwood fashion these transceivers provide superior transmit and receive performance.

Both the 2 meter and 70 cm versions deliver one watt R.F. output on HI power and 150 mW low, for really extended battery life! Functional design includes three digit thumb-wheel switch for easy frequency selection along with a built-in 5-kHz UP-Shift switch and repeater offset switch (± 600 kHz or simplex, 2m version and ± 5 MHz or simplex 70 cm version.)

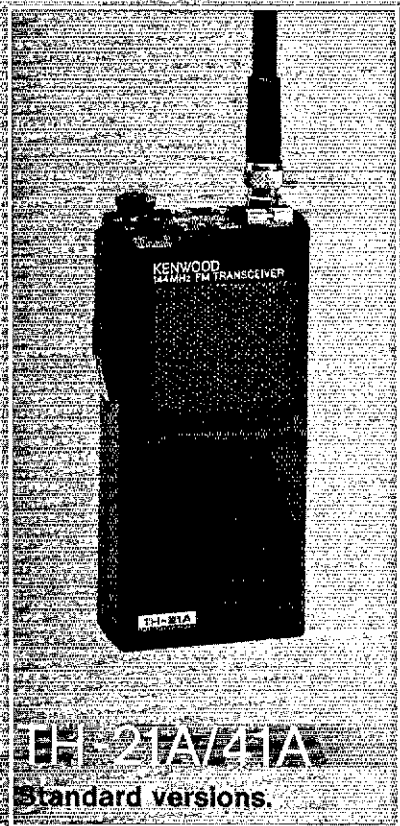
Both the 2 meter and 70 cm pocket/handheld transceivers are available in standard or 16-key autopatch DTMF encoder versions. Kenwood thread-loc antenna connector is also provided.

See your authorized Kenwood dealer and take home a pocket full of 2 m or 70 cm performance today!

Optional accessories:

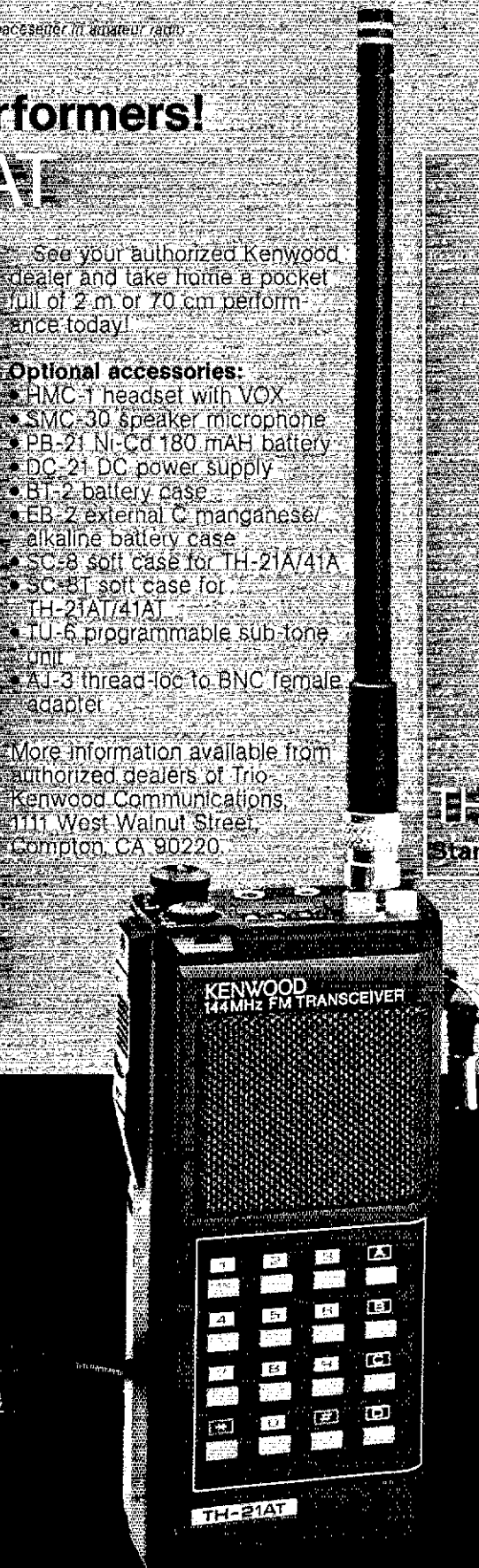
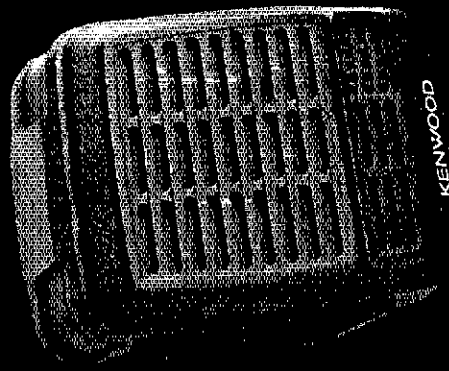
- HMC-1 headset with VOX
- SMC-30 speaker microphone
- PB-21 Ni-Cd 180 mAh battery
- DC-21 DC power supply
- BT-2 battery case
- EB-2 external C manganese/alkaline battery case
- SC-8 soft case for TH-21A/41A
- SC-8T soft case for TH-21AT/41AT
- TU-6 programmable sub-tone unit
- AT-3 thread-loc to BNC female adapter

More information available from authorized dealers of Trio-Kenwood Communications, 1111 West Walnut Street, Compton, CA 90220.



TH-21A/41A
Standard versions.

TH-21AT/41AT
specifications and prices are subject to change without notice or obligation



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THE AMERICAN RADIO RELAY LEAGUE, INC.



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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.

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"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 U.S. and Canada.

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Are the Bands Too Crowded?

The January editorial about the need for growth in our ranks elicited a good deal of thoughtful comment. Setting a goal of 600,000 licensed radio amateurs in the United States by the end of the decade has gotten people's attention, and there's been a flood of worthwhile introspection and of good ideas as to how we get from here to there.

There's also been some concern expressed by amateurs who don't like to think about what their favorite band may sound like if that goal is achieved. They ask, Aren't the bands crowded enough? If there are more newcomers, won't that simply mean more QRM and less enjoyment for the rest of us? What guarantees do we have that they will be good operators?

As we said in January, it's true that some of our bands are crowded. But the real problem is unequal distribution of activity. Even as we complain of overcrowding in one part of the spectrum, other parts lie fallow. Also, we've allowed an unrealistic expectation to develop — an expectation that we should all be able to enjoy interference-free communication, all the time. The fact is, operating on the most popular amateur bands not only constitutes acceptance of a responsibility to avoid interfering with others whenever possible, but also is tacit acceptance of the incidental interference which may arise from others engaging in their legitimate amateur pursuits. The only kind of amateur radiocommunication that is given absolute protection from interference by the rules is emergency communications, and rightly so. If interference-free communication is important to you as a radio amateur, you can probably find a place to do it — but you must choose a less-travelled path.

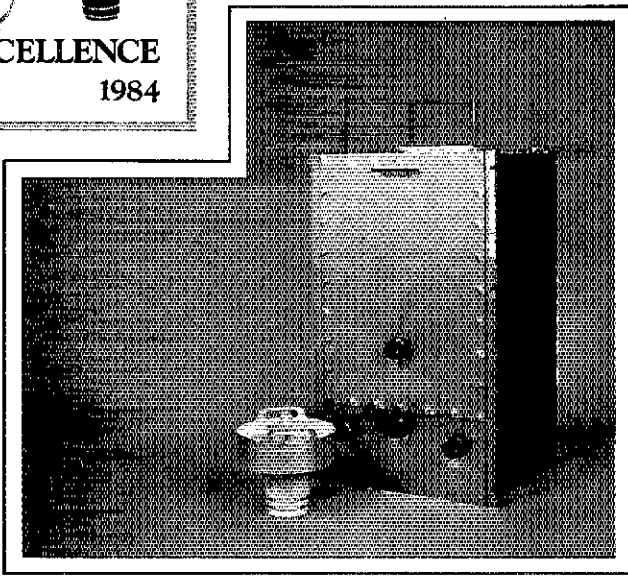
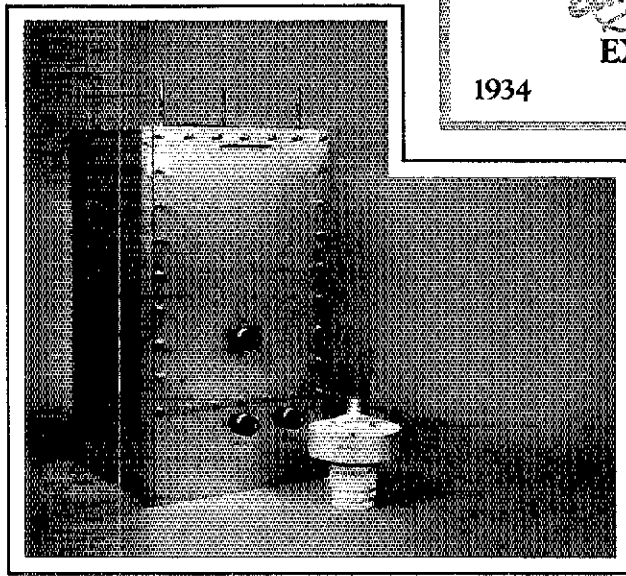
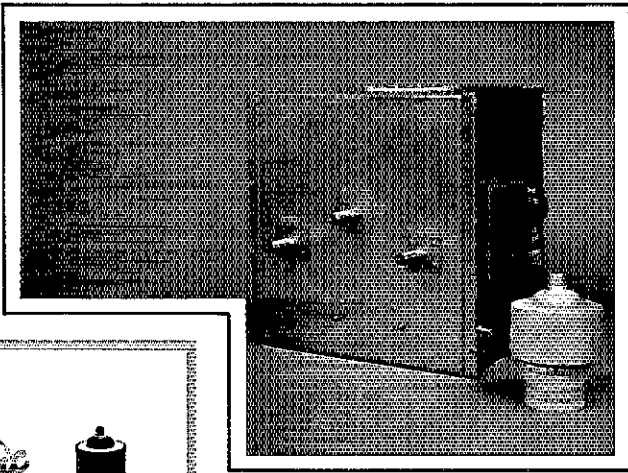
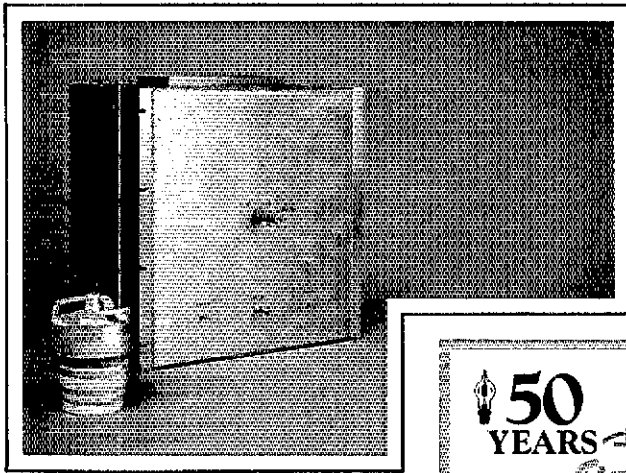
One way of viewing the radio spectrum is as a limited, but infinitely renewable, natural resource. It is renewable in the sense that it is not consumed through use, and can be recovered simply by turning off the transmitters that occupy it; the "limit" is the number of different uses to which it can be put at a given time. In setting aside certain bands of frequencies for our exclusive use, and by permitting our access to other bands on a shared basis, our government has said, in effect, that the public will benefit more from this use of the spectrum than from some alternative use. We are at grave peril if we take our spectrum allocations for granted, for there are strong economic forces at work whenever allocations questions are raised. For example, recently a VHF television station in a major metropolitan area changed hands — a rather unusual occurrence, since licenses for such stations are popularly equated to licenses to print money. The price of the station was nearly a quarter of a billion dollars! The station consisted of equipment, personnel, and goodwill that had been built up in the community over the years, all of which had a value to the purchaser of no more than a few tens of millions of dollars. What

he was really paying for was access to 6 MHz of spectrum in a major market — spectrum that is not much different from the spectrum you gained access to by passing your license examination. Little wonder that other radio services cast covetous glances in our direction.

We have long argued that the amateur bands must remain exempt from economic market forces. One cannot put a price tag on international goodwill, or on lives saved by volunteer emergency communications. Consider, too, the analogy of the public park. At the federal, state, and local levels, our government has set aside tracts of prime land as off-limits to commercial development. The land is there for all of us to enjoy, as long as we pay the minimal fees required for upkeep and as long as we obey the rules that protect the park for the enjoyment of others. In the same way, the amateur bands are available for the noncommercial use of all who pay the entrance fee — demonstration of the skills required of licensees — and who agree to obey the rules.

There are about 250,000 of us licensed to operate on 20 meters, and each has just as much right to be there as any other. Now, if we all chose to do so at the same time, whether or not we were joined by our overseas brethren, there would be absolute bedlam. Fortunately, we don't all, simultaneously, find ourselves wanting access to the band, any more than all Americans want to visit Yellowstone Park on the same weekend. At any given time, some of us are pursuing other interests, such as earning a living or getting reacquainted with our families; others are operating VHF; and still others are operating on some other HF band, or just listening. In spite of these alternatives being available, some weekend afternoons it sounds as if every ham must be on 20 meters, so it's understandable why some would question the wisdom of adding to the din! At other times of the day, week, or sunspot cycle, the same could be said about any of the other HF bands with the possible exception of 10 MHz, which is a special case because of its shared status. In the more densely populated parts of the country, some of our VHF and UHF bands are reputed to be in similar shape.

The answer to overcrowding of a particular band is not to discourage entry into Amateur Radio, any more than the answer to traffic jams at Yellowstone is to reduce the number of citizens who are entitled to visit their national parks. The park system in this country would not survive for long if only an elite group could enjoy its benefits. Instead, the answer is to popularize the alternatives. If Yellowstone (2 meters) is crowded, suggest that people visit Canyonlands National Park in Utah (220 or 1240 MHz, and soon possibly 902 MHz) instead. It's harder to get to, but those who have made the trip say it's a great experience! Besides, if few of us visit, how can we complain about its being put to some other use? — David Sumner, K1ZZ



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Antenna and Interference Relief on the Way?

Help in resolving two nagging problems may be on the way from Congress in the form of Amateur Radio-related bills submitted by Senator Barry Goldwater, K7UGA. S. 36 asks the FCC to act favorably on PRB-1, which seeks federal preemption for amateur antenna systems. The

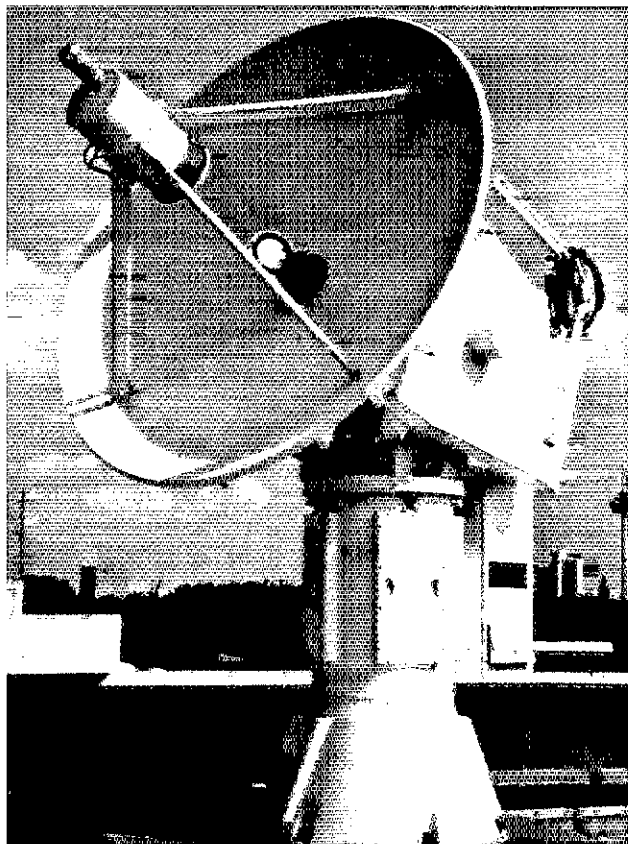
other resolution, S. 66, would amend the Communications Act of 1934 to make willful or malicious interference to radio communication a statutory offense. Amateurs can help ensure passage of these bills by writing to their U.S. Senators. Details are in this month's Happenings.

VE Walk-ins

Some Volunteer Examiner Teams working with the ARRL are now accepting walk-in candidates. If you know of a test session and did not submit your FCC Form 610 before the 30-day registration deadline, check with the VE Team to see if they accept walk-ins. The VE Team has the right to limit the number of candidates because of available VEs or size of their facilities. But why take a chance when you can get a printout of available test sessions in your state, updated weekly, for a business-size s.a.s.e. to ARRL/VEC Office, 225 Main St., Newington, CT 06111. Persons living near a state line may request a listing of exam sessions in the adjacent state as well.

Spread-Spectrum Beacon Activated

Spread-spectrum experimenters have an on-the-air point of reference. In early January, the Amateur Radio Research and Development Corp. (AMRAD) activated its experimental 2-meter spread-spectrum beacon, K4RS, under Special Temporary Authority from the FCC. The beacon, which originates from Vienna, Virginia, will provide (1) a signal for experimenters to receive, (2) a signal for use in detection and direction-finding exercises and (3) a means to assess interference to other 2-meter-band users. Those wishing to hear the signal should first listen to the WD4IWG repeater output on 147.21 MHz.



Some radio amateurs in West Germany have ventured where no other amateurs have gone before. On December 10, a group of experimenters at the First Physical Institute of the University of Cologne made a split-frequency QSO over 46 km using 77 GHz and 430 MHz. Manfred Bester, DL5KR, Karl Jacobs, Rudolf Scheider, DL6KAM, and Tom Pauls, N4CDS/DJØKP, believe this may be the first QSO on the 75.5-81.0 GHz band. The receiving system was a radio telescope. The battery-powered transmitting system used a 10-mW-output, PLL-stabilized Gunn oscillator coupled to a 30-cm portable dish antenna. Their return link was the 70-cm Cologne repeater, DBØSK.



Jim Lomasney, WA6NIL (center) ARES Emergency Coordinator for Palo Alto, California, surveys the disaster area after a simulated collision between two buses at Stanford University. Forty-seven radio amateurs participated in the MEDEX (medical exercise) as part of a drill held twice a year by the Santa Clara County Medical Society. About 75 "victims" were treated at 13 nearby hospitals, all staffed by radio amateurs. Several of the participating hospitals were connected by packet radio. (N6BIS photo)

Conference Speakers Sought

Are you well-versed on low-noise receivers, microwave techniques, computer applications to RF design or any other topics pertaining to the bands above 50 MHz? Organizers for the 11th Eastern VHF/UHF/SHF Conference are looking for speakers to share their knowledge May 17-19 at Rivier College, Nashua, New Hampshire. Contact conference Chairman Thomas J. Kirby, P.O. Box 455, Meadow Knoll, Pelham,

NH 03076, tel. 603-635-2514 or 617-449-2000 (ext. 3505) for further details.

QRQ, Anyone?

Interested in sponsoring an official ARRL code competition at a hamfest or convention? Send an s.a.s.e. to Field Services Department, ARRL, for a copy of the guidelines.



As two dozen radio amateurs in the Los Altos, California, area found out, providing public-service communications can be rewarding in many ways. Here, WA6VAQ (left, with a small friend) and KT6W mix some work with a little pleasure from their front-row seats at the Festival of Lights parade last November. (N6BIS photo)

Another Packet Radio Breakthrough

Amateur packet radio users have taken a big step in developing the communications technique for worldwide use. Using UoSAT-OSCAR 11 as it orbited about 429 miles (690 km) above the earth, Larry Kayser, WA3ZIA, operating at the Pacific Telecommunications Council conference in Hawaii, sent letter-perfect messages to Martin Sweeting, G3YJO, at the University of Surrey, England, and received replies. The messages —

digitized "packets" of information — were stored in the UO-11 on-board computer and downloaded to a personal computer at the University as the satellite passed overhead. This operation represents a breakthrough in the use of packet radio in low-orbiting satellites as a means of communicating worldwide. The first full-service Packet Communications Satellite (PACSAT) is tentatively scheduled for launch in early 1987.

Call for Packet Radio Papers

Amateur packet radio enthusiasts are invited to submit papers to the third SOFTNET Workshop, to be held May 11 at Linköping University, Sweden. Suggested topics are high-speed packet radio hardware and propagation, distributed routing in PR networks, and SOFTNET applications and specification issues.

Camera-ready summaries of less than two standard A4 pages should be received by the SOFTNET User Group no later than May 1. Proceedings from the workshop will be available through the SOFTNET User Group. For more information, contact Per Lundgren, SUG, Dept. of EE, Linköping University, Linköping S-581 83, Sweden.

Stubby Duckie or Quarter Wave?

Confused as to what antenna works best on what UHF/VHF band? You can get the answer to this and more by listening in on a talk by Jim Larsen, K7GE, on the North American Teleconference Radio Net on March 29, beginning at 8 P.M. CST. Jim has been designing and building antennas for a good many of his past 50 years as an amateur. Access to TRN

is provided by more than 180 gateway stations, mostly VHF repeaters, linked together to cover virtually every metropolitan area in the U.S. and much of Canada. For information on linking your repeater into the net, send an s.a.s.e. to NTRN Net Manager Timothy Loewenstein, WA0IVW, Midway ARC, P.O. Box 1231, Kearney, NE 68847-1231.

If most young hams are anywhere as enterprising as Alex Clifford, KB1PB, of Deer Isle, Maine, the future of Amateur Radio is in good hands. Alex, shown here operating portable VE2 in Quebec City, began his ham career last year through a course for gifted and talented students being offered at his school. He attained his Novice ticket in March, worked his way up to Advanced by August, and plans to shoot for Extra later this year. Most of the 13-year-old's gear was bought with money he earned from mowing lawns and doing odd jobs. Alex is very interested in computers and hopes to be operating computerized CW and RTTY by next year.



VEC Fee Increase

In some parts of the country, candidates may be paying slightly more to take an amateur exam. The FCC has okayed an increase, from \$4 to \$4.16, in the maximum amount Volunteer Examining Coordinators can recoup for out-of-pocket costs. This is based

on a 4% increase in the Department of Labor Consumer Price Index between September 1983 and September 1984. The ARRL, a 13-area VEC, has notified the FCC, however, that it intends to hold the line at \$4 throughout 1985.



Most radio amateurs quake at the very mention of the name, but when John Morris, K6OO, hears the words *Wouff Hong* he conjures up visions of sunny skies, a stiff sea breeze and the smell of salt air. For the past 12 years, John (center) has been sailing in and around the San Diego Bay with a bit of Amateur Radio lore proudly displayed at the boat's stern. Never far from the airwaves, John operates using a mast-mounted 2-meter antenna — which he says gets out great. On this day, John enjoyed a cruise around the bay with shipmates San Diego SM Art Smith, W6INI, and Nanette Craig, who is studying for her Novice ticket.

Don't know what a Wouff Hong is? Check out Jan. 1982 QST, page 9.

League Lines...

By Order released January 29 and effective immediately, FCC has revoked the rule requiring 30 days advance notice to FCC District Engineers of examination sessions being conducted in the Volunteer Examiner Program. The Commission found that most applicants were already licensed amateurs seeking upgrades; they tended to have good communications with clubs and VE teams and were aware of local examination opportunities.

At the request of the Dayton Amateur Radio Association, the Commission has amended Section 97.28(f)(1) to require that Volunteer Examiners enter only their names and Amateur Radio call signs on the back of FCC Form 610 when certifying the results of an examination. The other information requested on the form, already available on license records, is no longer required (except that each VE must still sign and date the form, of course). The Order, released January 25 and effective February 14, also encourages anyone reproducing the forms to block out the VE's mailing address, operator class and license expiration date blanks on the form until revised forms become available.

On a third matter, the Commission proposes to abolish the 30-day waiting period before retaking a failed exam. PR Docket 85-21 released January 29 would amend Section 97.26 of the Amateur Rules by deleting paragraph (h). It would also amend paragraph (a) to require public announcement of an examination only for sessions intended for five or more candidates. FCC said that the 30-day waiting period was "based on the administrative requirements of our Field Operations Bureau. We concur with the petitioner [Phil H. Miller, RM-4835] that this rule should be revisited." The Commission does not believe that examinations would be compromised. "VECs are already charged with the tasks of maximizing the number of available examinations, frequently changing the questions, and assuring that the same set of examination questions is not used in successive examination sessions." Comments must be filed by April 8, and reply comments by May 10, 1985.

FCC has released a Notice of Proposed Rulemaking (NPRM) concerning repeater coordination. The NPRM, designated PR Docket 85-22, proposes to add the definitions of a "coordinated repeater," "frequency coordinator" and "harmful interference" to Part 97, and proposes to adopt a rule that where there is interference between a coordinated repeater and an uncoordinated repeater, the burden of resolving the interference falls on the uncoordinated station. In the NPRM, the Commission asks for comments from the amateur community. FCC seeks comments on whether an amateur operator should be required to seek frequency coordination for a new repeater in a metropolitan area, and comments as to whether FCC should recognize a single national frequency coordinator for the Amateur Service. Comments are due by July 1, 1985, and reply comments are due by September 30, 1985. Until FCC takes further action on this Docket, there is a moratorium on new repeater operation in metropolitan areas; at press time the League was considering requesting that the Commission reconsider its moratorium. Details on this Docket appear in the January 31 ARRL Letter, and Jim Clary, WB9IHH, is handling calls to Hq. concerning the moratorium at 203-666-1541, extension 241. Copies of the NPRM are available from Hq. for a large s.a.s.e. with 56 cents postage.

To aid in the production of our upcoming UHF/Microwave Experimenter's Book, the ARRL Lab is seeking tax-deductible donations of microwave-related components and equipment. In addition, good articles and projects are being sought for the book. Please contact the Microwave Book Editor at Hq. for details.

The ARRL Headquarters building and W1AW, the Hiram Percy Maxim Memorial Station, will be open on Saturday, March 30, and Sunday, June 9, from 10 AM to 5 PM. If your club would like to schedule a visit to your Headquarters on one of these dates, please give as much notice as possible to the Membership Communications Services Office. If you intend to operate the Maxim Station W1AW, please bring a copy of your operator's license with you.

The 1985-1986 ARRL Repeater Directory will be bigger and better than ever. It should be available in late April. The price for this new edition will be \$3. Watch April QST for details.

The ARRL Office of Development is looking for someone to fill the position of Public Information Officer. The Office of Development is located in Washington, DC. Contact Bill Lazzaro, N2CF, at 1920 N St., N.W., Suite 520, Washington, DC 20036.

A Quarter-Kilowatt 23-cm Amplifier

Imagine, a linear amplifier with great efficiency and long-term stability that is super quiet and small in size. Sounds like HF? Not exactly . . .

By E. H. "Chip" Angle,* N6CA

To me, there is nothing more frustrating than having to dig through a construction article to find out exactly what performance you can expect from the finished product. So here it is:

- 1) Grounded-grid 7289/2C39 cavity amplifier, single tube.
- 2) Linear operation (what you put in, you get out, only more of it).
- 3) Covers 1240 to 1300 MHz.
- 4) Power gain ranges from 12-20 dB depending on output power, input power, loading, anode voltage and grid bias voltage.
- 5) 50-ohm input and output — no stub tuner required.
- 6) Power output greater than 200 W with about 12-W drive.

This is Part 1 of a two-part article. In this installment, I describe the design and construction of the RF deck. Part 2 describes power-supply construction, testing and operation.

This amplifier is a tried and proven design. Much development work has gone into this project. The amplifier works well, is reliable and can be duplicated. More than 50 of these amplifiers have been built to date. I have successfully worked many 1296-MHz EME (earth-moon-earth) stations with one of these amplifiers and a 384-element loop-Yagi array during the past year. Amplifiers of this design were used on both ends of the first California-to-Hawaii QSO on 1296 MHz. Another unit has logged more than 20,000 hours of continuous operation at the KH6HME beacon.

General Design Approach

A cavity amplifier is similar to a conventional amplifier designed for lower frequen-

cies. The tube anode excites a resonant circuit, and power is in turn coupled into a load, usually 50 ohms. Instead of using coils and capacitors, as at lower frequencies, the cavity provides the resonant circuit necessary to tune the amplifier output.

The anode cavity of this amplifier is a squat cylinder. Cylinder height is set by mechanical tube requirements. The inside diameter of the cylinder sets the highest resonant frequency. Any capacitance added from the top to the bottom of the cavity will lower its resonant frequency, as will increasing the cavity diameter.

This amplifier uses 1/8-inch-thick copper plates for the cavity top and bottom, and a thick-wall aluminum ring, cut from tubing, for the walls.¹ This heavy construction virtually eliminates all resonant-frequency variations caused by thermal and mechanical changes.

Fig. 1 is a schematic diagram of the cavity amplifier. The circuit is simple. Filament voltage and cathode bias enter the RF deck through feed-through capacitors (C4, C5) and RFC1 and 2. High voltage is fed to the anode through RFC3. C8, the anode bypass capacitor, is homemade from Teflon[®] dielectric sandwiched between a copper plate and the chassis.

The input pi network easily tunes the entire band at any power level. It is made from two Johanson piston trimmer capacitors and a "coil" made from copper wire. An input cavity is not necessary at 23 cm.

Output coupling is through a rotatable loop that serves as a variable loading control. This allows amplifier-tuning flexibility; it may be tuned for maximum gain or for maximum power. Light loading can pro-

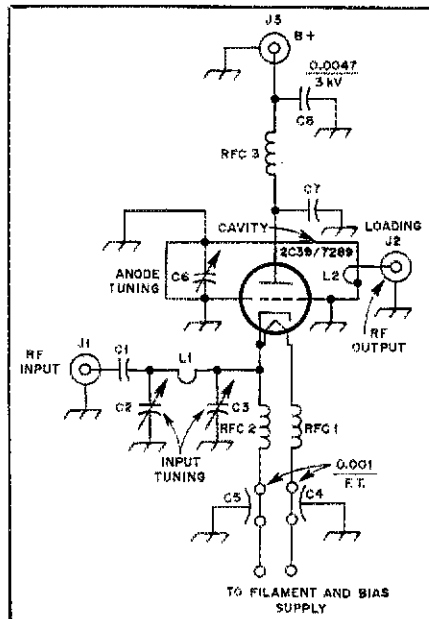


Fig. 1 — Schematic diagram of the 23-cm, amplifier.

- C1 — 3-pF dipped mica capacitor.
- C2, C3 — 1- to 10-pF piston trimmer capacitor (Johanson no. 3957, 5201 or equiv.).
- C4 — Anode-tuning capacitor. See text and Fig. 11.
- C5 — Anode-bypass capacitor, 90 pF. Homemade from copper plate and Teflon sheet. See text and Figs. 5, 12 and 15.
- C8 — Disc ceramic, 0.0047- μ F, 3-kV capacitor.
- J1 — 5-mm SMA connector, chassis mount, female.
- J2 — Modified Type-N connector. See text and Fig. 7.
- J3 — Female chassis-mount BNC connector.
- L1 — Loop of no. 18 bus wire soldered between C2 and C3. See Fig. 15.
- L2 — Output-coupling loop. Part of output-connector assembly. See text and Fig. 7.
- RFC1, RFC2 — 5 turns no. 20 bus wire, 3/16-inch ID.
- RFC3 — 3 turns no. 20 bus wire wound on a 20-ohm, 1-W carbon-composition resistor.

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¹Notes appear on page 20.

duce stable power gains of up to 20 dB.

Amplifier tuning is accomplished with a homemade cylindrical coaxial capacitor with Teflon dielectric (C6). There are no moving metal parts to cause erratic performance. The Teflon rod/tube screws in and out of the coaxial capacitor, increasing or decreasing the capacitance by changing the amount of Teflon dielectric inside the cylinder. With the rod all the way in, the dielectric is all Teflon; with the rod all the way out, the dielectric is all air.

Teflon has a relative dielectric constant (relative to air = 1) of 2.05, which means that the value of the capacitor with the rod all the way in is twice the value of the capacitor with the rod all the way out. Full capacitance will pull the resonant frequency of the amplifier down to 1240 MHz. Use of only one tuning adjustment means the amplifier will have more gain because cavity shunt capacitance has been minimized.

Thermal Considerations

The cavity walls are formed by a thick-wall aluminum ring, which is sandwiched between two thick copper plates. RF and thermal properties of these two metals are reasonably close, whereas brass is rather poor in both respects. The 7289/2C39 tube used in this amplifier is being run at 2-2½ times its normal dissipation rating; therefore it's important to have a cavity that remains thermally stable.

Most previously described amplifiers have used sheet brass in their construction. This

has usually meant constant retuning of resonance to maintain output power at or near maximum.

The copper and aluminum construction in this amplifier has solved all thermal stability problems. The amplifier can easily be run key down for over an hour at 200-W output without retuning. This, of course, is obtained only with a good tube and water cooling. A practical water cooling system will be described in Part 2 of this article.

Water cooling keeps the internal structure of the tube thermally stable. When air cooling is used for output levels of 100 to 150 W, output power fluctuations are a direct result of internal tube changes. These changes vary from tube to tube and must be tested for. In some cases, otherwise perfectly good RF tubes have had poor thermal stability. Such tubes can make good drivers at lower power levels.

"Using Simple Hand Tools Will ..."

Hand tools are great if you are skilled and patient. Most people want to hurry up and finish their new project. If that's you, then have a machine shop make all of the parts, leaving you only the final assembly. It should cost about \$200. The parts are not difficult to fabricate, but the process is time consuming. If you have the time and patience to do it yourself, this amplifier can be very inexpensive.

Gathering the Materials

All of the materials used in this amplifier

are fairly common and should be available from suppliers in most metropolitan areas. Some suppliers have "short sale" racks, where they sell odd pieces cut off standard lengths or sheets at reduced prices. The parts for this project are small enough to be fashioned from cutoff stock. Surplus-metal houses have some great buys, so start there if one is nearby.

The key to successfully completing this project is careful layout work before cutting or drilling any parts. Invest in a can of marking dye, a sharp scribe, an accurate rule, vernier calipers and several center punches. These tools are available at any machinists' supply shop. The marking dye will make cutting and filing lines much easier to see. Measure all dimensions as carefully as you can and then recheck them before cutting. Mark with a sharp scribe because the sharper the scribe, the finer the marked line, and the finer the marked line, the closer your cut will be to where it should be. Remember — the accuracy of your drilled holes is only as good as your center-punching ability, so use a fine punch for the first mark and then a bigger one to enlarge the mark enough for drilling.

Access to a drill press is a must. It's extremely difficult to drill holes accurately with a hand drill. Although they are not absolutely necessary, you should have access to a lathe or milling machine.

Other tools that will aid you with this project are a nibbling tool, a set of punches, a new set of files and some sharp drill bits. If you don't already have one, purchase a file card to clean metal shavings out of your files as you work. Clean, sharp files are faster and more accurate to work with. You'll also need an assortment of sandpaper for the final finish work.

The Template Approach

I highly recommend fabrication of a single template for marking and drilling the anode plate, anode bypass capacitor, cavity ring, grid plate and front panel. The template shown in Fig. 2 has all of the holes for these parts. If you use the template, you'll only have to make the careful measurements once — after that, it's simple to mark and drill the rest of the parts.

The template approach offers several other advantages. A template makes it much easier to maintain accuracy between the anode plate, cavity ring, grid plate and front panel; these parts will fit perfectly because they were all drilled from the same master. The template approach also makes it possible to set up a small production line if you decide to build more than one of these amplifiers and combine them for higher power, or if a friend wants to build an amplifier along with you.

See Fig. 2 for complete template dimensions. Start with a piece of 1/16-inch-thick aluminum stock that is larger than you need and degrease it with soap and water. Dry it off and spray it with marking dye. Scribe

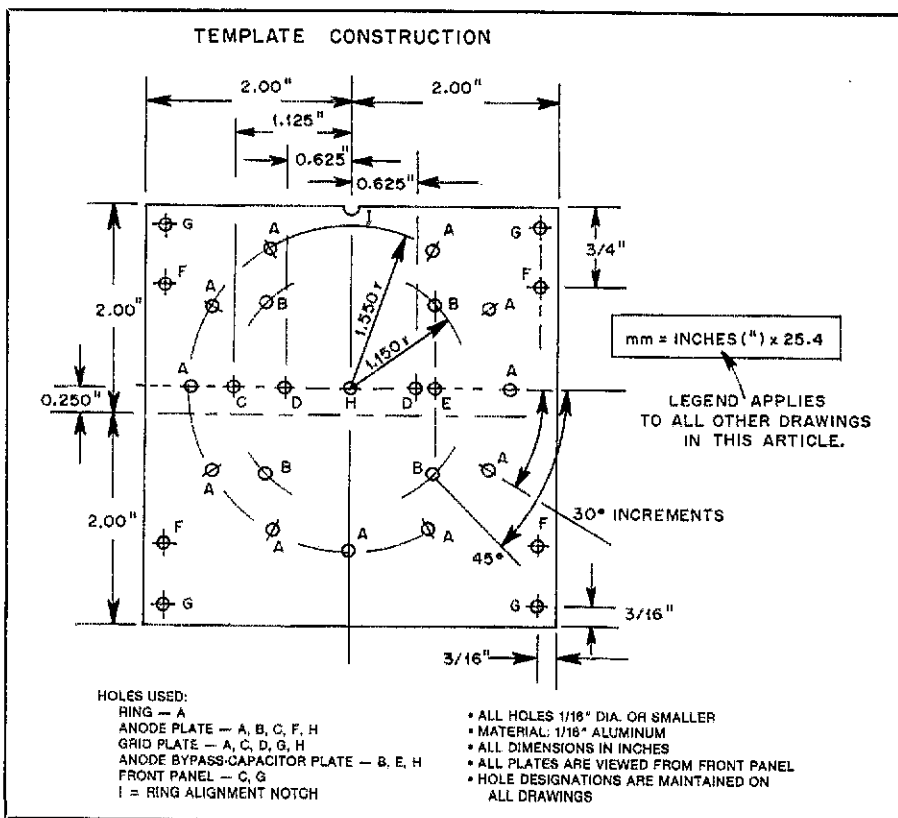


Fig. 2 — Complete dimensions for the aluminum template.

a 4-inch square on the stock and cut the template to size. A shear will make this job much easier, but it can be cut with hand tools and filed to size.

Carefully measure and scribe all holes. Note that holes A and B are on the circumference of circles. Use a compass to scribe the circles, and then locate the holes. After you have marked and checked all holes, centerpunch and drill them. The holes should be drilled with a 1/16-inch or smaller bit. Recheck all measurements. If you goof, start again. The time you spend making the template as perfect as you can will save you much time and aggravation when you make and assemble the other parts.

When you finish the template, mark the front side for future reference. All plates made from the template are marked and drilled from the front side (as viewed from the front panel).

Making the Copper Plates

Once you have completed the template, it will be easy to make the copper plates. The anode plate, grid plate and anode-bypass-capacitor plate are all made from 1/8-inch-thick copper. See Figs. 3, 4 and 5 for the dimensions of these pieces.

Measure and cut the three plates to the proper dimensions. Carefully break (deburr) all sharp edges to avoid small cuts to your fingers and hands.

Clean the plates with alcohol and spray them with marking dye. Clamp the aluminum template to each plate, and carefully scribe the correct holes. Remember that all plates do not have the same holes. The anode plate uses holes A, B, C, F and H; the grid plate uses holes A, C, D, G and H. The anode-bypass-capacitor plate uses holes B, E and H.

Use a small center punch to punch all holes lightly. If they then look accurate, enlarge them enough for drilling.

Copper isn't the easiest metal to work with. It's very stringy, and drilling it can be frustrating. You'll need the proper drill bits for best results. Special drills can be purchased, or you can use a grinder to carefully remove the sharp points on the outer edge of the cutting surface of each side of a standard drill bit. This will eliminate any tendency for the copper to grab. Practice on an old bit and be sure to grind it symmetrically. Modified drill bits can still be used on aluminum and other metals.

Always start with a smaller drill and work up to the final hole size. It's safer and more accurate. The larger holes can be cut with a flycutter, or you can drill a series of smaller holes around the inside of a larger hole and file to finish. Either way is fine. Use lots of cutting fluid to lubricate the drill bit, and wear safety glasses and an old shirt. Remember, some cutting fluids are not to be used on aluminum.

Start with a no. 50 (0.070-inch) or smaller bit and drill pilot holes at each of your punched marks. The details for finishing

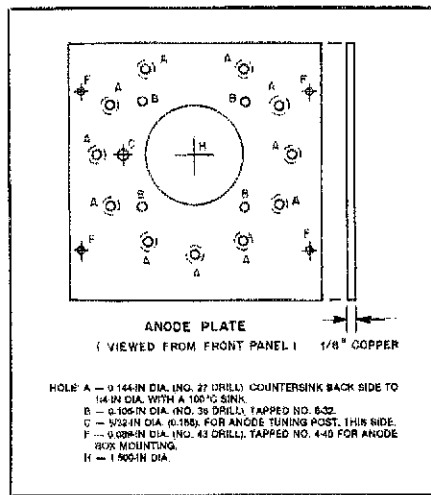


Fig. 3 — Drilling details for the anode plate. See Fig. 2 for additional information on hole location.

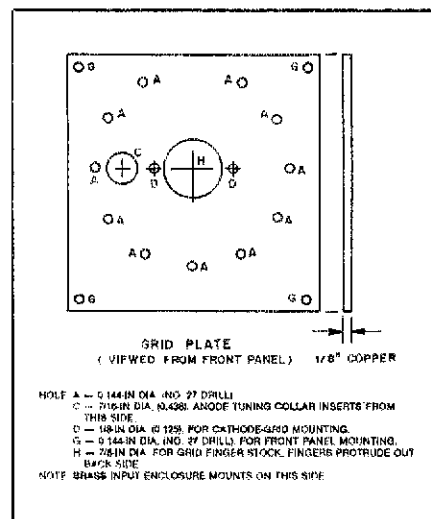


Fig. 4 — Drilling details for the grid plate. See Fig. 2 for additional information on hole location.

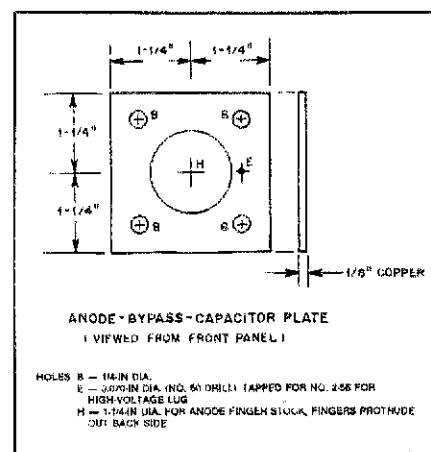


Fig. 5 — Drilling details for the anode bypass capacitor plate. See Fig. 2 for additional information on hole location.

each hole are listed in the drawings. Some holes are countersunk or tapped. Pay attention to the details, and take your time.

When you are through drilling, you must deburr each hole. Copper is soft, so it tends to rise up around the hole during drilling and deburring. Use a flat file for the initial cut, and then remove any remaining material with a countersink. File the copper plates flat again; a flush fit on both sides of the aluminum ring is important.

When all copper work is done, you should be able to stack the plates and see all pertinent holes align correctly. Enough tolerance is included in the dimensions to accommodate minor errors. After the holes are drilled, it can be difficult to tell which side of each plate is which, so mark the front side of each plate with a permanent marker.

Machining the Ring

The aluminum ring that forms the cavity wall is cut (sliced) from a length of 3 1/2-inch-OD tubing with a 3/8-inch wall thickness. See Fig. 6. The tubing ID is about 2 3/4 inches. The dimensions of the ring are the most critical in this amplifier. Tolerance of the ring thickness is ± 0.005 inch to maintain full band coverage.

The ring can be hacksawed or bandsawed out of the tubing, but take extreme care to be accurate. Cutting tubing straight isn't easy. Clamp the tubing to prevent rotating on the band saw. The final finish cut is best done on a lathe or milling machine, but careful filing will work.

Once the ring is the correct thickness, deburr the sharp edges and spray it with marking dye. Notice that the outside and inside diameters are not concentric. This is normal for large tubing. Lay the ring flat and find the thickest wall section. Scribe a line across the wall at this point, across the center of the ring and across the wall on the other side. The scribed lines on each side of the ring will be used to align the template. The output connector will be placed at the thick wall section.

Carefully align notch I on the template with the line scribed on the thickest wall section on the ring. Clamp the template onto the ring. Mark each of the 11 holes labeled A on the template. After you mark the holes and remove the template, check alignment with the copper plates just in case. If everything lines up, center punch all eleven holes on one side of the ring only, and drill each hole completely through the ring. Use lots of cutting fluid. File the ring flat before and after deburring, taking care not to change the wall thickness. Tap each hole to accept no. 4-40 machine screws. Each hole will have to be tapped to a depth of at least 3/8 inch from both sides because long taps don't exist. The inside of the ring doesn't need to be polished.

The hole for mounting the output connector can now be drilled. There are two ways to mount this connector, and either scheme works fine. Read ahead to the sec-

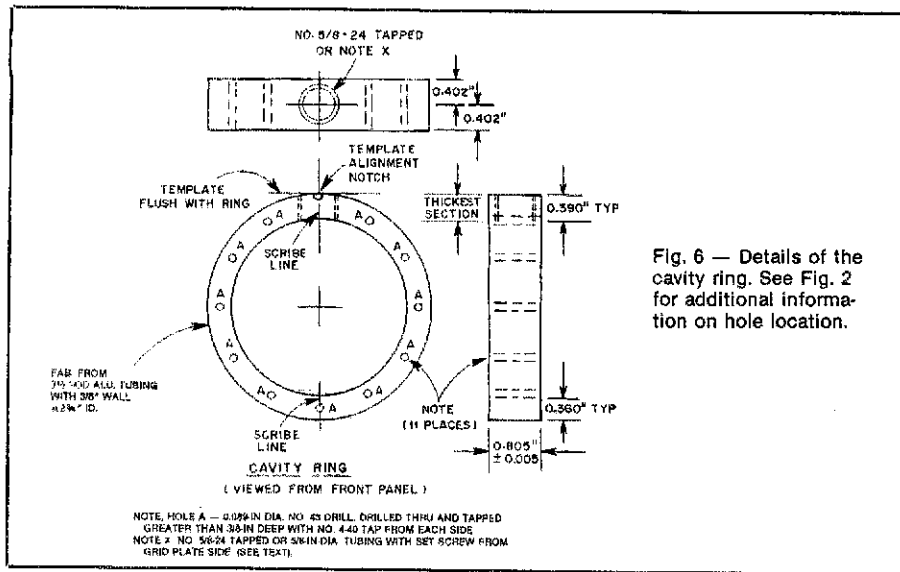


Fig. 6 — Details of the cavity ring. See Fig. 2 for additional information on hole location.

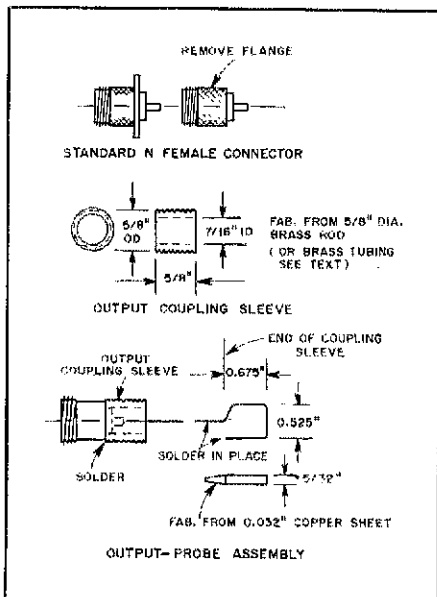


Fig. 7 — Output-probe/connector assembly details.

tion on making the output connector for more information. The first method of mounting the connector involves tapping the ring with a no. 5/8-24 tap and using a lathe to cut matching threads on the output connector coupling sleeve. Large taps are expensive, but a tap and die for Type-N connectors are handy if you do much building.

If you don't have access to a lathe or a large tap, the second method is easier. Make the output connector coupling sleeve from 5/8-inch-OD brass or copper tubing, and drill the ring to just clear it. Then drill and tap the grid-plate side of the ring above the output connector to accept a setscrew. Also, drill a clearance hole in the grid plate for the setscrew. Use the setscrew to secure the output connector.

Output Connector

A standard Type-N chassis-mount female

connector (silver plated) is used for the output probe/connector. See Fig. 7. First, remove the flange with a hacksaw and file flush with the connector body. Next, make the output-coupling sleeve that is right for your application (threaded or unthreaded, depending on how you fabricated the ring). The sleeve will be the same length in either case. The output-coupling loop is fashioned from a piece of 0.032-inch-thick copper

sheet that is 5/32 inches wide. Bend it to the dimensions shown in Fig. 7. We will solder the output connector together later.

Grid Compartment

The grid compartment measures 2 inches square by 1 1/2 inches high. See Fig. 8. It is made from brass and can be sawed out of square tubing or bent from sheet. The cover can be made from any material.

I use two small PC boards (Fig. 9) for holding the finger stock that makes contact with the filament pin and cathode ring on the 2C39 tube. These boards are cut from 1/16-inch-thick, double-sided G-10 glass-epoxy stock. The copper pattern is identical for both sides of each piece. Mark and drill or file the holes first, and then cut the boards to size. Small boards are difficult to hold while drilling them. Mark each side of each board and score the copper foil with a sharp knife.

The unwanted copper can be removed easily by heating the foil with a soldering iron and lifting it off. Use a flat file to deburr the boards. Do not use a countersink because the copper foil must be as close to the holes as possible to facilitate soldering the finger stock in place.

The input connector that I use is a 5-mm SMA type. This is an excellent RF connector, especially for low-power UHF applications. I highly recommend use of an SMA,

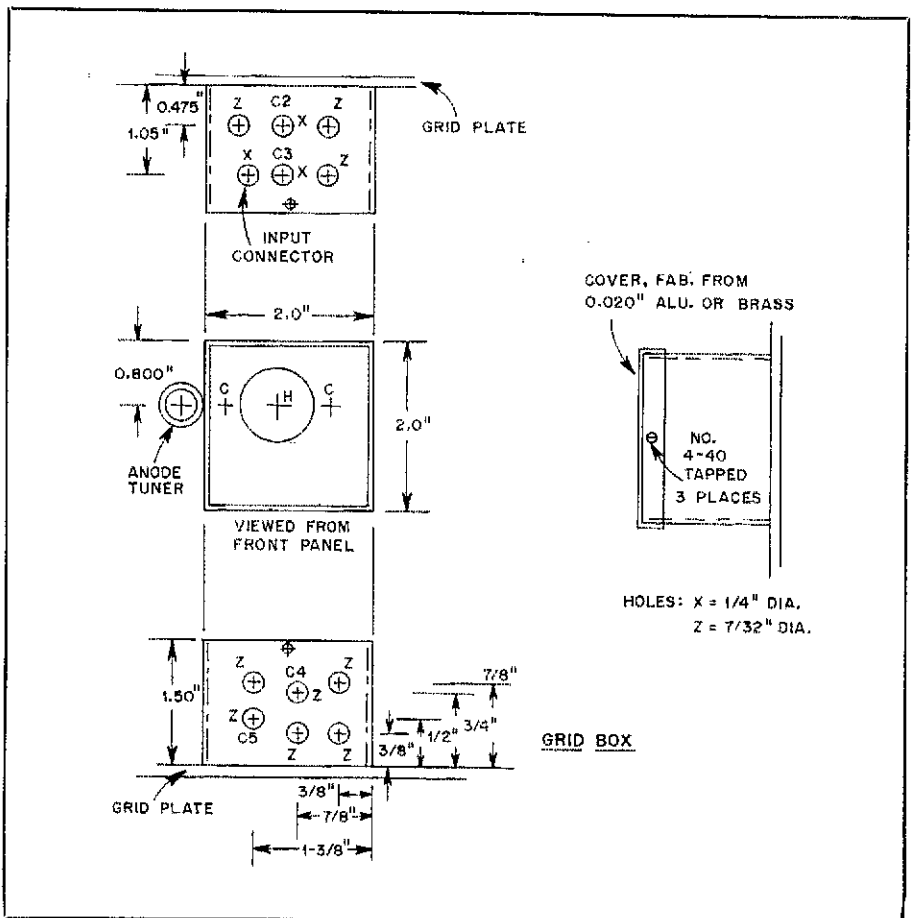


Fig. 8 — Input-compartment details.

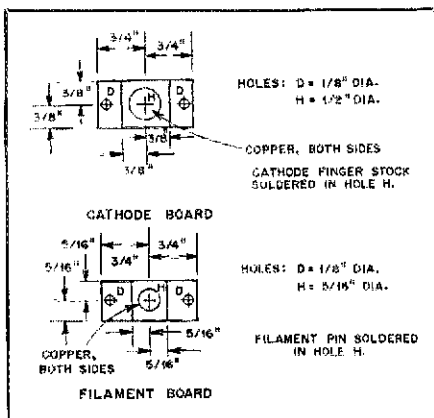


Fig. 9 — Cathode and filament PC-board details.

but any small screw-on connector will do. If you really feel you have to use a BNC then do so, but it's a lousy connector at frequencies above 200 MHz. Remember to move the connector hole to accommodate its larger size.

The input connector must be as close as possible to the first input capacitor. The lead length of the input dc blocking capacitor must be as short as possible. The 3-pF capacitor is series resonant at 1200 MHz only with short (1/16-inch or less) leads.

Miscellaneous Bits and Pieces

There are still several small, but very important parts to fabricate. The front panel I use is shown in Fig. 10. It is made from

a piece of 1/8-inch-thick aluminum sheet. Some builders may wish to mount the amplifier on a rack panel. Wash and dry your front-panel material and spray it with marking dye. Clamp it to the template and mark the holes. Check the hole alignment with the copper grid and anode plates. If all lines up correctly, center punch and drill the holes. The only front-panel control is for the anode tuning capacitor, which is adjusted by a 1/4-inch shaft protruding through a 3/8-inch panel bushing in hole C.

The anode tuning collar, shown in Fig. 11A, is made from a piece of 1/2-inch-OD brass rod. This rod has a 3/8-inch hole drilled through its center, and it is turned down to 7/16-inch OD for half its length. The inside of the 1/2-inch-OD end is tapped to a depth of 1/4 inch to accept 3/8-24 threads. This collar will be inserted into hole C on the grid plate.

Fig. 11B also shows the anode tuning post. It is simply a length of 5/32-inch-OD brass rod that inserts into hole C on the copper anode plate. This rod will form one plate of the anode tuning capacitor.

The anode tuner (Fig. 11C) is machined from a piece of 3/8-inch-OD Teflon rod. One end of the rod is drilled out with a no. 21 drill. The outer wall of this end is threaded with a no. 3/8-24 tap. This is the end that will thread into the anode tuning collar and slip over the anode tuning post. The other end is turned down to fit inside a 1/4-inch shaft coupler.

Fig. 12 shows the remaining parts. The tuning shaft (A) is made from a piece of 1/4-inch brass rod. A coupler (B) to connect the tuning shaft to the anode tuner may be

purchased or made. This also applies to the front-panel spacers (C). The Teflon dielectric for the anode bypass capacitor (D) is made from 0.010-inch-thick Teflon sheet. Use the template to locate holes B and H. Teflon washers and inserts (E) are used to insulate the mounting hardware for the anode bypass capacitor from the chassis. The inserts are made from 1/4-inch-OD Teflon rod. The washers are made from Teflon sheet. Sharpen a piece of 3/8-inch aluminum tubing and chuck it up in a drill press. This tool will cut neat, round washers from the sheet.

The box that encloses the anode compartment (Fig. 13) is fabricated from a Bud AU-1083 utility cabinet. Clean the chassis and spray it with marking dye. Secure the template to the side of the enclosure that contacts the anode plate and scribe the holes labeled F. Make sure that these holes line up with the holes on the copper anode plate. If they do, center punch and drill them to size. If air cooling is used, the blower will mount to this box.

Soldering the Subassemblies

Once all copper and brass parts are drilled and deburred, they should be cleaned with alcohol and Scotch-Brite®, a nonmetallic pot cleaner, and washed in alcohol again. Set the pieces aside and avoid touching them. Fingerprints will inhibit soldering.

I have found that the best way to solder the heavy brass and copper parts is to first build the soldering fixture shown in Fig. 14. This soldering fixture, made from 1/2-inch-thick aluminum plate, will evenly heat the entire assembly to be soldered. Even heating

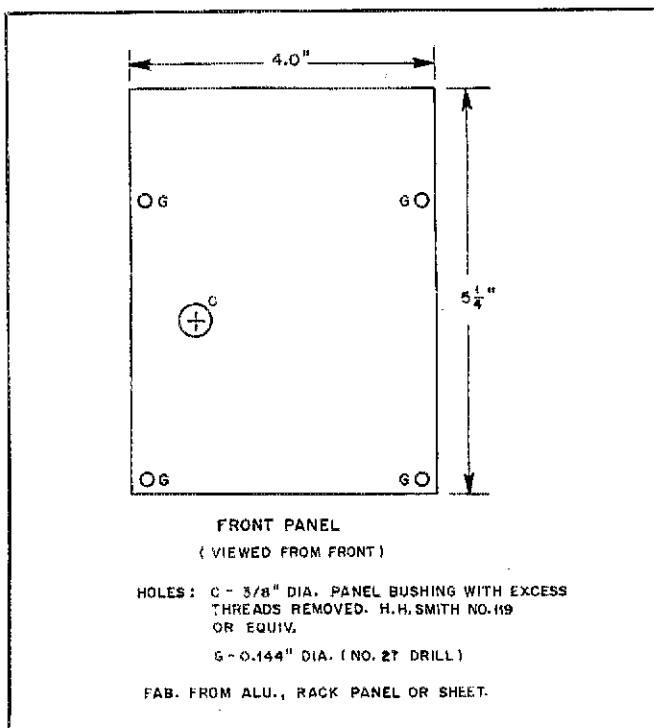


Fig. 10 — Front-panel details.

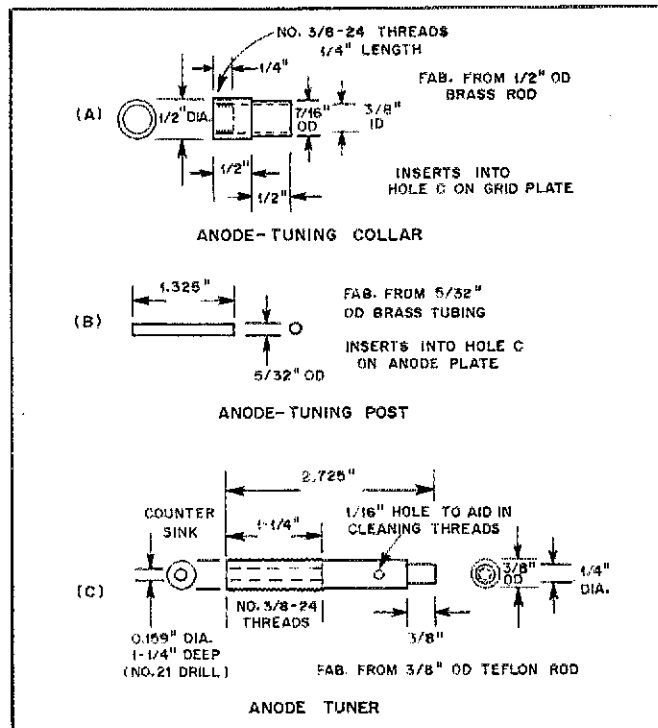


Fig. 11 — Anode-tuning capacitor details.

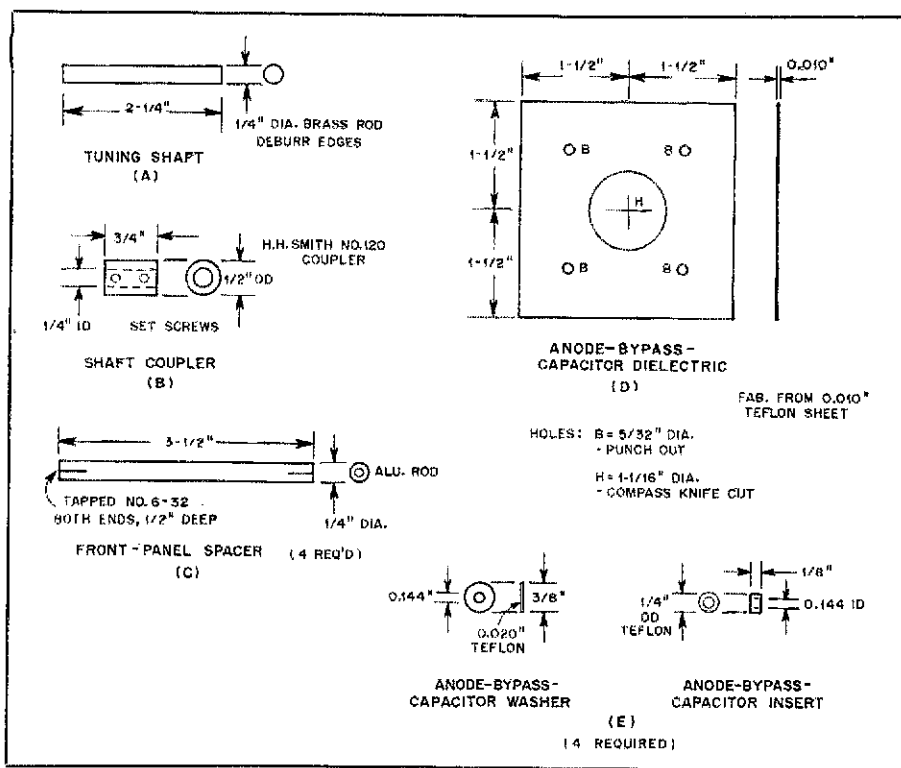


Fig. 12 — Miscellaneous parts necessary to complete the amplifier.

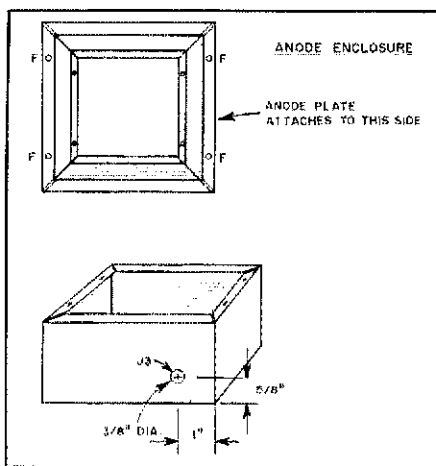


Fig. 13 — Anode-enclosure details.

will allow you to do a much better soldering job than you could otherwise.

The soldering fixture should be preheated on a stove or hot plate until bits of solder placed on its surface just melt. At this point, reduce the heat slightly. Avoid excessive heat. If the copper parts placed on the fixture suddenly turn dark, it's too hot.

Solder the grid plate assembly first. You will need the copper grid plate, grid finger stock, anode tuning collar and brass input compartment.² Look at the drawings again to be sure that you know which parts go where. Insert the grid finger stock into hole H on the grid plate. As viewed from the front-panel side, the curved fingers will pro-

trude out the back side, away from you. Apply liquid or paste flux and set the grid plate in the soldering fixture. The finger stock will fit in hole H in the fixture, allowing the grid plate to rest flush with the surface of the fixture. Next, apply flux to the anode tuning collar and insert it in hole C of the grid plate. Part of the tuning collar will slip into hole C in the soldering fixture. Make sure the collar seats flush with the grid plate. The flux should start to bubble.

Carefully apply solder directly to the joints of the installed parts. The solder should melt almost immediately and flow bright and smooth. Next, place the square brass input compartment in place and apply

flux. In a few seconds, it can be soldered by running solder around the joints, inside and outside. If you have trouble getting it to flow on both sides, merely tap the brass box aside (1/16 inch) and return it to its original position.

Now comes the hard part — getting the soldered assembly away from the heat without disturbing the alignment. A pair of forceps is recommended, but long pliers will do. Carefully lift the assembly off the soldering fixture and set on a cooling rack. Do this without moving any part. The cooling rack can be any two pieces of metal that will allow clearance for the protruding parts. You can expedite cooling by using an ordinary hair dryer in the "cool" position to gently blow air across the assembly.

While the grid assembly is cooling, assemble the output connector. See Fig. 7. Place the modified Type-N female connector, threaded end down, on the soldering fixture. Apply flux to the top and install the output coupling sleeve. Allow both parts to heat before applying solder. Carefully remove the soldered output connector from the fixture. When it has cooled, solder one end of the loop to the center pin of the N connector and the other to the output coupling sleeve.

Now place the anode plate on the soldering fixture and allow to heat. Apply flux to hole C. Insert the anode tuning post (5/32-inch-OD brass tube) and allow to heat; apply solder. Remove the parts and cool. Next, solder the finger stock in hole H on the anode bypass capacitor plate.³

This completes the work with the soldering fixture. Be sure to let it cool off before handling! Save the fixture for future construction; you never know when you might want it again.

The anode plate and the anode-bypass-capacitor plate must be filed and then sanded flat on their butt surfaces to assure that there are no solder bumps or sharp points to puncture the Teflon dielectric. This must be done after soldering. The Teflon sheet is adequate insulation for many times the anode potential of this amplifier, but only if the surfaces it separates are smooth!

Next, clean the cathode and filament PC boards. Install the finger stock to both sides of the cathode board. Apply flux to both sides of the board. Heat with a hot iron and apply solder around the circumference of hole H, soldering the finger stock on both sides of the board. Use the same technique to install the filament pin.⁴

After all parts have cooled, use a spray can of flux remover to clean them. Slight scrubbing with Scotch-Brite pot cleaner will finish them nicely. Congratulations: You have finished the pieces and are now ready to bolt the amplifier together.

Silver Plating

Over the years, many people have pushed silver plating as the only way to go. You may wish to silver plate the amplifier components before soldering them together, but

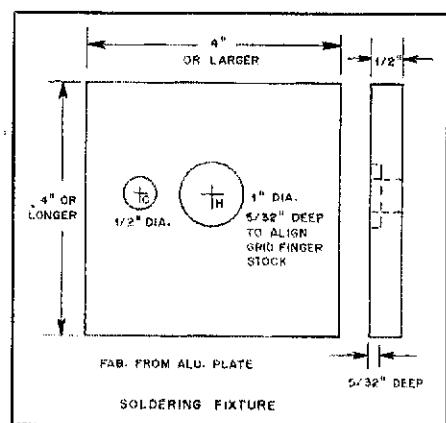


Fig. 14 — Dimensions of the soldering fixture. See Fig. 2 for more information on hole location.

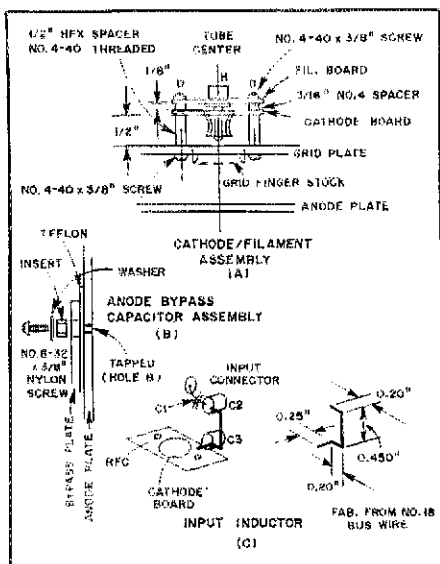


Fig. 15 — Assembly details for the filament and cathode boards (A), the anode-bypass capacitor (B) and the input pi network (C).

I do not think it's necessary. I ran several tests to prove how much various types of plating affect performance of this amplifier. Remember that the RF skin conductivity of aluminum and copper is pretty good at 23 cm; they are much better than brass.

Four amplifiers were built for this test. They were plated as follows:

- 1) Nickel plated
- 2) Tin plated
- 3) Silver plated
- 4) Unplated

There was no difference in performance among the tin-plated, silver-plated and unplated versions. The nickel-plated amplifier exhibited 3-dB less gain.

In other words, it is not necessary to silver plate this amplifier; however, it does improve appearance by making the parts a similar color. Silver does tarnish, especially with fingerprints. The decision to plate or not to plate is up to you.

Assembly

After fabrication of all parts, assembly is simple. Figs. 15 through 17 show assembly details. Loosely fasten the grid and anode plates to the ring. Mount the input connector and capacitors on the input compartment. Loosely install the cathode and filament boards and their respective spacers. See Fig. 15A.

Now insert a 7289/2C39 tube. This will center up all finger stock. Place the Teflon anode tuner in its collar on the grid plate and screw it most of the way in. Now tighten all of the screws. The 7289/2C39 tube should slide in and out snugly, and the anode tuner should screw in and out smoothly.

The Teflon sheet and anode bypass capacitor plate can be installed now (Fig. 15B). Assemble the remaining input

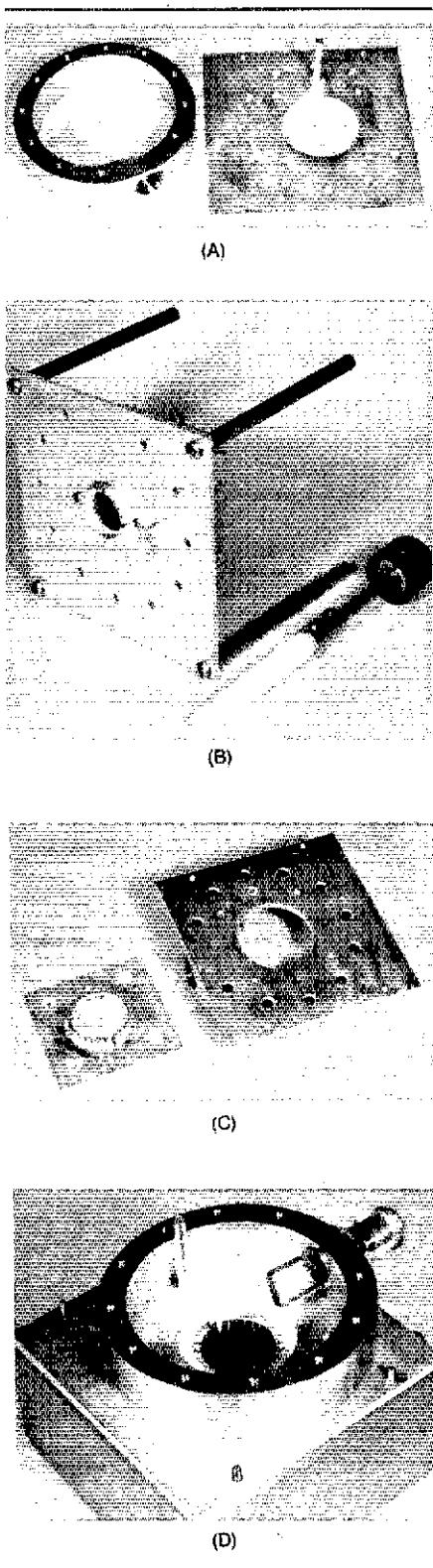


Fig. 16 — The completed cavity ring and anode plate with anode tuning post soldered in place are shown at A. The photo at B shows the grid plate with finger stock, input compartment and anode tuning collar soldered in place. The completed anode tuner is at the right. C shows the cavity ring attached to the anode plate. The anode-bypass capacitor is ready for installation. At D, the interior of the cavity as seen from the grid plate side is visible. The output probe/connector assembly is installed. The anode bypass capacitor and anode enclosure have been installed on the anode plate.

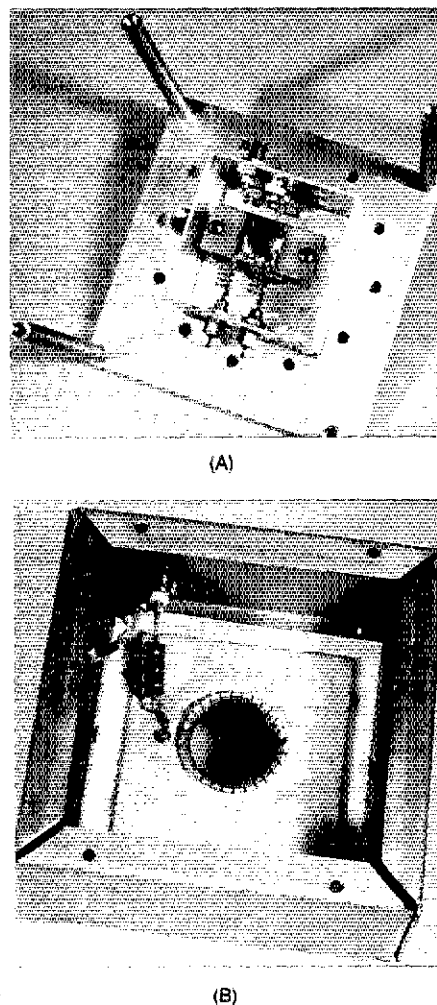


Fig. 17 — At A, the interior of the completed input compartment is visible. The photo at B shows the interior of the anode compartment with the anode bypass, RFC3, C8 and J3 installed.

components, the filament feed-through capacitors and RFCs (Fig. 15C). Screw the output probe into the cavity ring (or push in the probe and tighten the setscrew, depending on which method you chose). Install the high-voltage connector and other parts in the anode box. Mount the amplifier on the front panel and install the anode tuner shaft. This completes the assembly.

Part 2 of this article will describe a complete power supply for the amplifier, a practical water cooling system, testing procedures, microwave radiation safety hazards, and amplifier tune-up and operation.

Notes

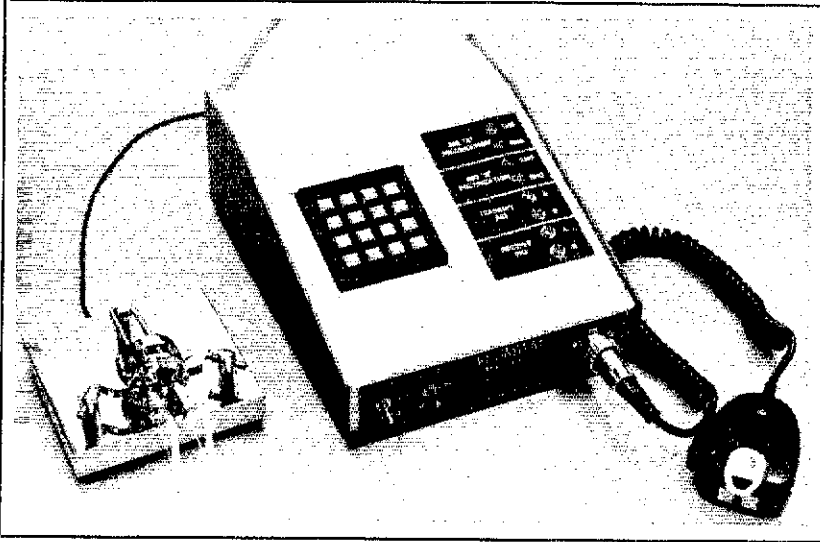
¹mm = in \times 25.4.

²The finger stock for this project is manufactured by Instrument Specialties, P.O. Box A, Delaware Water Gap, PA 18237. Contact them for the name of the closest distributor. The part numbers for this amplifier are: anode bypass capacitor plate, no. 97-70A; grid plate, no. 97-74A; cathode board, no. 97-420A; filament board, no. 97-280A.

³See note 2.

⁴See note 2.

The VE3MWM All-Mode PTT Switch



The push-to-talk switch in this little box is a wee bit more than a simple SPST toggle switch. In fact, it uses a microcomputer!

By G. Stewart Beal,* VE3MWM

This is a description of the latest in a series of microprocessor-controlled additions to my shack. The device is an outgrowth of the belief that any preamplifier loses sensitivity because it contains RF-overload protection devices. (These devices are meant to protect the preamplifier from any burst of RF that might reach the preamplifier before a control circuit has a chance to switch the TR relays.) I think that positive pretransmission disabling of preamplifiers is a more secure method of prolonging their life. In addition, GaAsFETs cannot tolerate the slightest amount of RF power at their output port and, therefore, must be switched out of the circuit prior to push-to-talk (PTT) activation. With these thoughts in mind, I designed a circuit that delays the PTT-line closure to the transmitter until preamplifier changeover has occurred.

Station Equipment

For satellite work, I use two rigs simultaneously. My station contains an FT-101E for 10-meter reception or for driving a Microwave Modules MMT-432-28S transverter for 70-cm work, an FDK Multi-750X all-mode 2-meter rig for OSCAR Phase II satellite uplink and Phase III downlink, and a Maki Denki UTV-1200B II 23-cm transverter driven from the FDK. The antenna system con-

sists of twin KLM 2M-18C crossed Yagis equipped with individual Advanced Receiver Research GaAsFET preamplifiers, a Cushcraft 20-element 70-cm antenna with a Mutek bipolar preamplifier, and Kenpro azimuth and elevation rotators connected to another microprocessor system for automatic tracking.

The preamplifiers, 70-cm transverter, 2-meter and 70-cm amplifiers, and the antenna changeover relays are all housed in a weatherproof box near the top of the tower supporting the Yagi antennas. Therefore, remote control is required for functions such as preamplifier bypassing and band switching.

Design

An early control-system design using discrete timers for all functions was too clumsy; adjustments were interrelated and too difficult to change. A simpler design had to be found.

I had successfully used single-chip microprocessors for simple functions, such as keyboard-scan code conversion and software UART functions, so I decided to base the control-system design around the Intel 8748 microcomputer. This IC requires a minimum number of external components (a power-on reset capacitor and a crystal) and provides three 8-bit I/O ports, several input lines, a counter/timer and timer-processing-interrupt capabilities. An 8748 has 2 kbytes of EPROM and 64 bytes of RAM, two banks of eight general-purpose registers and an 8-entry stack. The instruction set provides for simple manipulation

of the I/O ports and status-line sensing.

Because a large amount of EPROM is available on the microcomputer, the project grew (and will probably continue to grow) from its initial concept to that presented here. The switch offers the following features:

- individual control of RF routing to the transverters or antennas
- separate disabling delays for two sets of preamplifiers
- independent selection of rigs for transmission and reception
- a WORLD-CHIP™ modem offering Bell 103/202 or CCITT V.21/V.23 full-duplex operation with or without amplitude equalization
- RS-232-C interface to a packet-radio TNC (terminal-node controller)
- automatic routing of microphone and data audio
- voice override and hold-off of data in packet mode
- a 16-key tone encoder for CTCSS transmissions
- an iambic keyer with all routing and control functions for use with the rig selected as the transmitter
- a keying rate that is adjustable "on the fly" from the microphone UP/DOWN switches
- all operating parameters adjustable from switches on the microphone while in the set-up mode.

Future enhancements will probably include RS-232-C access to the keyer and tone encoder. Although room for a Morse-decoding algorithm exists, it probably

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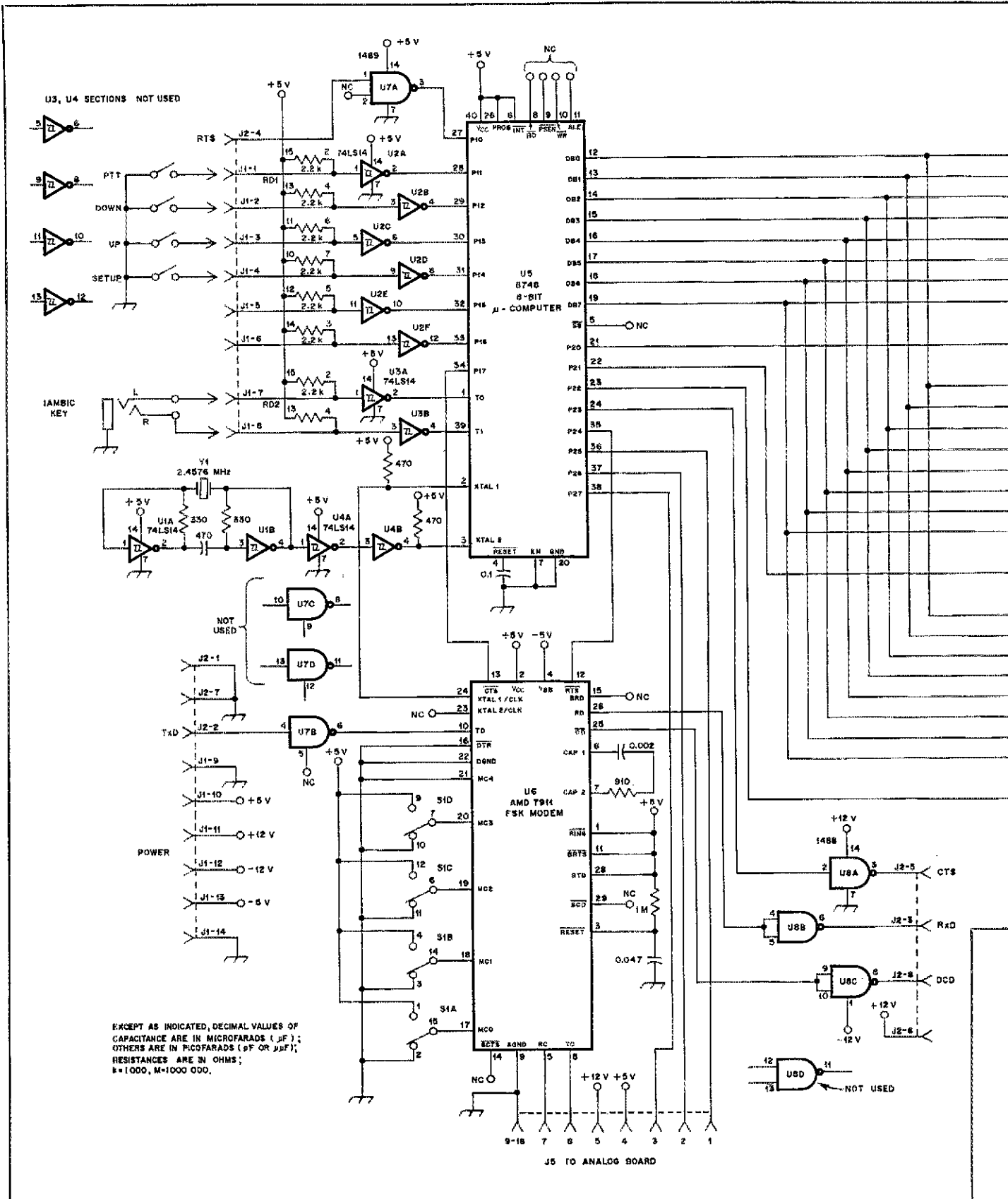
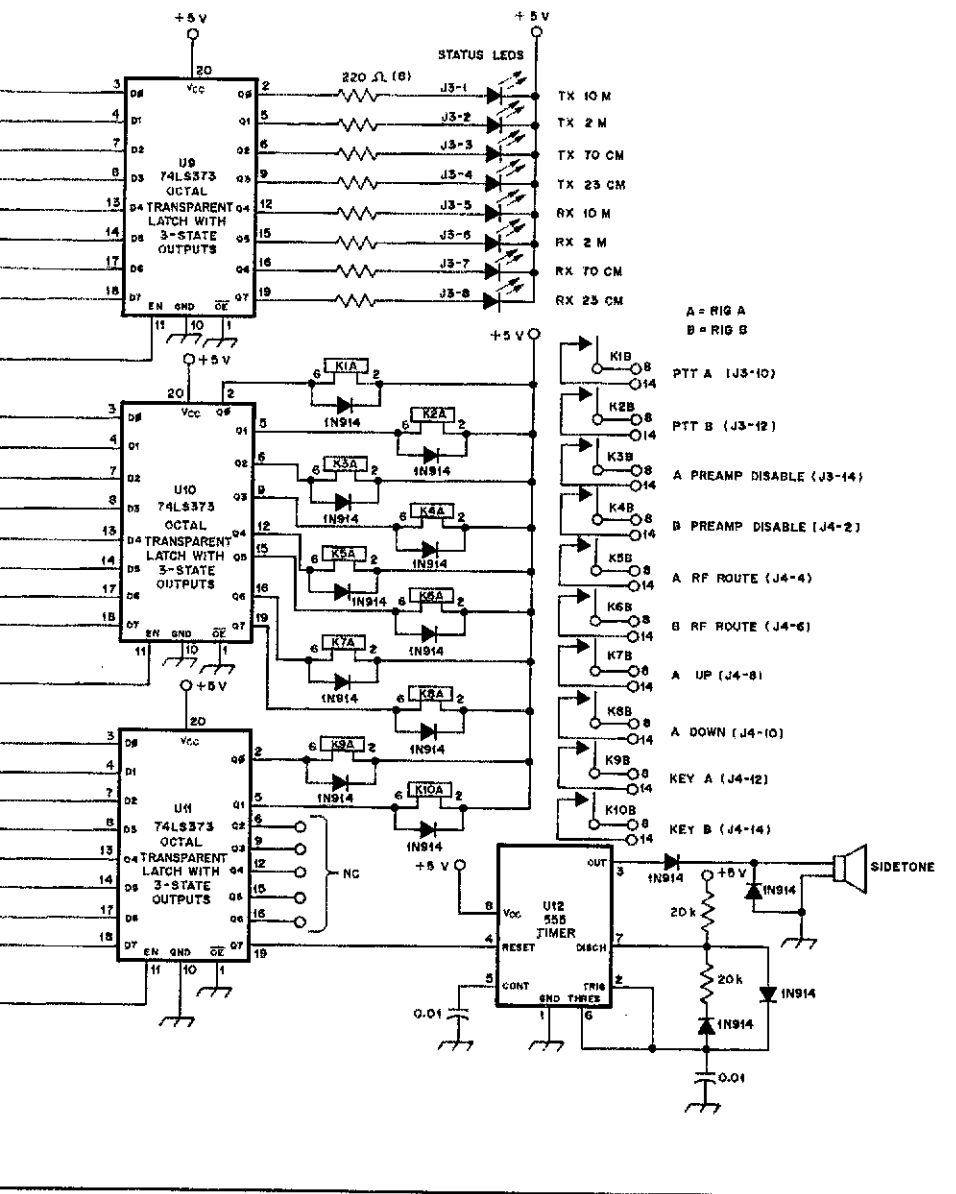


Fig. 1 — Schematic diagram of the digital board in the VE3MWM All-Mode PTT Switch. Input and output connections are routed to rear-panel connectors. Although the author used DB-style connectors, the connector types and pin assignments are arbitrary and not shown. The numbers at each end of the resistors associated with RP1 and RP2 relate to the pin numbers on the DIP resistor arrays. Discrete resistors may be used in lieu of the DIP resistors. Since the title photo was taken, the panel labeling has been altered to reflect the pin-out identifications shown in this figure.

J1-J4, incl. — Single-row male PC-board headers (Molex 22-05-2101-P or equiv.).
 J5A — 16-pin DIP socket.
 J9 — 3-circuit key jack.

K1-K10, incl. — Gordos 831A1 SPST relay or equiv.
 P3 — Single-row female connector (Molex 22-01-2101-P or equiv.).

P5 — Double-ended 16-pin DIP plug (connects J5A and J5B).
 RP1, RP2 — 2.2-k Ω in DIP.
 S1 — 4PDT in DIP.



- U1-U4, incl. — 74LS14 inverter.
- U5 — Intel 8748 single-chip microcomputer (Jameco Electronics, 1355 Shoreway Rd., Belmont, CA 94002).
- U6 — Am7911 modem. (Available from Advanced Micro Devices, 901 Thompson Pl., P.O. Box 3453, Sunnyvale, CA 94088, tel. 800-538-8450 or 408-732-2400. An equivalent is the EF7910 from Thomson

- Semiconductors, 45 Ave de l'Europe, 78140 Vélizy, France; tel. (3) 946 97 19.)
- U7 — 1488 receiver.
- U8 — 1489 transmitter.
- U9-U11, incl. — 74LS373 octal D-type latch.
- U12 — 555 timer.
- Y1 — 2.4576 MHz.
- Y2 — 3.4579 MHz.

won't be implemented.¹ The switch is built on prototyping boards.

Circuit Description

An examination of the schematic diagram (Figs. 1 and 2) reveals that the design of the controller is straightforward. An external clock circuit is used so the pro-

cessor and the modem chip can be driven in parallel, eliminating the need for another crystal. Schmitt trigger 74LS14 inverters with 2.2-kΩ pull-up resistors handle all the switch closure inputs. Although the inputs could have been wired directly to the microprocessor, I felt the protection given to the expensive 8748 (\$12.50, at flea-market prices) is warranted. The inverters also provide some immunity for the input circuits. Only the RTS and CTS lines for the TNC go to the 8748, although the 8748

generates and monitors RTS and CTS for the modem chip. This allows the processor to have complete control over the CTS delay, required by the packet node. It also means the processor can override the digital communication when the operator picks up the microphone and presses the PTT button.

The output side of the schematic diagram shows the 74LS373 8-bit latches. These ICs are used to control a multitude of functions and devices. The LEDs indicate the selected transmit and receive band (10 or 2 meters, 70 or 23 cm). Relays (K1-K10) isolate all the controlled functions from the microcomputer circuitry. A 555 timer is used as a sound-generator for sidetone during CW work (or practice in the setup mode), and for audio verification of selections in setup mode.

RS-232-C transmitted and received data (TXD and RXD) and the data-carrier detect (DCD) lines come directly from the modem chip. The lines pass through 1488 and 1489 line receivers and drivers to the outside world.

Fig. 1 shows five lines (numbered 1-3, 7 and 8) that, along with +5 V, +12 V and ground, pass via a 16-pin DIP jumper to a companion board containing the analog components. This board is mounted on top of the digital board, on the side opposite the microcomputer. This helps to eliminate any coupling of the switching signals into the audio path. Most lines on the analog board are of relatively low impedance to help with this isolation. One section of an LM387 preamplifier IC is used to raise the microphone level to about 1 V for mixing with other signals from the tone-encoder pad and the modem. All audio sources are equipped with trimming potentiometers to allow signal-level balancing before mixing. The received signals (one input source is amplified by the other half of the LM387 preamplifier IC) are then passed through 14066 CMOS analog switches. Control signals for these gates are mutually exclusive and are generated by a single 74LS14 inverter from the RECEIVER SELECT signal (J5-1) originating on the digital board. The selected audio is then passed to the modem chip via J5-7.

Microphone audio (possibly mixed with tones from the tone encoder) is passed to another pair of 4066 gates, one for each transmitter. Data audio from the modem chip arrives on J5-8 and exits to a corresponding pair of gates. The outputs are mixed to become the transmitted audio. Control lines J5-2 and -3 from the digital board generate the appropriate paths to select voice or data to either one of the rigs. An output attenuator then reduces the 1-V signal to a level more appropriate for the specific transmitter.

Operation

The software operates in one of two modes, depending on the position of the SETUP switch (the only control switch on

¹A program listing is available from the ARRL Technical Dept. Please include an s.a.s.e. with all correspondence.

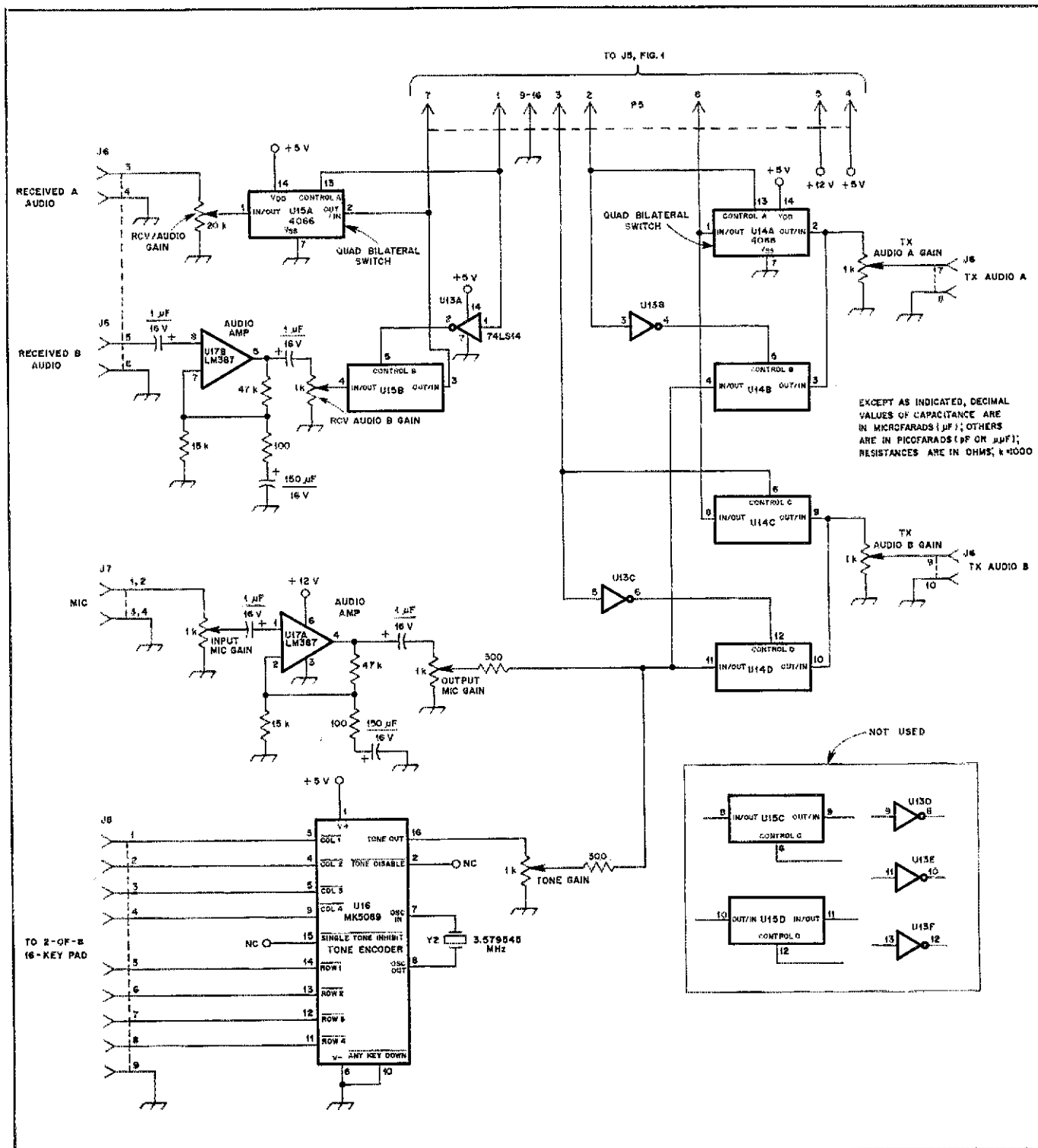


Fig. 2 — Schematic diagram of the analog board.

J6-J8 — Single-row male PC-board headers.
 J5B — 16-pin DIP socket.

U13 — 74LS14 inverter.
 U14, U15 — 4066 quad analog switch.

U16 — MOSTEK 5089 DTMF decoder.
 U17 — LM387 dual low-noise preamplifier.

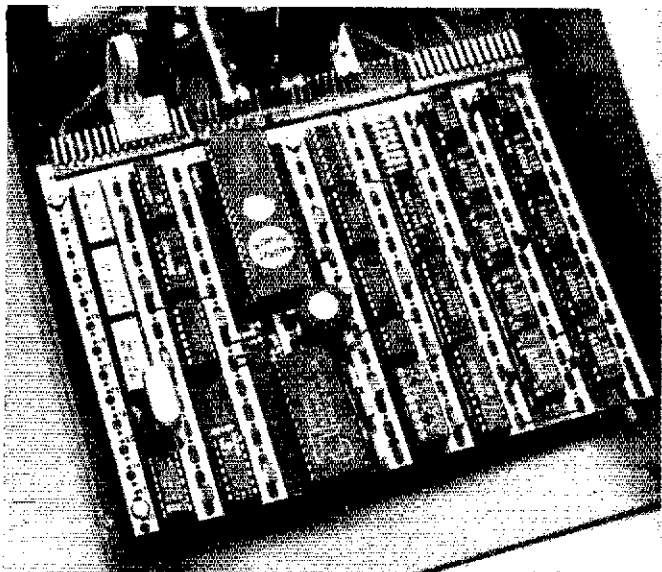
the box). When the switch is in the SETUP position, the software can adjust the iambic keyer timing or select the transmit/receive band combination. During band changes, a rapidly flashing LED indicates the selection. Bands can be changed by pressing the UP or DOWN button on the microphone. As the band selections are made, the switch energizes the appropriate relays to select RF

routing and enable the required pre-amplifiers. The PTT button will shift to the next function and begin flashing an LED.

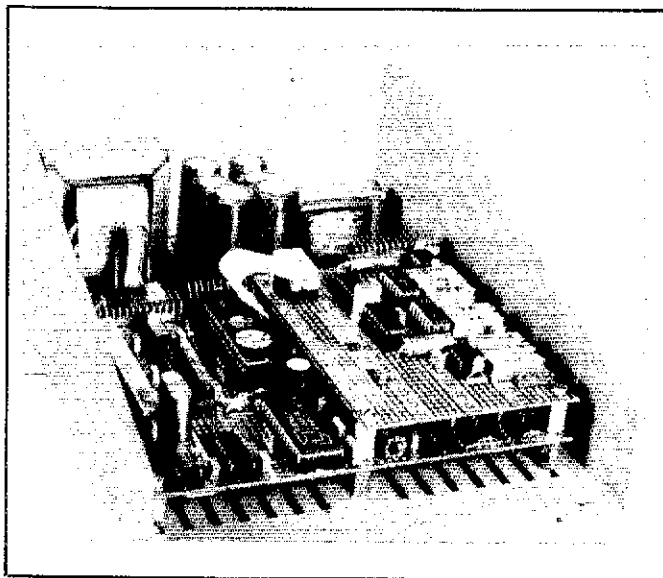
When all the selections have been completed, the sidetone oscillator beeps, and the keyer speed can be set. Squeezing both paddles simultaneously sends an alternating stream of dots and dashes. Pressing the microphone UP button increases the keyer

speed; pressing the DOWN button decreases keyer speed. (This also works in the operational mode. It is not necessary to enter the setup mode to increase or decrease keyer speed.)

The system remains in the setup mode, cycling through functions with each press of the PTT switch until the SETUP switch is placed in the OPERATE position. Once this



An inside view of the PTT switch showing the digital board; the analog board has been removed for this photo. The largest IC on the digital board is the 8748; the other large IC is the Am7911 modem. J5 is the empty 16-pin DIP socket at the center rear of the board between the 8748 and the eight discrete resistors. An unused DIP resistor pack and 74LS14 IC are on the prototype board. The connectors at the rear of the board are used, from left to right, as J1 through J4, inclusive. A 6-pin cable connector is shown attached at J1-9 through J1-14; this is the power connector for the digital board as shown in Fig. 1. The enclosure (see title photo) is a Hammond 1456 KH3C fitted with a 1456 KH3P panel.



The analog board is shown mounted above the digital board.

is done, the system begins monitoring the RTS line from the packet rig, the PTT line, UP and DOWN microphone buttons, and the keyer paddles. If RTS is asserted (negative true), control passes to the data routine that turns on the selected transmitter. The modem chip is commanded to enter transmit, and the audio route from the modem to the selected transmitter is completed. After an appropriate delay, CTS from the modem is examined; if it is set, CTS is generated for the packet node. The program then loops, watching for RTS to disappear, which indicates that the node no longer wishes to transmit or that the PTT button is pressed. If RTS becomes inactive, the transmitter is shut down and timers for the reactivation of the preamplifiers are started. If the microphone is keyed, CTS to the packet node is dropped, control is transferred to the microphone routine, where the audio routing is established, and the microphone is connected to the transmitter. If the key is touched, nothing happens, since it is necessary to place the respective MODE switch in the CW position on both rigs.

The process of activating and deactivating the transmitter is as follows. The preamplifier bypass relays on the selected feed line are operated to isolate the preamplifier, and routing of the audio for microphone or modem is completed. If, for example, the receive band is set as 2 meters and the transmit band as 23 cm, the routine has previously determined that no preamplifiers are required on the FT-101 side; but to transmit, the 2-meter preamplifier must be disabled and the RF

from the FDK rig must be rerouted to the 23-cm transverter. The 23-cm preamplifier remains switched out since it (as the gear connected to the FT-101) is also not required. After about 50 ms, the PTT or keying line for the transmitter is activated. To shut down a transmitter, the PTT or key line is deactivated, and a 250-ms timer is started. Control immediately passes back to the main loop, and input scanning begins. Should something require use of the transmitter within this delay interval, it can be fired up immediately. After the time delay expires, the preamplifiers are switched back in, if required, and the routing for receive is reestablished. Should the transmit and receive paths not require any common equipment (transmit on 70 cm and receive on 2 meters, for example), the correct paths will be maintained con-

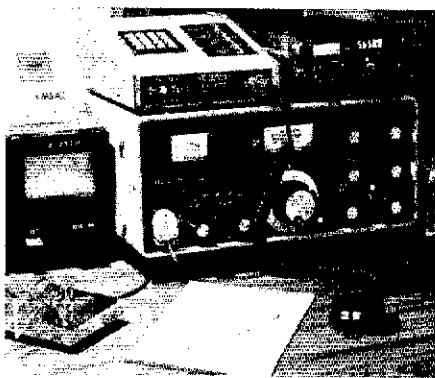
tinuously, permitting true full-duplex operation. This eliminates some wear and tear on the tower-mounted relays.

Precautions

For several months, I encountered no difficulties using the switch. Then, the CW-key-line relay contacts welded. I traced the problem to the FT-101 transceiver; it has a 0.5- μ F capacitor on the key line. Inserting a 100-ohm, $\frac{1}{2}$ -W resistor in series with the relay contacts cured the problem.

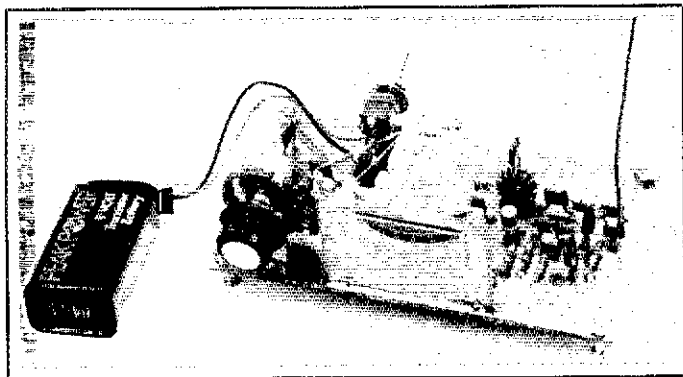
Some precautions must be observed when attempting to automate TR switching functions such as these, especially where GaAsFETs are present. There must be a fail-safe scheme to prevent RF from reaching the output of the preamplifier. Transients may be produced at the moment a rig is turned on or off. As this switch is turned on and off, the relays momentarily assume indeterminate states, and this could cause a rig to turn on without disabling the associated preamplifier. Also, what happens if the ac power fails?

I have attempted to protect things by having a separate toggle switch to disable the preamplifiers unconditionally when other pieces of equipment are turned off or on. In addition, the relay voltage is controlled by a toggle switch ganged to the primary power switch on the unit. This causes all relays to open before the bus state becomes undefined as V_{cc} dies, causing the micro to "crash." The only protection against ac power failure is a fast-acting, 117-V ac relay with normally open contacts in series with the manual preamplifier-disable switch. This scheme is, unfortunately, an untidy loose end in my shack. I didn't recognize the power-failure problem until after the first unit was completed. Future revisions of the circuit will have the fail-safe mechanisms built in from the start.



VE3MWM operating position with the PTT switch atop the HF transceiver.

Learning to Use Field-Strength Meters



If you like to experiment with antennas, you need a field-strength meter. Let's learn some circuit details and applications for this versatile instrument.

By Doug DeMaw,* W1FB

Are field-strength meters something new? Definitely not. The field-strength (FS) meter and wavemeters were among the early instruments of radio, and they remain popular for a variety of purposes.

There was a time when we had no standing-wave ratio (SWR) meters with which to work when developing or adjusting an antenna system. Some rather practical and sensible techniques were used in those days, and more importantly — they worked! I clearly recall, for example, connecting an NE2 neon lamp to each conductor of my open-wire feed line, then adjusting the Transmatch (antenna tuner in those days) for maximum bulb brightness. Crude, but effective. Those with more loose change than I had would insert RF ammeters in the two-wire feed line to permit tuning the Transmatch for maximum antenna current.

Most of us operated mobile on 160 meters or in the HF bands before 2 meters became the favored mobile frequency. A great many homemade loading coils were used for the antenna systems of mobile stations, and they needed to be adjusted for resonance. The common technique in those days was to set up an FS meter in the vicinity of the automobile, then trim the loading coil for maximum field strength. This did not correct SWR problems, but it did indicate resonance. Some operators used matching networks in their mobile antenna systems, and they were also adjusted for maximum FS, which usually coincided nicely with minimum SWR.

I would be remiss if I failed to mention another standard method for adjusting a Transmatch or mobile antenna. A resistive dummy load (usually 50 ohms) was attached to the far end of the coaxial feed line. The transmitter was adjusted for resonance and proper loading. The dial readings were written down, then the antenna system was adjusted so resonance of the PA tank occurred at the same dial setting, with the loading control also indexed to the setting for the 50-ohm load. In a sense, the transmitter functioned as an RX bridge. Once again, it was "crude, but effective," at least compared to modern standards.

Field-strength meters still have a place in our ham shacks. Let's learn how they are built, and when we might use them in

routine amateur experimentation.

Practical FS-Meter Circuits

A field-strength meter is essentially a small receiver with an indicating device, such as a sensitive dc meter. A simple FS meter is depicted in Fig. 1. In effect, this is a TRF (tuned radio frequency) receiver with a diode detector. It would function as a crystal-set radio if we replaced M1 with a pair of high-impedance headphones. C1 and L2 form a resonant circuit at the desired signal frequency. D1 changes the RF (ac) voltage to direct current, and C2 filters the ripple from the dc voltage. R1 is a sensitivity control. It is used to set the meter for a full-scale reading when a signal is being picked up by the whip antenna. The short antenna can be removed and a low-impedance antenna (reference dipole) connected at J1. The larger the pickup antenna, the greater the deflection at M1 for a given signal intensity. R1 could be eliminated in the interest of simplicity. If that were done, we could detune the tank circuit by means of C1. This would lower the meter reading.

As shown, the circuit of Fig. 1 is a single-band instrument. C1 and L2 are chosen to tune through the band of interest. Best results will be obtained with any FS meter if it is enclosed in a metal cabinet. An earth ground should be attached to the case whenever possible. This will help to ensure that signal pickup is only through the sampling antenna.

A band-switching version of the Fig. 1 circuit is offered at Fig. 2. L1 and C1 tune to the lowest desired operating frequency. S1 is used to select one of four additional coils to raise the operating frequency. The inductance value of L1, with L2, L3, L4

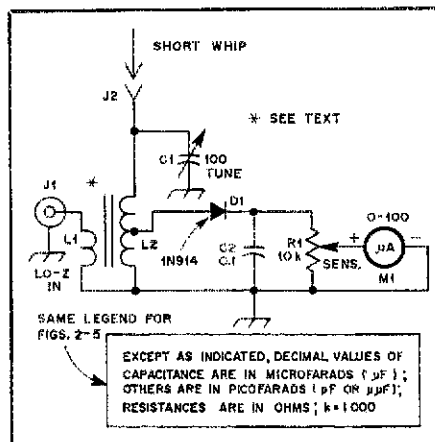


Fig. 1 — This simple field-strength meter operates as a TRF radio. D1 rectifies the RF signal, and the resulting dc causes the needle on M1 to deflect upward.

*ARRL Contributing Editor, P.O. Box 250, Luther, MI 49656

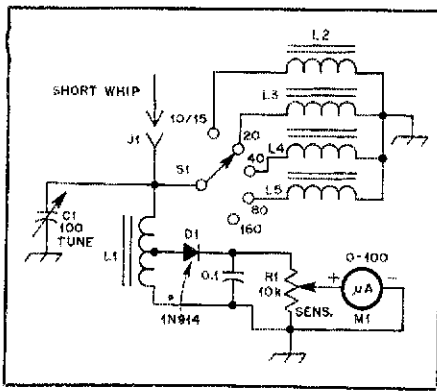


Fig. 2 — A method for covering several frequency bands with an FS meter. Coils of various inductances are placed in parallel with L1 to effectively lower its inductance.

or L5 in parallel with it, will be determined by the individual inductance values of the four additional coils. The net value of the inductors in parallel is determined in the same manner as when calculating parallel resistances:

$$L(\text{total}) = \frac{1}{\frac{1}{L1} + \frac{1}{L2}} \text{ etc.} \quad (\text{Eq. 1})$$

where L is the inductance in microhenrys, millihenrys or henrys. Thus, if L1 of Fig. 2 was 80 μH , and we needed 21 μH for 80-meter use, L5 of Fig. 2 would need to have an inductance of 28 μH , and so on. If two coils of equal Q are placed in parallel, the net Q will be approximately the same as for one of the coils.

An input link can be added to L1 (as in Fig. 1) to permit a low-impedance antenna to be attached. The diode (D1) in both circuits is tapped toward the ground end (10 to 25 percent of the turns, up from ground) of the coil. This prevents the diode and associated circuit from loading the tuned circuit. Excessive loading would broaden the tuning response, lower the sensitivity and reduce the tuned-circuit Q. Although we show a 100- μA readout meter in Figs. 1 and 2, a 50- μA meter would yield greater sensitivity. Similarly, a 200- μA meter can be used, but at a slight sacrifice in sensitivity.

Amplified FS Meters

We may increase the sensitivity of our FS meter by not only using a more sensitive meter at M1, but by amplifying the dc current from the rectifier/detector diode. This method is illustrated in Fig. 3. Q1 operates as a dc amplifier to greatly increase the effective current through M1. This makes it practical to use a 0-1 mA meter instead of a microammeter at M1. However, we may still use a μA meter along with Q1 to greatly increase the sensitivity of the FS meter. You will notice also that two diodes are used in

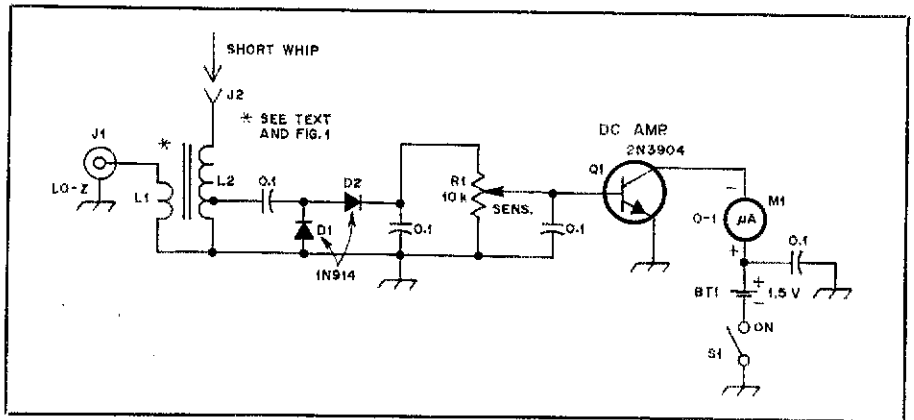


Fig. 3 — The sensitivity of an FS meter can be increased by using two diodes in a voltage-doubler circuit and by adding a transistor dc amplifier.

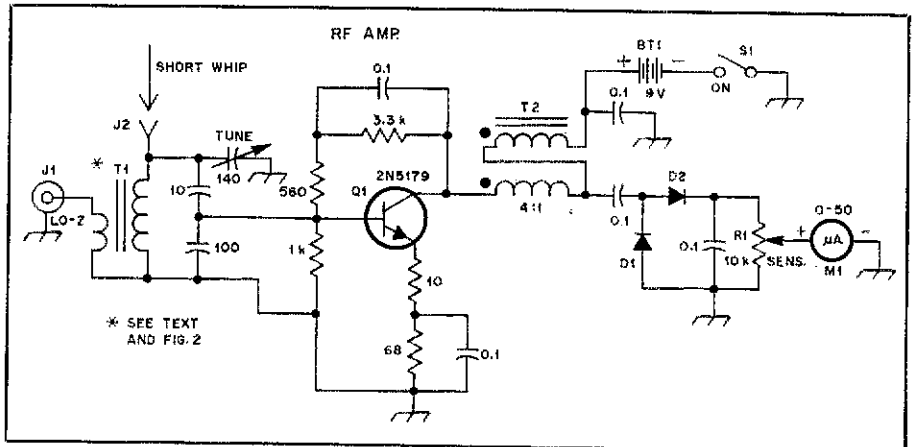


Fig. 4 — Added sensitivity can be had by including an RF amplifier in the FS-meter circuit. Q1 operates as a fed-back class-A amplifier to provide constant gain over a wide range of frequencies.

Fig. 3. As configured, they function as a voltage doubler. This also boosts the sensitivity of the instrument. A pair of hot-carrier diodes would work nicely in this circuit, but you may use inexpensive 1N914-family diodes if you wish.

It is not essential to resort to dc amplification in our field-strength meters. We may prefer to add a broadband RF amplifier instead. A method for doing this is shown in Fig. 4. A 2N5179 transistor (Q1) is inserted between the tuned circuit and the detector. Q1 operates as a class-A fed-back linear amplifier. Degenerative and shunt feedback is used to cause the transistor input to look like 50 ohms. The collector impedance is roughly 200 ohms. T2 is a 4:1 broadband transformer that consists of 15 turns of no. 28 enamel wire (bifilar wound) on an Amidon FT50-43 toroid core. The output port of T1 is 50 ohms. The band-switching, tapped-coil circuit of Fig. 2 can be adopted for this circuit. If so, a 0.1- μF blocking capacitor must be used between the L1 tap (Fig. 2) and the base of Q1 (Fig. 4).

If you feel motivated to build a super-duper instrument with high sensitivity, try combining the circuits of Fig. 3 and 4. The use of an RF and dc amplifier, plus a 50- μA meter, would provide great sensitivity, indeed. This is important for far-field or QRP measurements, particularly if a short pickup antenna is used.

Using a Step Attenuator

It is helpful when doing antenna measurements to observe signal-level changes in decibels (dB). Fig. 5 illustrates how we might add a ladder attenuator ahead of the RF amplifier of a field-strength meter. Actually, it could be used between Q1 and the detector, since that is a 50-ohm line also. S1 is a two-pole, five-position wafer switch. It provides decibel steps of 0, 10, 20, 30 and 40. If you already own a step attenuator, you may eliminate the attenuator of Fig. 5 and insert your out-board unit between the pickup-antenna feed line and J1. The advantage of using an attenuator *after* Q1 is that it can then be used when the short sampling antenna

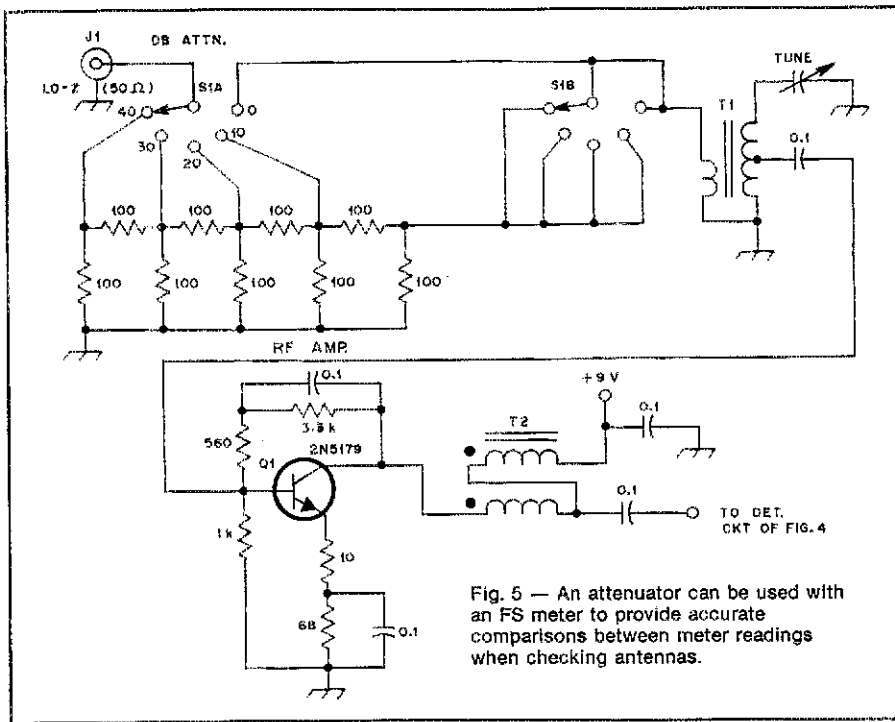


Fig. 5 — An attenuator can be used with an FS meter to provide accurate comparisons between meter readings when checking antennas.

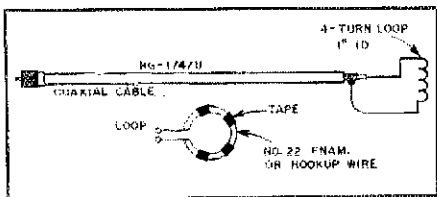


Fig. 6 — Details of a loop probe for use with an FS meter. The loop is placed near various RF circuits to aid in tuning or troubleshooting (see text).

(whip) is employed. A step-attenuator kit is available.¹

Another Use for the FS Meter

We can attach an RF probe to the low-impedance input port of a field-strength meter for use as an RF "sniffer." When might we have a need to sniff RF? Well,

there are many occasions when we need to check for RF leaks from transmitter cabinets while seeking solutions to TVI or RFI. Also, we can explore circuit-board conductors for unwanted RF ground loops (hot spots). The wavemeter concept is in force when we use our FS meter to check tuned circuits for harmonic energy. The probe is coupled to the tuned circuit, and the FS meter is tuned for the second, third or fourth harmonic of the-transmitter frequency. The harmonic-level reading will only be relative, but we can observe our progress in reducing harmonics while using the instrument in this manner. Fig. 6 contains the details for a simple probe. It can be used also for peaking RF tuned circuits in transmitters, or resonators in receiver oscillator chains. This is done in the same manner as when using a dip meter as a wavemeter.

An Operational FS Meter

For those of you who want to build an FS meter, please look at Fig. 7. This is a model I use for most of my antenna work. The input contains a junction FET in a source-follower circuit. Q1 serves only as an impedance-transformation device. This permits the short sampling antenna to be matched to the input of the first RF amplifier, Q2. Low-impedance input is found at the source of Q1, as shown. I elected to use two RF amplifiers rather than one RF amplifier and one dc amplifier. There are no tuned circuits in my FS meter, but if commercial signals interfere with your meter readings (depending upon your location), you may add a band-pass filter or tuned circuit between J1 and the pickup

¹Notes appear on page 30.

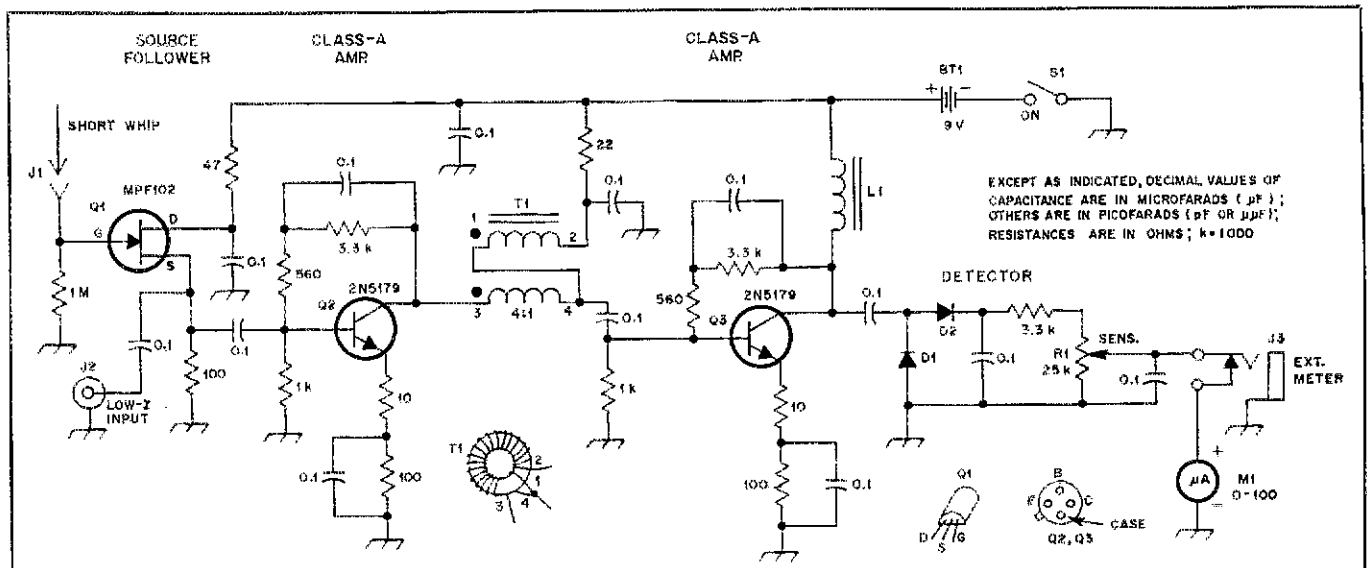


Fig. 7 — Schematic diagram of a practical field-strength meter that will operate from 1.8 to 30 MHz without band switching. Capacitors are disc ceramic, and fixed-value resistors are 1/4-W carbon composition.

- BT1 — 9-V transistor-radio battery.
- J1 — Banana jack.
- J2 — Phono jack or SO-239 coaxial connector.
- J3 — Closed-circuit jack.
- L1 — 15 turns of no. 26 enamel wire on an Amidon FT50-43 toroid core.

- M1 — Microammeter, 50 or 100 μA suitable.
- D1, D2 — Radio Shack Schottky diode or 1N914 silicon diode.
- R1 — 25-kΩ linear-taper carbon control (panel mount).

- S1 — SPST toggle or slide switch.
- T1 — Bifilar-wound transformer, 4:1 impedance ratio, 15 bifilar turns (twist wires for 8 twists per inch before winding) of no. 26 enam. wire on an Amidon FT50-43 toroid core (see inset drawing).

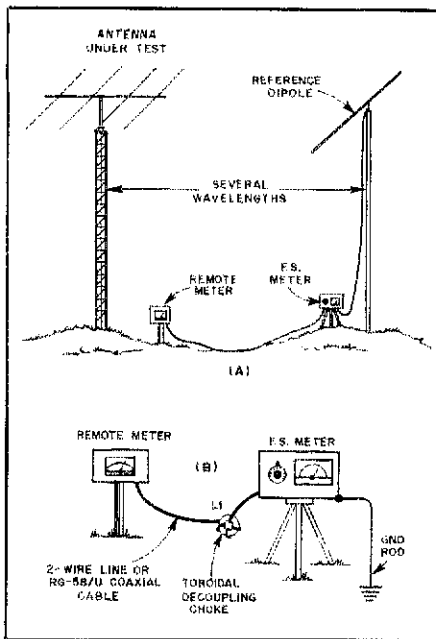


Fig. 8 — A remote meter may be used as a convenience when the FS meter is located 1 wavelength or more from the antenna under test (A). The cable for the remote meter (B) should be decoupled (L1) to prevent RF energy from entering the FS meter via that route. An earth ground is recommended for attachment to the FS-meter cabinet.

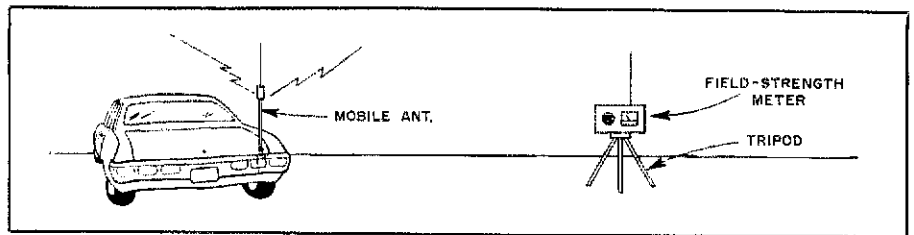


Fig. 9 — Illustration of how to use an FS meter for checking the radiation pattern of a mobile antenna. A camera tripod is handy for mounting the FS meter.

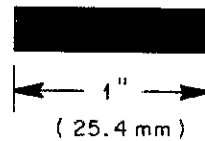
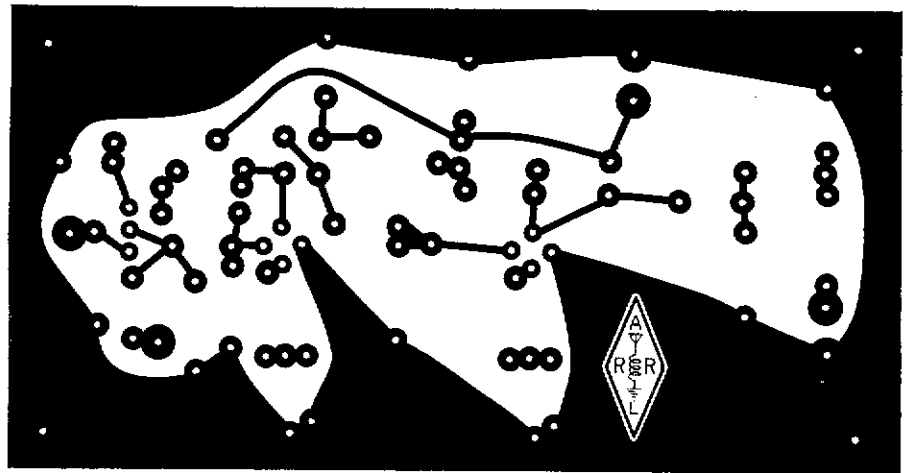


Fig. 10 — Scale pattern for the FS meter circuit board, as shown from the etched-foil side.

antenna. The ARRL *Handbook* has complete filter data in the transmitting chapter.

Increased sensitivity is provided by the D1, D2 voltage doubler. A closed-circuit jack (J2) provides an option between use of the internal meter (M1) and a remote meter (see Fig. 8). The remote meter is essential when making far-field measurements. The broadband amplifiers (Q2 and Q3) are flat in response (within 1 dB) from 1.8 to at least 30 MHz. The system gain is on the order of 20 dB. Slightly more gain would result if BT1 were a 12-V type. Circuit boards and a parts kit for this FS meter are available (see note 1).

Meter Calibration in dB or μV

For most amateur work we will be interested in the decibel (dB) change when adjusting antennas, or when checking front-to-back and front-to-side power ratios of directional antennas. The meter scale can be calibrated in microvolts (μV) or millivolts (mV) if you have access to a laboratory-grade signal generator. The input to the FS meter is then attached at J1 of Fig. 7.

Calibration in decibels can be accomplished by setting up your FS meter a distance from the transmitter antenna, then adjusting the transmitter output power in 3-dB increments. Each time you double the output power, a 3-dB power increase will result. This should be done with a fairly strong signal entering the FS meter, since we want to do the calibration with D1 and D2 operating above the knee of their curve.

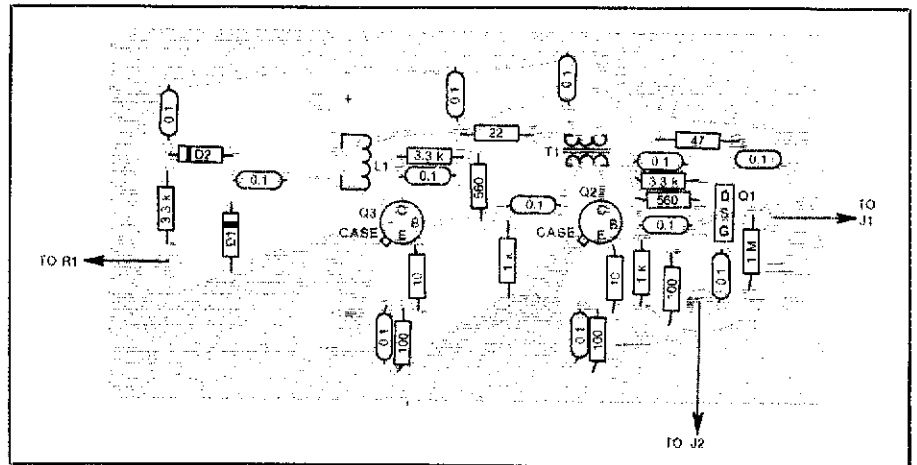


Fig. 11 — Parts-placement guide for the FS meter of Fig. 7, as viewed from the component side.

This may degrade the calibration accuracy somewhat at weak signal levels, but the instrument will still be useful. An alternative method for calibration in decibels is to insert a quality step attenuator between the pickup antenna and J1. Operate your transmitter at a steady output power and switch in various amounts of attenuation

at the step attenuator while observing the dB drop in meter reading.

Using the FS Meter

Fig. 9 shows how an FS meter can be used to check the pattern from a mobile antenna. Shadows or nulls in the radiation pattern can be plotted by moving the FS

meter in a circle around the vehicle (at an equal distance of 1 or more wavelengths). A camera tripod is handy for supporting an FS meter in the field.

Beam-antenna patterns can be observed by using the setup shown in Fig. 8. In this example, we have included a remote indicating meter to ease our observations. Alternatively, a spotting scope could be used at the antenna site to observe M1 of Fig. 7. It is important to RF-decouple the connecting line for the remote meter from the FS meter. Fig. 8B provides details for this. L1 is a medium-size toroid through which a few turns of the meter cable have been looped. I use an Amidon FT114-43 ferrite toroid (permeability = 950). L1 is mounted as close as possible to J1 of Fig. 7. It is also helpful to connect the FS-meter case to a nearby earth ground. A 6-foot rod driven into the ground will generally suffice.² The grounding and

decoupling help to ensure that the sampled signal enters the FS meter only from the pickup antenna. A balun transformer or RF decoupling coil is suggested for use at the feed point of the pickup dipole (Fig. 8A) to prevent the feeder from acting as part of the pickup antenna.

In Summary

A circuit-board pattern for the FS meter is provided in Fig. 10. The parts-placement guide is given in Fig. 11. You should have no trouble laying out a pattern of your own, providing you keep all RF leads short and direct. Perf-board or a universal breadboard (available from Circuit Board Specialists) can be used as the foundation.

We should acknowledge that the ideal FS meter would be an all-band superheterodyne receiver (battery operated, such as the Uniden CR-2021). An external metering circuit would be connected to the

receiver AGC line for observation of signal-level changes. We might even consider using a pocket transistor AM radio in the same manner. A simple crystal-controlled converter could be used ahead of it to provide coverage of the desired amateur band. The resulting selectivity and sensitivity would be extremely useful in areas where strong commercial signals abound.

I hope this article has helped to inspire more serious antenna experiments. Comparing results in your own backyard avoids the troubles encountered when trying to obtain comparative antenna-performance reports from a ham several miles away.

Notes

¹Circuit Board Specialists, P.O. Box 969, Pueblo, CO 81002.

²mm = in × 25.4; m = ft × 0.3048.

Strays

QEX: THE ARRL EXPERIMENTERS' EXCHANGE

□ Wonder what you've been missing by not subscribing to *QEX*, the ARRL newsletter for experimenters? Among the features in the February issue were:

- Eliot Mayer, W1MJ, shared his design for "An Audible SWR Indicator"
- Two Russian satellites heard on EME frequencies were discussed by Paul M. Wilson, W4HHK, in "Satellite Signal Source for 2304 MHz"
- The 1984 *QEX* index covers issues no. 25 to 36, and puts the year at your fingertips.

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

THANKS, SCIENTIFIC RADIO SYSTEMS

□ The League would like to express its gratitude to Scientific Radio Systems, Inc. of Rochester, New York, for a two-year loan of a 1-kW power amplifier. The purpose of the loan is to enable W1AW to conduct 6-meter meteor-scatter tests using packet radio. While the amplifier is at W1AW, it will be used for regular bulletin

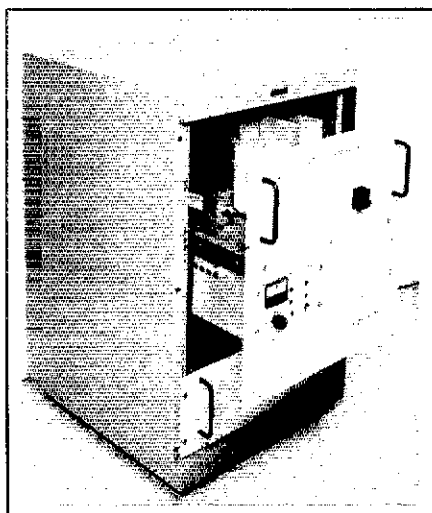


Fig. 1 — Scientific Radio System's SR-1120 1-kW, 6-meter power amplifier.

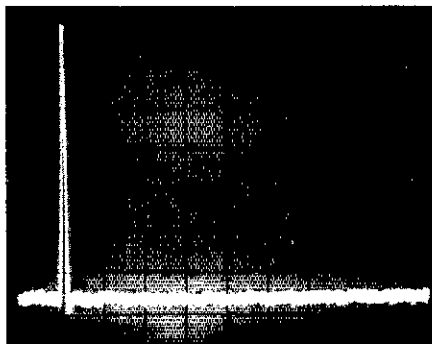


Fig. 2 — Spectrum analyzer display of the unusually clean output from the SR-1120.

operations as well. The model SR-1120 amplifier was designed for meteor-burst communications in the 30- to 50-MHz frequency range. Two type 3-500Z tubes are used in the amplifier. We also wish to thank SRS Chief Engineer Jacob Schanker, W2STM, for arranging this loan and for providing technical information on meteor-scatter communications. — Paul Rinaldo, W4RI

Next Month in QST

Ever wonder how inductors and capacitors produce resonance and reactance? You're probably in good company. The April installment of *First Steps in Radio* will take you through these fundamental Amateur Radio concepts, and provide a practical workshop experiment as well.

Elsewhere in April *QST* you'll find:

- an article that describes an active audio filter that interfaces an amateur transceiver to a personal computer.
- part 2 of the construction article on the 250-W, 23-cm power amplifier, including its power supply, cooling, testing, tune-up and operation.
- an updated list of computer nets that can put you in touch with others with similar interests, and
- a discussion of *QST*'s revitalized interest in young people and beginners.

Beam-Antenna Pattern Measurement



A practical setup for relative pattern measurements of homemade or commercial directional antennas. Author Bry explains how to make your own measurements.

By Al Bry,* W2MEL

An effective beam antenna can be rewarding in Amateur Radio! An "on-site" measurement technique will enable an amateur to plot radiation patterns of beam antennas. Generally, evaluation and comparison of antennas is assumed by referring to theoretical performance or the measured performance of a scale model at a much higher frequency. However, an on-site antenna may differ from a mathematical or scale model in many ways. Results may vary widely. More-reliable information is needed to improve or optimize beam-antenna performance.

Field-Strength Measurements

Over a number of years, while engaged in beam-antenna design and building activities, I developed a system that provides field-strength measurements suitable for determining horizontal radiation patterns of rotatable antenna arrays. The methods provide measurement repeatability and accuracy sufficient for pattern comparison. The system uses a remote antenna, a diode peak detector and a line to an adjustable indicator at the operating position. A method of measuring transmitter output is required, and the AUT (antenna under test) must be rotatable and have a calibrated directional indicator. Use of the remote indicator results in good repeatability and isolation of the sense antenna. Accuracy depends primarily on the means of measur-

ing transmitter output during system characterization as well as the actual field-strength measurements. The accuracy is adequate when using commonly available equipment.

System wiring is shown in Fig. 1. The peak-detector circuit is assembled on a 1-3/4 x 3-5/8 inch glass-epoxy copper-coated board.¹ A PL-259 connector is fastened to the input end of the board with a no. 8-32 screw. A 3/8-inch hole is made at the other end of the board. A grommet

in the hole is used for strain relief of the output line, which is composed of surplus telephone wire. At the other end of the line, connection is made to a 50- μ A meter and 5-k Ω potentiometer, with a bypass capacitor, as shown. This assembly is mounted on a 2-3/4 x 1-3/8 inch sheet-metal connecting bracket fashioned from part of an old panel.

The remote sampling antenna is a half-wavelength dipole cut for the center of the band of interest. An inverted V is the preferred design because it requires only one upper support point at the center, where it is equipped with a homemade

¹mm = in x 25.4; m = ft x 0.3048.

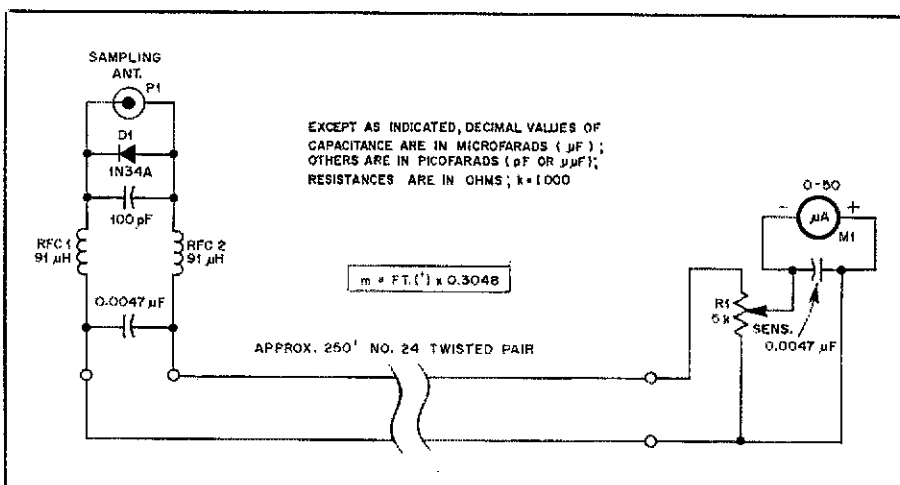


Fig. 1 — Schematic diagram of the test equipment for making antenna-pattern measurements with a sampling dipole. Capacitors are disc ceramic. P1 is a PL-259 connector; R1 is a linear-taper carbon-composition control.

*556 Duke Rd., Venice, FL 33595

phenolic insulator and an SO-239 connector. The peak-detector board, with line attached, is connected prior to raising the dipole.

Results

Good results have been obtained on 28, 21 and 14 MHz with the sampling antenna hung from a tree branch 15 feet up and at a distance of 197 feet from the base of the AUT. Acceptable measurements on a 7-MHz beam have been made at a distance of 375 feet. A distance of approximately 3 wavelengths seems to be optimum for this system. A shorter distance may involve excessive distortion of the AUT pattern because of excessive excitation of the sampling antenna, and a greater distance may limit the lower range of measurements or necessitate the use of more sophisticated measurement equipment and higher power levels. The sampling antenna should be broadside to the AUT.

Initial Adjustments

After a check of all wiring and of the meter polarity (Fig. 1), the system should be ready for initial adjustments. First, the SENSITIVITY control (R1) is set at the extreme clockwise position, where it effectively shorts out the meter. The control must be set at this position at transmitter turn-on to prevent damage to M1.

With the AUT directed at the sampling antenna, power is increased slowly while observing the meter. If all wiring and the meter polarity are okay, the meter should indicate current as R1 is advanced. The exact bearing of the sampling antenna should be found by rocking the AUT with the rotator. A system check should show that full-scale meter deflection can be obtained with less than 25-W output. It should be possible to adjust R1 and maintain a full-scale reading with over 500-W output. At this site, the sampling antenna bearing was 105°. The AUT is left in this position for the next step. Naturally, a carrier should not be transmitted for longer than necessary (check for a clear frequency first), and ID must be made in accordance with regulations.

In testing and making measurements, when trying to get the most for the least, a technique called system characterization is used. In my case, this provides greatly increased accuracy by compensating for system defects such as diode nonlinearity and so on.

Preparing for Measurements

Our first step is the preparation of a characterization-data table (Table 1) and a normalized correlation curve that compensates for system nonlinearity. The table has three vertical columns designated Power (watts), Meter Reading and Normalized Reading. With the AUT pointed directly at the sampling antenna, and power output at the test value of 500 W, R1 is adjusted

to provide a full-scale meter reading. My 50- μ A meter has a scale of 1 to 100, so the reading was 100. The top line of the chart will then have a power of 500 W, and columns 1 and 2 will show a reading of 100. (I used a Drake model W-4 wattmeter for transmitter-output measurements.) Power is then reduced in convenient (or 3-dB) increments and noted in column 1, while the corresponding meter readings are inserted in column 2. The last reading should be made at the lowest possible power level that will produce a discernible reading on M1. The heading of the AUT should not change during the measurements. We can now compute a normalized meter reading for each power level in column 1 and place it in the corresponding line of column 3. This is done using the equation:

$$NR = \frac{100}{\sqrt{\frac{500}{p}}} \quad (\text{Eq. 1})$$

where

- NR = the normalized reading
- 100 = the full-scale reading
- 500 = the full-scale power
- p = the power used for the respective meter reading.

The equation is derived from the fact that current ratio varies as the square root of the power ratio.

A simple graph is then prepared, plotting the relationship between readings in column 2 and the normalized readings of column 3. It can be used as long as the system is not altered. Where the resolution of the graph is inadequate at low meter readings, interpolation can be substituted to provide the normalized reading. This concludes the system characterization, and our graph is called a Current Normalization Curve (Fig. 2).

Before you make pattern measurements, it is advisable to prepare a second table to organize and store the data. Call this Table 2, Measurement Data. A minimum of six (three pairs) columns should be provided. This will allow for one additional measurement run. Twenty-four data lines are necessary. Column 1 is for Normalized Bearing and can be filled immediately with the required bearings, starting at 0°/360° and progressing at 15° intervals to 345°. The second column is for the actual bearing of the AUT; in our case, it starts with 105° on the top line. The 105° is then added to the numbers in column 1, and the result is placed in the corresponding space of column 2. We must subtract 360° from the result when it exceeds that number. Each additional pair of columns is used for a series of measurements. They are headed with the date and measurement frequency. Each pair will contain the measurement and its corresponding normalized reading.

The Measurements

We are now ready for measurements.

Table 1
System Characterization Data

Power (W)	Meter Reading	Normalized Reading
500	100	100
250	67.5	70.5
125	44	50
62.5	28	35
50	23	31.5
31	18	25
25	14	22.4
15	10	17.3
10	8	14.1
7.5	5	12.25
5	4	10
2	2	6.32
1	1	4.5

Meter: Marion 3 inch, FS = 50 μ A, 0 to 100.
Wattmeter: Drake W-4.
Sampling antenna: $\lambda/2$ dipole, inverted V, apex at 15 ft.
Distance to base of AUT: 197 ft.
Frequency: 21.015 MHz.
AUT: 2-element Triband quad, 8-ft boom, separate gamma-match feed.
Boom height: 55 ft.
Date: 12/22/83.

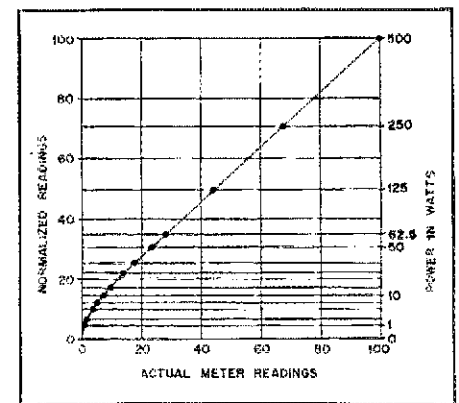


Fig. 2 — Meter reading (M1, Fig. 1) normalization curve (see text).

Power output is checked at 500 W before every reading, and a full-scale meter reading is verified at 105° actual reading for a first reading of 100, which is placed in column 3. Measurements are then made at each heading, as indicated in column 2, and the corresponding meter reading is placed in column 3. Care must be taken to maintain a 500-W power level and to keep the rotator indicator at the required bearing.

After recording all 24 readings, you can obtain the normalized readings by using the normalization curve, or through interpolation. They are inserted in their respective places in column 4. The remaining columns can be used for a verification run of the same series of measurements, or they may be utilized to check performance at another frequency, remote from the initial spot. The results can be compared and, if necessary, the AUT tuning can be tweaked to provide optimum results over the entire band. Alternatively, it can be customized for maximum performance in a chosen portion of the band.

Table 2
21-MHz 2-Element Quad Measurement Data†

Bearing Normalized	Actual	12/22/83-21,015 kHz		12/23/83-21,286 kHz	
		Actual	Normalized	Actual	Normalized
0/360	105	100	100	100	100
15	120	88	88	86	86
30	135	68	71	69	72
45	150	42	47	50	55
60	165	18.5	25.5	20	27.5
75	180	0	0	1	4.5
90	195	2+	6.5	6	13-
105	210	2.5	7.5	12	19.8
120	225	0	0	13	21.0
135	240	0	0	9	15.6
150	255	4-	10-	5	12.25
165	270	6	13-	2	6.32
180	285	6	13-	1	4.5
195	300	2	6.3	2.5	7.5
210	315	0	0	4	10
225	330	0	0	5	12.25
240	345	1	4.5	4	10
255	0/360	2	6.3	2	6.32
270	15	4	10	8	14.1
285	30	16+	23.8	22	30.5
300	45	44	50	42	48
315	60	65.5	68.5	69	72
330	75	84	85	91	92
345	90	98	98	98	98

†See System Characterization in Table 1.

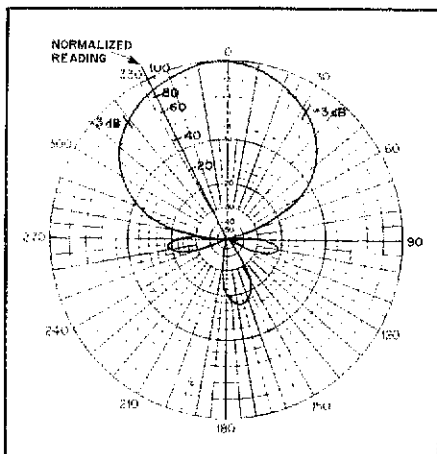


Fig. 3 — Radiation pattern determined with the test setup described in the text. Data is from Tables 1 and 2. Pattern is for a 2-element quad at 21,015 kHz, a boom height of 55 feet, and a boom length of 8 feet.

The data in the normalized-bearing column, together with a series of corresponding normalized readings, are used to plot the AUT radiation pattern as seen by the sampling antenna. Polar-coordinate graph paper, No. 340-P, made by Eugene Dietzgen Co., was obtained for this purpose. A completed graph of the data from Table 2, columns 1 and 4, is shown in Fig. 3. Note that the circular lines are calibrated with the meter scale and also in decibels. Each dot represents a normalized reading at its respective bearing. The dots are connected by a smooth line to provide the radiation pattern. The 3-dB points are indicated. They show a beam width of 74°. Other relevant information is recorded and

may be useful for future comparisons. It appears that skewing (obvious in this pattern) is probably due to an error of about 4° when the heading of 105° is initially set on the sampling antenna. This has no effect on the accuracy or usefulness of the measurements.

Some Thoughts

Although making patterns can be an interesting amateur experience, there are many cases in which a series of data is needed to provide the desired information. Examples can be illustrated by focusing on Table 2. Note the five "0" readings in column 4, which are indicative of radiation levels too low for detection by my system. The zeros occur at nulls between the pattern lobes and indicate levels below 30 dB down (1/2 W). It is doubtful that such nulls could be obtained if there was significant radiation from the coaxial feed line or shock excitement of the adjacent concentric quads for 10 and 20 meters.

Look at the data in columns 5 and 6, which were taken under the same conditions as the earlier measurements of columns 3 and 4. Only frequency has been moved 271 kHz higher to 21,286 kHz. Note the degradation of performance, as indicated by the disappearance of the zeros and the generally higher readings to the rear. Obviously, this quad is not tuned for peak performance on 15-meter SSB. Shortening the reflector should improve performance on the high end of the band. The impact on the low end would have to be watched, of course, if the CW end is of interest.

Undoubtedly, other applications for an antenna test system will appear during the

experience of pattern making. I suggest all information and data relative to antenna measurements be documented and preserved for future reference. This should include SWR curves. Such data is recorded at the rear of the station log at my station and is available for comparison whenever changes are made.

This test system evolved over a long period of time to satisfy the need for accurate information while designing, building and testing a number of quad antennas. The choice of components was influenced greatly by their availability in my junk box. The repeatability of results was excellent. Measurement accuracy is limited by my use of the Drake W-4 wattmeter, which is "spec'd" rather ambiguously at low levels. An ac VTVM was used to double-check the W-4 meter at levels down to 1/2 W, and I found that the forward-power accuracy of my unit was acceptable. The range of measurements is limited by the diode detector and the wattmeter. A limit of 27 dB (with a little stretching, 30 dB) is the capability of this setup. Unquestionably, the use of more sophisticated detection methods and power measurements would easily extend the range of measurements to 45 dB. Conversely, reasonable changes in power level, distance and/or measurement equipment can result in a useful system of somewhat different range capability. The idea is to substitute measurements for wishful thinking in antenna evaluation.

In Conclusion

In Amateur Radio today, antennas remain an area of technical interest in which activity and experimentation have not diminished. Indeed, antennas have always been allocated the highest priority by aggressive amateurs. Theory of design and properties of radiation have been available in amateur publications and engineering texts for years. Still, the availability of measurement techniques suitable for reliable antenna evaluation is extremely limited. It is very difficult to find proof that an existing antenna provides the radiation pattern promised by theory. I hope this article is a step in that direction. □

Strays

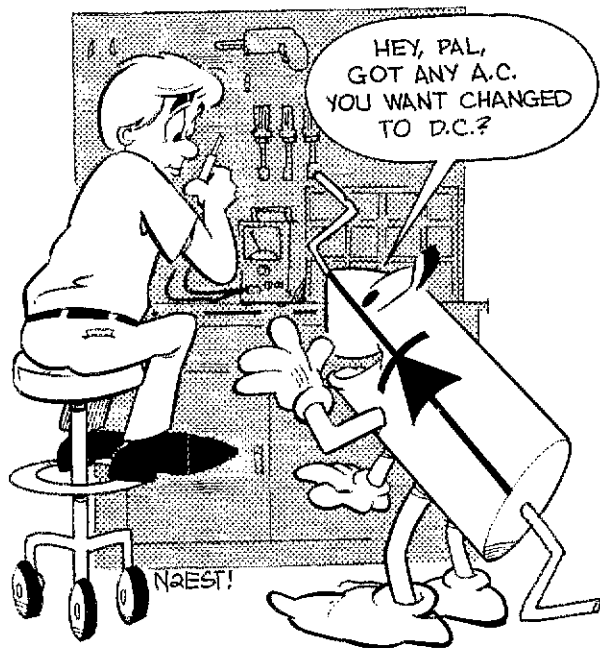
QST congratulates...

□ ARRL Technical Advisor Dave Geiser, WAZANU, of New Hartford, New York, on his 200th publication, a Technical Correspondence item in December 1984 QST.

Diodes and How They Are Used

Part 15: However simple diodes may be, you'll use them again and again in Amateur Radio.

By Doug DeMaw,* W1FB



Could there be an electronics technology without diodes? Probably not — at least not as we know the technology today. It is incredible that so simple a device can play such an important role in radio circuits. The first radio signals were detected by means of diodes: Diodes were used in “crystal sets” to detect standard AM broadcast signals in the early days of radio. There are many new types of diodes, but a diode remains a diode with respect to the function. A diode is a device that has a cathode and an anode, and passes current in one direction only.

The combination of the galena crystal and “catwhisker,” used to detect AM (amplitude modulated) radio signals, was, in fact, a solid-state diode. The galena serves as one half of the diode, and the tip of the catwhisker (fine wire) comprises the remaining half. When the two objects are in contact with one another, it is possible to rectify the incoming radio signal and create pulsating dc that would activate a pair of earphones at an audio rate, thereby enabling a person to listen to a favorite radio program. A number of other materials, such as carborundum, were used to form a diode for signal detection. The idea is to provide a poorly conducting junction that causes rectification (changing ac to dc) of the radio signals.

The irony of having solid-state diodes in the old days is that vacuum-tube diodes were used for nearly every other diode application until copper-oxide and selenium rectifiers were introduced; prior to World War II. The large-signal semiconductor diode (silicon or germanium) came into being in the early 1950s. Germanium small-

signal (low-power) diodes were used prior to 1940 for various detector circuits, and were a vital part of radar receivers during WWII.

Modern Diodes

Fig. 1 illustrates the progression of diodes since the first days of radio. We went from the tube diode and galena crystal to selenium diodes, low-power point-contact (germanium) diodes and, finally, to germanium or silicon junction diodes. Germanium has fallen out of popularity as a power-diode material; silicon is the principal material used today. We now have rectifier diodes that can accommodate many amperes at relatively high peak voltages (e.g., 50 A at 100 V). The larger diodes are used extensively in such devices

as electroplating rectifiers, welding machines and automobile alternators.

The small-signal diode has come a long way, also. There are many types of internal structures for these diodes, and each is created to perform a specific job in electronic circuits. We will examine some of these interesting applications later in this article.

One of the principal differences between germanium and silicon diodes (apart from the difference in crystal material) is the “barrier voltage.” If we apply a current to a diode, it will not commence to conduct until a particular voltage is developed across the diode junction. Therefore, this level of voltage functions as a *barrier*. For germanium diodes, the barrier voltage is approximately 0.4. It is on the order of

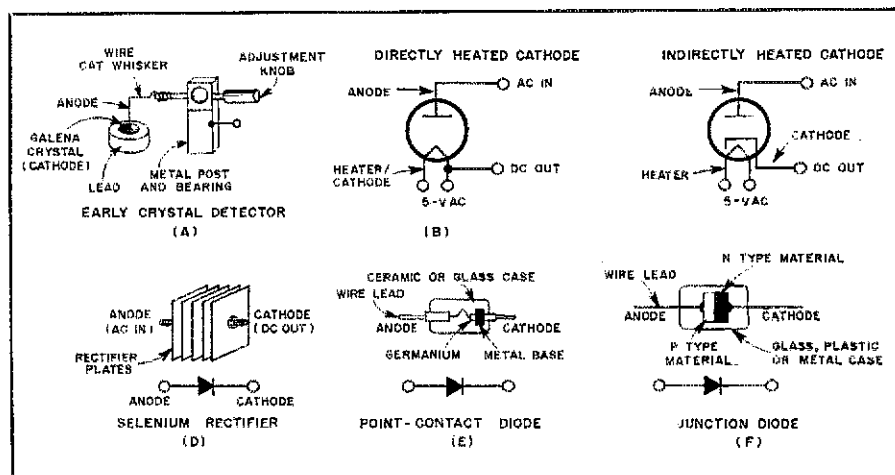


Fig. 1 — The evolution of diodes. The crystal detector at A was used for signal reception in the early days of radio. Vacuum-tube diodes (B and C) were used as rectifiers and signal detectors for many years, until selenium (D) and junction diodes (F) replaced them. Point-contact diodes remain in common use as hot-carrier diodes (E).

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0.7 V for a silicon diode. In everyday language, we may think of the germanium diode as being the more *sensitive* of the two, since it will conduct at a lower voltage level than will its silicon brother.

The solar-electric (photovoltaic) cell found in solar panels utilizes the barrier concept to develop dc voltage. A solar cell is a type of diode, and when photons impinge on the cell a current will flow. The barrier voltage is approximately 0.5 per cell. Therefore, many solar cells must be wired in series to obtain a desired voltage output from a solar panel. To realize 13 V from a solar panel (with a load connected to it, such as a transmitter or receiver), we must use roughly 36 cells. Under no load this will produce about 17-18 V dc at peak sunlight.

Various packaging formats are used for the current crop of diodes. They may be housed in metal, glass or plastic cases. Fig. 2 shows a group of modern diodes in various packages. The physical characteristics may vary with the power ratings, and electrically similar diodes may look different because of the manufacturer's choice of package style. Most diodes have a band of paint around one end of the body to identify the cathode end of the diode. The cathode end of a metal-encased, stud-mount power diode is generally the stud end. The anode terminal is set in glass at the opposite end of the diode.

Diodes as Power Rectifiers

Whenever we apply ac voltage to a diode and extract dc voltage from it, we are using the diode as a *rectifier*. Even though the diode may be used in a specific application to change a radio-frequency voltage (signal) to audible, pulsating dc voltage, it is still acting as a rectifier.

Few pieces of electronic equipment operate without some form of ac power supply. Among the exceptions are portable radios, watches, calculators, car radios, and some portable and mobile Amateur Radio gear. Most indoor appliances are plugged into the ac outlets of our homes. When this is done, we must have provisions, within or outside the equipment, to not only increase or decrease the wall-outlet voltage to a level suitable for the item it will power, but to change the ac voltage to dc.

As we learned earlier in this series, a transformer is used to change the voltage amount. Let's suppose that we wanted to power a CW keyer from the ac wall outlet. The keyer is designed to operate from 12-V dc. What type of power supply would be suitable to satisfy our requirements? A circuit for accomplishing our goal is shown in Fig. 3A. However, we will find that the dc voltage will shift up and down somewhat as the CW keyer is activated (no load to full load). Some circuits are not sensitive to small voltage changes, while others are very intolerant of voltage shifts (poor regulation). The no-load, full-load voltage

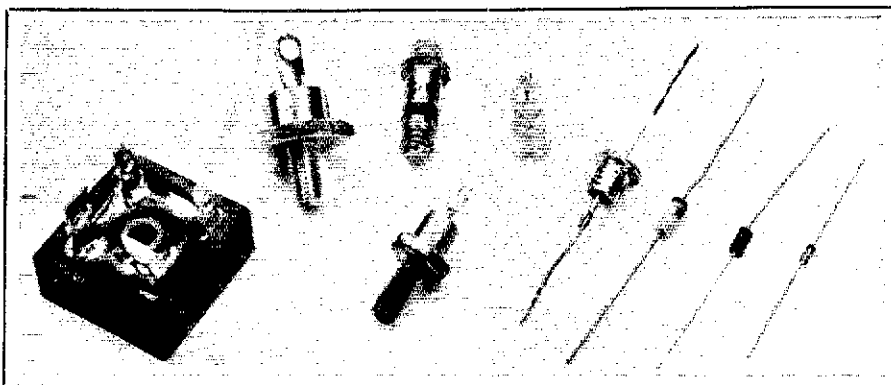


Fig. 2 — Various types of solid-state diodes. High-power units appear at the left, with small-signal diodes at the right.

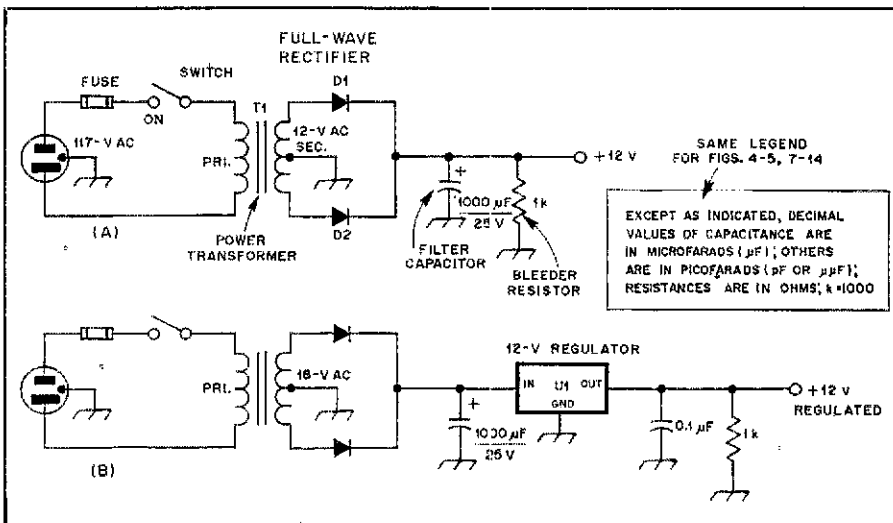


Fig. 3 — Diagram A shows a simple, unregulated 12-V dc power supply in which D1 and D2 serve as rectifiers. A regulator (U1) has been added in circuit B to stabilize the output voltage at +12.

changes can be stopped if we add a voltage regulator, as shown in Fig. 3B. I don't wish to get involved with a discussion of voltage regulators in this installment, but you should be aware that they exist and that they are used frequently to ensure a nearly constant output voltage from a power supply.

The power supply at A of Fig. 3 will produce approximately 17-V dc while no external load is attached to it. The output voltage will drop to roughly 12 with the load connected. D1 and D2 are the rectifier diodes that change the ac to dc.

A voltage regulator has been added to our power supply, as shown at Fig. 3B. Another change is the power-transformer secondary voltage. It has been increased to 18 V. This is necessary in order to permit U1 to work as a regulator: A regulator needs more input voltage than the output voltage it delivers. Actually, this circuit delivers 25.3-V dc to the input side of the regulator. This is because when a filter capacitor is used immediately after a rec-

tifier, the no-load voltage from the diodes is 1.41 times the secondary ac voltage of the power transformer when a full-wave rectifier is used. The input voltage to a regulator must be high for another reason: For the regulator to prevent the power supply output voltage from falling *below* the desired amount, more than the required output voltage must be present in the first place (25.3 V versus 12 V).

Rectifier diodes can be used in other forms of power supplies. For example, we may use what is called a half-wave rectifier (Fig. 4A), but the load-no-load shift in voltage will be greater than with a full-wave rectifier. Also, the ripple (hum) from a half-wave rectifier is much harder to filter out. Fig. 4B shows a full-wave bridge rectifier. The dc voltage characteristics from this rectifier are the same as for the simple full-wave rectifier of Fig. 3. When the four diodes are used, however, the power transformer does not require a center tap on the secondary winding.

We can employ diodes in other types of

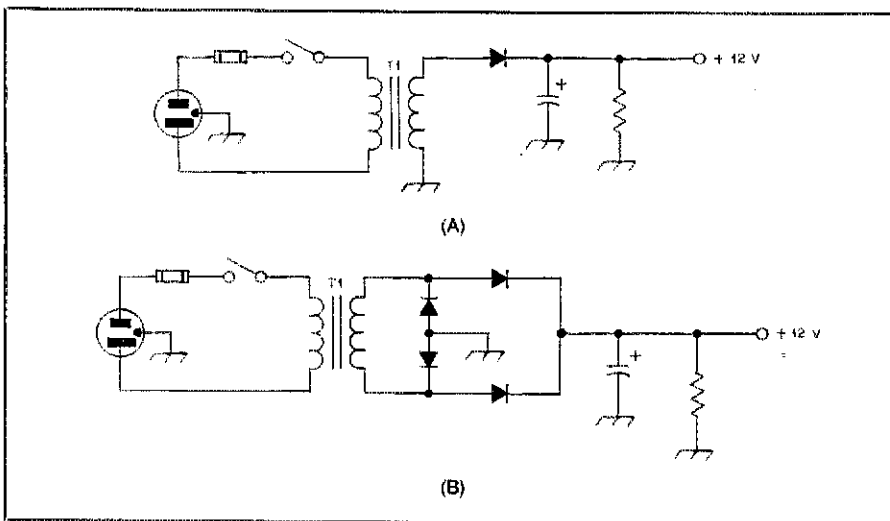


Fig. 4 — Diodes are shown here as rectifiers in a half-wave (A) and full-wave bridge (B) rectifier. T1 needs no secondary center tap when a bridge rectifier is used.

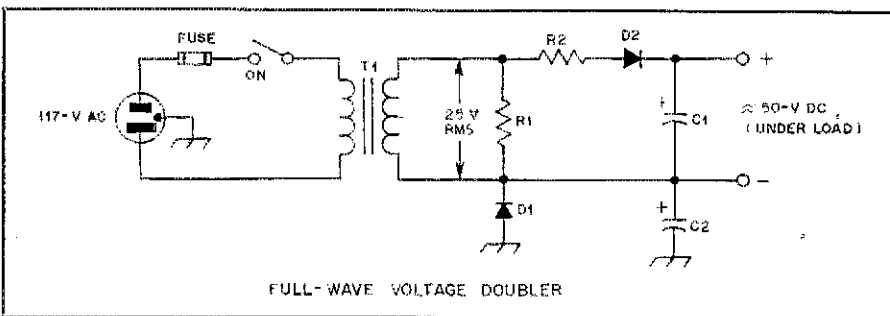


Fig. 5 — Example of how two power diodes can be used in a voltage doubler.

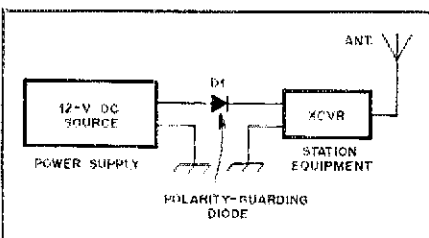


Fig. 6 — D1 functions here as a protective diode against accidental polarity reversal of the power supply (see text).

power-supply rectifiers. They can be arranged with appropriate capacitors to form a voltage doubler, as shown in Fig. 5. The resistors (R1 and R2) are chosen to protect the diodes from high-current surges when the power supply is turned on. These resistors will also protect D1 and D2 from excessive reverse voltage: Too much voltage or current can destroy a diode.

The dc output from a voltage doubler of this type will be approximately twice the RMS voltage across the secondary winding of T1. Under no-load conditions the voltage may approach 2.7 times the RMS secondary voltage.

There are also voltage triplers and quadruplers. A full explanation of power-

supply rectifiers and their applications can be found in the power-supply chapter of the ARRL *Handbook*. I urge you to go beyond this simple discussion of diodes by studying the *Handbook*.

Other Uses for Diodes

A diode can be used as a protective gate. An example of this is shown in Fig. 6. D1 is inserted between the dc power supply and the equipment with which it will be used. If we were to reverse the power-supply terminals (reverse polarity), we could instantly destroy the solid-state devices in our transceiver or other equipment. Such mistakes are made frequently. We may prevent damage resulting from human error by using D1 of Fig. 6. It will permit current to flow through it when the power-supply polarity is correct. Current will not pass through D1 if the polarity is reversed, thereby protecting the station equipment. There will be a 0.7-V drop through D1 (the barrier voltage), so the power supply should have an output of 12.7 or 13 V to ensure that 12 V reaches the equipment. The diode must be chosen to safely pass the current of the transceiver or other gear with which it is used. Similarly, we must select a diode that has a voltage rating somewhat greater than 12 V for this example.

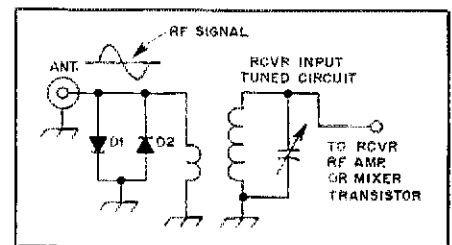


Fig. 7 — Small-signal diodes can be used as shown to prevent damage to the front end of a receiver from excessive input signal voltage.

Another protective circuit in which diodes can be used is found in Fig. 7. Here we show two diodes reverse-connected in parallel across the 50-ohm receiver input line. They will not conduct until the incoming signal voltage (ac) reaches approximately 0.7. They will create a short circuit for all input signal voltages in excess of 0.7. D1 and D2 will prevent damage to the input stage of the receiver. Arranged as shown in Fig. 7, D1 and D2 will conduct on both the negative and positive peaks of the incoming RF signal. We may wish to use two diodes in series for each leg of the protective circuit. The barrier voltage will then be 1.4, which will still ensure safety for the receiver. Series diodes are sometimes necessary when very strong commercial signals are present. They could cause D1 and D2 of Fig. 6 to conduct, which would result in rectification of unwanted signals. This would create many spurious signals and "hash" to appear in the receiver output. By using two diodes in series for each branch of the protective circuit, we would raise the barrier voltage above the signal level of the strong commercial station.

Fig. 8 shows how we can use a silicon power diode to establish a 0.7-V positive potential that is used as bias for a solid-state linear amplifier. R1 is used to limit the current through D1, thereby preventing the diode from burning out from excessive heat. Here again, we have taken advantage of the barrier voltage of the diode to establish a +0.7-V reference for the base of Q2.

Diodes are commonly used as electronic switches. We can see how this is done by referring to Fig. 9. The advantage is that S1 can be located a long distance from the three crystals, Y1, Y2 and Y3. The leads going to the diodes carry only dc voltage. The three 4.7-k Ω resistors provide RF isolation between S1 and the crystals, while serving as current-limiting devices for the diodes. As each diode is made to conduct, via application of dc voltage from S1, the related crystal is connected to the oscillator circuit. Low-power silicon diodes of the high-speed switching variety are suitable for this type of circuit. This same general switching technique is used for selecting

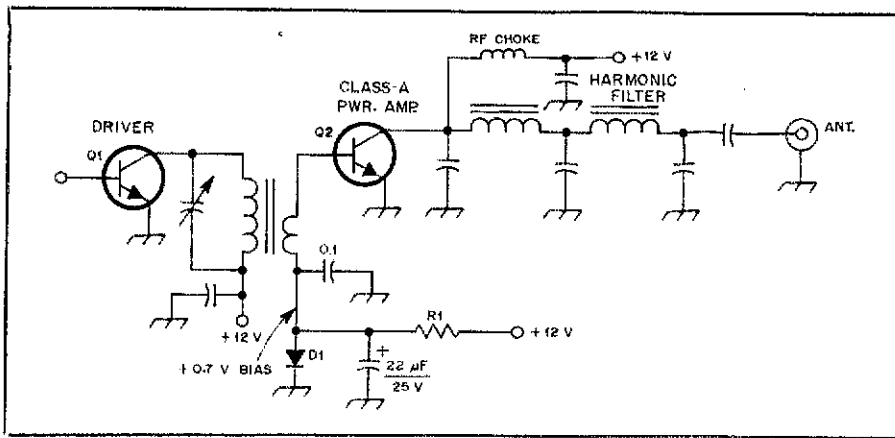


Fig. 8 — The barrier voltage of a silicon diode can be used to establish a +0.7-V bias for linear operation of an RF power transistor.

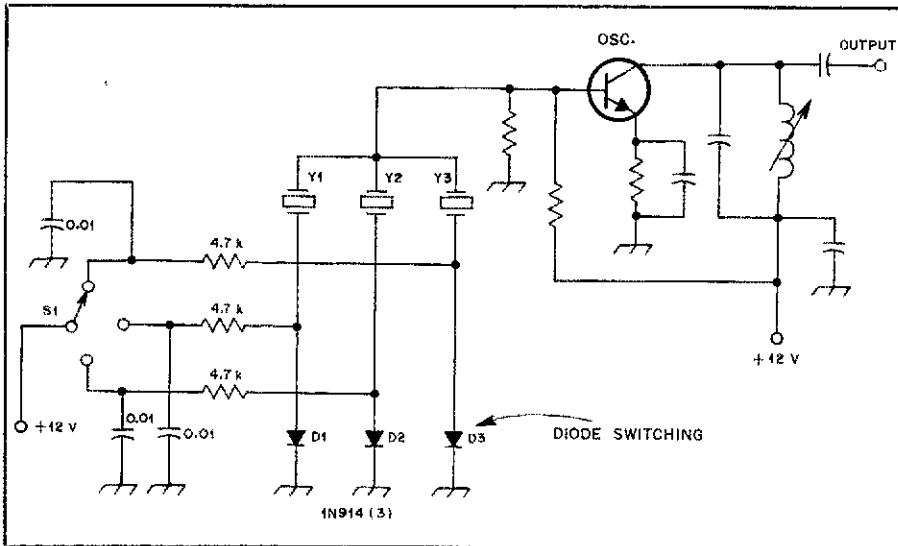


Fig. 9 — Diodes (D1, D2 and D3) are used here as switches to select one of three crystals.

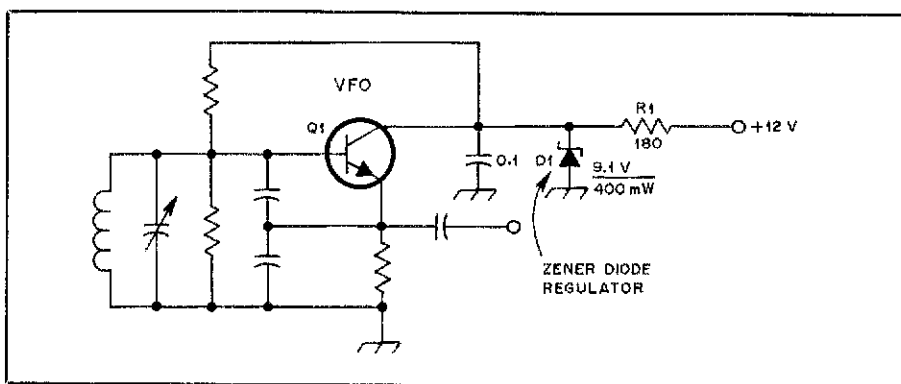


Fig. 10 — Zener diodes serve as regulators when connected as shown. They are available in a host of voltages and power ratings.

various tuned circuits and filters in radio equipment.

Still More Applications

Applications for diodes are limited only

by your imagination. We are barely touching the surface in this article, but let's examine a few more common uses for diodes. A special type of diode is shown in Fig. 10. D1 is known as a Zener diode, and

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you can observe that the symbol has two little hooks on the cathode end. Only a Zener diode has this symbol. We see D1 serving as a voltage regulator for a VFO. R1 is a current-limiting resistor that prevents D1 from passing too much current through its junction. The formula for selecting the correct R1 value is given in the *Handbook*. In this circuit, D1 maintains the Q1 operating voltage at 9.1, despite variations in the 12-V supply line. Severe voltage changes would cause the VFO to change frequency unexpectedly, so we have used a Zener diode to stabilize the dc voltage at Q1. Zener diodes are available in various operating voltages and power ratings.

In Fig. 11 we see a pair of low-power, high-speed diodes employed in a frequency doubler. You will notice a similarity between the hookup for T1, D1 and D2 and the circuit of Fig. 3A. A doubling action takes place also in the full-wave rectifier of a power supply. That is why the frequency changes from 60 to 120 Hz in a power supply.

Another style of diode is called a varactor (variable reactor). This diode is illustrated in Fig. 12. It can be used as a frequency doubler, tripler and quadrupler, or to generate higher-order harmonics of the driving signal. Here we depict it as a tripler. The second harmonic is removed by what is called an "idler tank," consisting of C1 and L1. Varactor diodes are quite efficient. For example, if we fed 25 W of 144-MHz energy into J1, we could obtain as much as 17.5 W of output at 432 MHz (J2). No dc operating voltage is needed.

A varactor type of diode can be used as a tuning diode. Fig. 13 contains two examples of how this is done. A single tuning diode is shown at A of Fig. 13. As the positive voltage applied to the cathode of D1 is changed by means of R1, the internal capacitance of the diode changes, thereby tuning L1 to resonance at various frequencies. Many modern TV sets use tuning diodes in the front-end section to avoid the use of a mechanical channel

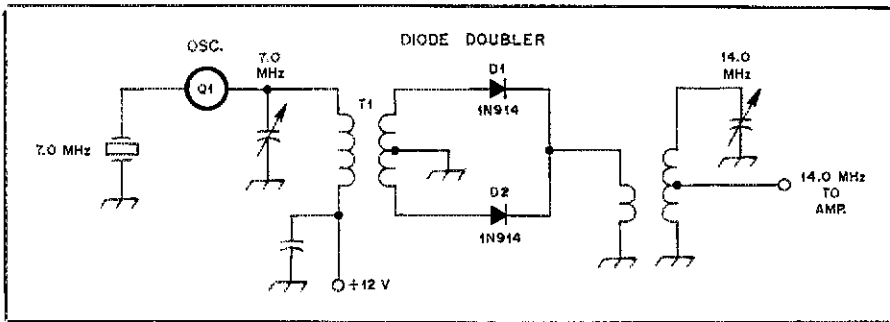


Fig. 11 — A push-push type of frequency doubler is shown here. D1 and D2 provide output at the second harmonic of the driving signal.

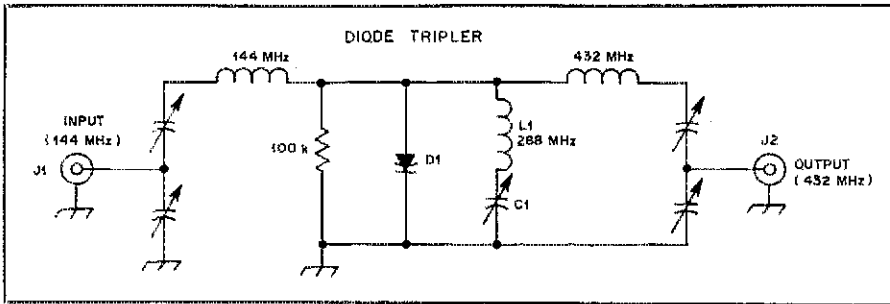


Fig. 12 — A power frequency multiplier can be made from a varactor diode. This circuit is typical of that used for tripling from VHF to UHF.

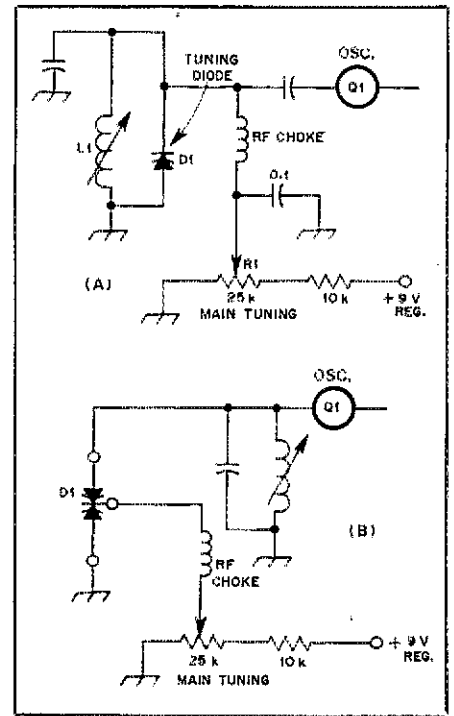


Fig. 13 — Tuning diodes can be used in place of large variable capacitors (mechanical). A single-ended tuning diode is illustrated at A, while the preferred type is shown at B (D1) in a double-ended diode format. The internal capacitance of the diode changes as the applied operating voltage is raised or lowered by means of A1.

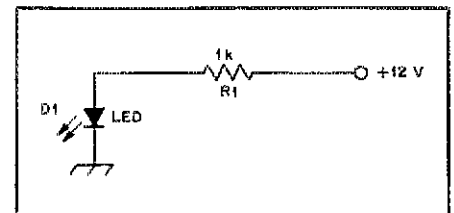


Fig. 14 — Example of an LED with operating voltage applied.

Glossary

- barrier voltage — the threshold voltage required across a diode junction to make it conduct or turn on. For germanium diodes it is roughly 0.4 V, while for silicon diodes it is 0.7 V.
- full-wave rectifier — a rectifier in which the negative half of the sine-wave cycle is inverted so that the output contains two half-sine pulses for each input cycle.
- half-wave rectifier — a rectifying circuit that passes only one half of the incoming sine wave, and does not pass the opposite half cycle. The output contains a single half-sine pulse for each input cycle.
- LED — light-emitting diode. It illuminates when operating voltage is applied: positive to the anode, negative to the cathode.
- linear amplifier — an amplifier for which the output waveform is a faithful reproduction of the input waveform, or the output quantity is essentially proportionate to the input quantity.
- photovoltaic — a principle in which a photoconductive or photoemissive action takes place. Transparent conducting films are separated by semiconductor material to form a photovoltaic cell (solar cell). Electromagnetic radiation upon one of the films will create a potential difference between the films.
- rectifier — a device that converts alternating current (ac) to direct current (dc). It has the characteristic of conducting current substantially in one direction only.
- varactor diode — a diode for which the internal capacitance is voltage-dependent. Used for frequency multiplication and electrical tuning of LC circuits.
- Zener diode — a special diode used for voltage regulation. A diode that exhibits, in the avalanche-breakdown region, a large change in reverse current over a very narrow range of reverse voltage.

switch in the critical RF circuits.

A double tuning diode is shown in Fig. 13B. It is the preferred type of varactor in terms of linearity of the tuned circuit. One such diode is the Motorola MV104. Various capacitance ranges are available for tuning diodes. This means that we must choose the proper diode for the desired tuning range.

We must not neglect to mention a very familiar modern-day diode — the LED. LED means "light-emitting diode." They are available in many colors. When the LED is given enough current to make it

conduct, it illuminates. A circuit for 12-V use is illustrated in Fig. 14. R1 is a current-limiting resistor that prevents burnout of D1. LEDs have a cathode and anode, just as do the other diodes. For this reason they will not light if the wrong polarity of voltage is applied. The electrical symbol for an LED always has two arrows pointing away from the cathode, as shown in Fig. 14.

Summary

An entire volume could be written about each of the diodes we have examined in this

article. Our objective has been to familiarize you with some of the more common uses for diodes. The list of practical applications in amateur circuits goes on and on; as you continue to gather knowledge, you will become familiar with all manner of uses for diodes. I dare say you will think of some applications that have escaped me! Once again I want to urge you to pick up your *ARRL Handbook*, and study the chapter on semiconductors and power supplies. The real nitty-gritty of how diodes function and how you may use them is contained in those chapters. It will be helpful for you to wire up some simple experimental circuits that use diodes. Observing the action of diodes will help you to better understand them.

Heath SA-2500 Antenna Tuner

What is it that contains transistors, diodes, SCRs, resistors, inductors, motors, switches, a power transformer, optical interruptors, variable and fixed capacitors, and a pair of meters? If you said "a transceiver," you're wrong. If you said "a Heath SA-2500 antenna-matching network," you've cheated and looked at the picture and title of this review! Yes, the SA-2500 contains all of that, and more.

Description

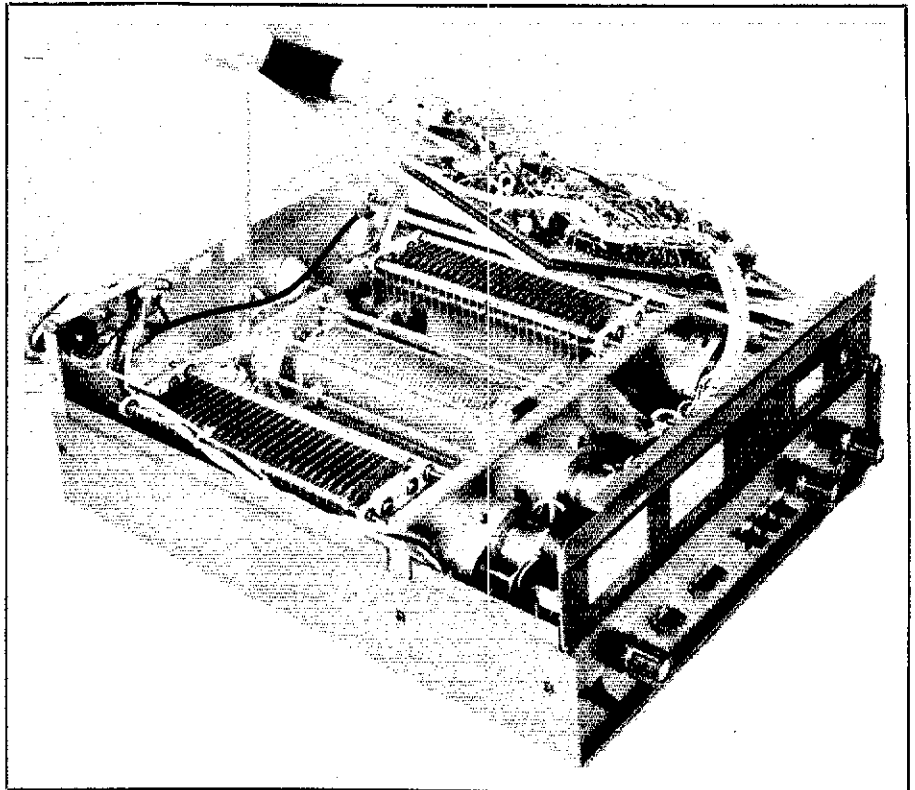
The SA-2500 is the newest of Heath's antenna-matching networks. At the heart of the unit is the T-network/balun arrangement Heath has used in the SA-2060 and SA-2060A. The information contained in the SA-2060 review (Product Review, July 1982, *QST*, pp. 40-41) pertaining to the matching-network and the antenna-switching arrangement may be applied to the SA-2500 as well. Outside of the matching-network and antenna-switching circuits, the rest of the '2500 is different: This unit uses motorized control of the two variable capacitors and inductor (there are no knobs to turn at the ends of the variable-capacitor or inductor shafts) and an auto-ranging power-metering circuit is featured.

By means of a front-panel rotary switch, you can locally select any one of 18 preset roller-inductor positions. If your transmitter or transceiver band-change function is equipped for remote control of external devices by providing a switch closure to ground, it can remotely control the SA-2500. From a remote location, one of nine presets from one of two banks can be chosen. Panel indicators inform you when the roller inductor, transmitter or antenna capacitors are being adjusted, how many active inductor turns are being used and which power-meter ranges are currently active. There's also an audible warning (the unit has a 2-inch speaker) when the SWR exceeds an operator-selected maximum.

Front-Panel Controls

The POWER switch is at the extreme left. It switches on or off the 117-V line for the internal power supply or externally applied 12-V dc power for the matching network.

Power output, reflected power and SWR are indicated on two meters. An automatic, factory-calibrated ranging circuit switches the forward-power meter between 200- and 2000-W maximum scales while changing the reflected-power-meter ranges between 50- and 500-W scale maximums. HI and LOW indicators to the right of the FORWARD meter inform you which power range is selected by the auto-ranging wattmeter circuit. The power-range circuit changes from the 200-W to 2-kW range at the 200-W power level, but the power must drop below 200 W (typically 180-190 W) before the circuit will return to the 200-W range.



The SA-2500 with the top shield propped up to permit a peek at the tuning capacitors and roller inductor. A section of the 4:1 balun appears between the rear ends of the transmitter capacitor (foreground) and the roller inductor.

SWR between 1:1 and 3:1 is read directly from the REFLECTED meter when the SWR-REFLD switch is pushed in. When that switch is in the outer position, reflected power is indicated on the same meter. A SENSITIVITY control beneath the meters permits adjusting the reflected-power meter SET point to full scale. To do this, the SET-FWD switch and SWR-REF switch must be locked in their inner positions. With the SET-FWD switch in the outer position, the FORWARD meter provides forward-power readings.

Local manual tuning is accomplished using three up/down, spring-return, front-panel lever switches: one to control the motor of each capacitor (TRANSMITTER and ANTENNA), and one for the rotary-inductor (INDUCTOR) motor. All motors are bidirectional. Three illuminated icons are used to indicate which of the three variable components are being moved at any time. The capacitor-control circuits have a 50%-mesh default; this is their resting position and where they will be positioned under manual control unless deliberately rotated to another position.

Although there is no specific default setting for the inductor, a number of operator-selectable

preset positions may be chosen. These inductor positions are selected by the BAND switch, discussed later.

To the right of the TRANSMITTER/INDUCTOR/ANTENNA switches is the TUNE SWR control. This potentiometer is used to preset an acceptable operator-selected SWR maximum (between 1.5 and 3) for the antenna in use. Two other switches are used in conjunction with the TUNE SWR control. When pushed in, the AUDIO ALARM switch enables a circuit to provide a 1- to 2-second aural indication that the SWR seen by the matching network exceeds the setting of the TUNE SWR control and that the automatic-tuning circuits cannot obtain a match within 20 seconds. Simultaneously, a visual alarm indication is presented by the illumination of another icon. The AUTO switch enables automatic antenna-matching network action when pushed in. Manual control is selected with that switch in the outer position.

The LINEAR switch comes into play if you intend to use a power amplifier in the lineup and wish to use the AUTO mode. Basically, it's used to bypass the amplifier while the antenna-

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matching network is tuning for minimum SWR.

The 10-position (160-10 meters and REMOTE) BAND switch and concentrically mounted LOW/HIGH lever switch provide for selection of as many as 18 different preset roller-inductor positions. You may, however, elect to use all 18 presets on a single band. Using the presets shortens the amount of tune-up time required. (It takes approximately 1 minute 20 seconds for the roller to travel from one end of the inductor to the other.) The preset inductor positions are chosen by you during the adjustment phase of construction, and may be reconfigured at any time. In the REMOTE position, you may select nine of the 18 presets, the HIGH/LOW switch determining which of the two sets of nine presets is chosen.

The COAX switch at the upper-right of the front panel is used to select routing of RF power output to one of three coaxial output connectors or a feedthrough insulator used for single-wire-fed antenna connection. One of the three coaxial-connector positions bypasses the matching network. This position may be used for selection of a resonant antenna or a dummy load.

Rear-Panel Connections

COAX 1, COAX 2 and BYPASS are the connectors just mentioned. They, and the INPUT RF connector, are mounted on the shielded box that houses the RF output switch and the SWR/power-meter sensor. Beneath the box is a large feedthrough insulator used for single-wire-fed antennas. If you've included the balun option, there'll be two more feedthrough insulators alongside the single-wire antenna connection. These points are used to connect the matching network to balanced feed lines. (If you haven't installed the balun option, the panel holes are filled with large metal plugs during assembly.) Next to the balanced-feed-line connectors is the GROUND post.

A 9-pin Molex connector provides for remote BAND switch connections. When the BAND switch is in the REMOTE position, grounding the appropriate socket pin selects one of the previously discussed inductor presets. If your transceiver has the proper provisions, you can have it control the matching network.

You may power the matching network with an external 12-V dc power supply capable of providing 1 A. A 2-pin connector is mounted on the rear panel for that purpose. Next to it is another 2-pin connector labeled ANT RELAY. The exciter amplifier-control relay is wired in series with this connector. It is through this jack that the matching-network LINEAR switch and internal relay operate. Finally, there's a fuse holder and a strain relief that allows passage of the ac line cord.

Construction

The Manuals

I can only imagine the work involved in producing instruction manuals for kit assembly; it must be a formidable task! This kit is supported by a pair of manuals and a large, easy-to-read schematic diagram. The main assembly/instruction manual is 143 pages long and contains everything you need to know about the SA-2500. The large (16 × 10½ in) pictorial manual provides you with detailed views of all assembly stages. There are also a few large sheets bearing detailed identification of strip-packaged components. Before beginning assembly of the kit, I had to make some changes and additions to the assembly/instruction manual and the accompanying pictorial manual. I later found a couple

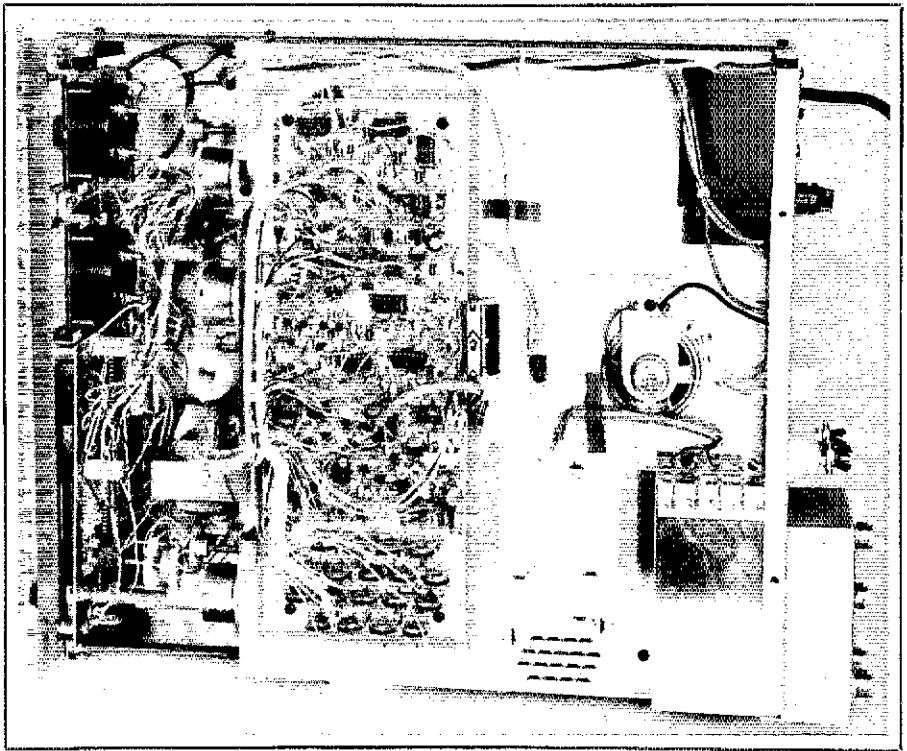


Fig. 1 — The Heath SA-2500 with the top cover removed. At the lower left, the display board may be seen mounted immediately behind the front panel. In between the front-panel-mounted components and the main circuit board, from bottom to top, are the antenna-capacitor drive motor and slotted photo-interrupter disc, the power transformer, the gear drive for the turns-counter potentiometer, the inductor drive motor and, finally, the transmitter capacitor drive motor and slotted photo-interrupter disc. At the bottom of the main circuit board are the inductor preset controls; to the right of them is a chart indicating the function of the trimmer potentiometers on the main circuit board. The Molex connector between the main circuit board and the shield box near the rear panel is the modification I made to permit easy access to the foil side of the main circuit board. A voltage regulator is chassis-mounted above the Molex connector between the circuit board and the speaker; I penned "UP" on the small connector to avoid improper attachment to the regulator. A fiber shield in the upper-right corner of the chassis covers the fuse holder/ac-line connections.

of schematic-diagram errors and notified Heath of them; these will be discussed later.

Getting It Together

This kit required approximately 27½ hours to assemble. "Stuffing" the circuit boards alone took me almost 12½ hours. Two circuit boards are included in the kit. A 7- × 3¼-in DISPLAY board contains a microcontroller, a four-digit gas display tube, several other ICs and supporting components. The MAIN board measures 12 × 4¼ in. This board contains a large number of components, and despite all precautions, it's easy to make a mistake — I speak from experience!

During construction, you may select a blue- or amber-colored digital readout for the inductor turns counter. I opted for the amber readout; it's simply a matter of installing an amber-colored filter on the backside of the front panel. Once the digital display was illuminated, however, I discovered the "amber" color is closer to green.

Assembly proceeded smoothly. In some instances, such as with the variable-capacitor ceramic end insulators and plate spacers, Heath supplied an extra piece for good measure. Only one part was missing: a cork washer for one of the large feedthrough insulators supplied by an outside vendor. Heath quickly sent not only the washer, but a new insulator package.

An adhesive-backed decorative label is used to cover the upper part of the front panel. This

strip has plastic windows for the meters, a turns counter and inductor/capacitor action indicators. Before removing the paper from the adhesive backing, make sure the windows are clean. Otherwise, you may find too late that you've left fingerprints or dust on the inside of the windows.

If you have (or think you will have) need for balanced-line feed, I'd recommend you purchase the SA-2500-1 balun accessory with the SA-2500. It's a bit easier to install the balun as part of the initial construction process. Otherwise, you'll have to partially disassemble the '2500 to add the balun.

Adjustment and testing consumed approximately five hours — primarily because I ran into a bit of difficulty when it came to setting the inductor presets and the turns counter. Surely a design problem; I'd checked everything! But no, the problem was traced to a mix-up in installing R451 and R453. The first is a 4.3-kΩ resistor, the second a 432-Ω resistor. The first three color-coded bands are the same (yellow, orange, red), but the smaller resistor also has a black band immediately after the red one. How I managed to mix them up I don't know. Heath has done everything they can to help builders avoid that sort of error: The parts are cut one at a time from a strip during assembly, the installation steps are separated by the installation of two other resistors and the parts' locations are charted. In any case, this mix-up created two voltage-divider

problems which, in turn, made it impossible to correctly set the inductor presets.

Once the voltage-divider problem was cured, I had to redo the turns counter adjustment. Because of the tolerance of the potentiometers used in the turns-counter circuit, I found it difficult to get precise 00.0 and 40.0 turns indications on the digital readout, and had to perform the adjustment procedure several times. After the turns counter was set, the inductor preset adjustments fell into place.

But, alas, another builder-produced problem raised its head when it came to the automatic SWR circuit adjustment procedure. That problem was traced to an unsoldered resistor connection. That fixed, the '2500 was up and running.

The only adjustment area that may cause some builders concern is the automatic power-ranging circuit. This is because the recommended range change-over point is 200 W. Since most transceivers produce an output of only 100 W or so, you'll have to insert an amplifier in the line to bring the power level up to 200 W. You can set the change-over point at anything less than 200 W, however. Essentially, all you'll lose by doing so is a bit of resolution during power-output measurement, and that shouldn't present any real problems.

Performance

A comparison of the manufacturer's specifications and measurements made in the ARRL lab is shown in the accompanying table. Although my antenna requirements are modest (a tribander and a 40-meter dipole), I put the network through its paces matching those antennas on a multitude of frequencies for which they were not designed. (I don't recommend the practice of doing this with a tribander and lots of power — it could damage the traps.)

It didn't take me long to get accustomed to using the SA-2500. The preset inductor selections eliminate the need to rotate one of the controls, and the automatically controlled capacitors find their marks rapidly. If the BAND switch is placed in the REMOTE position, you must have a ground connection applied to one of the pins of the appropriate Molex connector. If you don't, the roller-inductor motor will be energized and will continue to attempt to turn the inductor — even when it reaches the rearmost position.

Because the preset inductor positions must be used to position the inductor when it's in the automatic mode, the nomenclature "automatic" may be inexact. As the SA-2500 is configured, it cannot automatically use the total roller inductor range during its attempts to match the transmitter to an unknown load. In this sense, "semi-automatic" seems more appropriate. Remember, you should use minimum power during the antenna-matching procedure. This will avoid possible component damage and lessen QRM.

Comments

I did find a couple of errors on the schematic diagram. Pins 3 and 4 of the optical interrupters are reversed. The instructions for connecting pins 1 and 4 of these devices (on page 71) are correct. Also, the indicated wire colors leading to the INDUCTOR POSITION control (R6) are mislabeled. Wire colors for lugs 1, 2 and 3 should be shown as WHT-ORG, WHT-YEL and WHT-GRN, respectively.

When manually controlling the '2500, you may find situations where you have to have a quick finger on the switches. This would occur, for instance, if you want to bring the SWR-meter

Heath SA2500 Auto-Tune Antenna Tuner

Manufacturer's Specifications

Frequency range: 1.8-30 MHz.

Input power-handling

capability: SSB, 2 kW (peak);

CW, 1 kW.

Wattmeter accuracy (full scale):

200/2 kW FWD, 500 W REFLD, $\pm 5\%$ (avg.)

50 W REFLD, $\pm 7.5\%$ (avg.)

Insertion SWR: Less than 1.1:1.

Automatic tuning requirements:

Cycle time, approx. 15 sec;

input power level to obtain

SWR SET, 35 W.

Power requirements: 120-V ac,

250 mA (Internal supply);

12-V dc, 1 A maximum (external supply).

Dimensions: 6 $\frac{3}{4}$ × 14 $\frac{1}{2}$ × 20 in (171 × 368 × 508 mm) HWD.

Weight: 19 lb (8.6 kg).

Measured in ARRL Lab

As specified.

As specified.

As specified.

As specified.

0.05 dB.

As specified.

needle as close to zero as possible; you may pass through the minimum SWR point a couple of times before you're satisfied. Also, when you're nearing the ends of the roller inductor, you'll want to be sure not to overshoot the end turn and disengage the roller. With a bit of practice, using up/down switches instead of cranking knobs becomes second nature.

Heath cautions that the inductor roller should not be run past the end of the wire turns at either end. This is good advice, as the motor does not have enough torque to bring the roller back onto the wire turn. Therefore, you'll have to manually reposition the roller should you fail to heed the warning. This detracking problem has been around since the advent of the SA-2040, and it's unfortunate that nothing has been done to prevent this from happening. I attempted to solve the problem by placing large solder blobs at both ends of the inductor turns. So far, this modification has proven effective. If you should decide to do something similar (remember your warranty!), be careful not to get solder between the inductor turns, and do not make the blob too large — it may interfere with the inductor support bars or the shoulder of the roller and prevent the roller from advancing.

During my main-circuit-board troubleshooting experience, I found it difficult to get to the bottom side of the board without unsoldering the five leads connected between the board and the SWR/wattmeter circuit. To make access a bit easier, I cut the connecting cable in half and installed a 6-pin (one pin unused) Molex connector. (These are available at Radio Shack; part numbers 274-226 and 274-236.) Then all I had to do was unplug the connector, leaving the soldered connections undisturbed, and I had free access to the bottom of the board.

Shortly after the SA-2500 was placed in operation, the antenna-capacitor indicator lamp failed. Though I searched three parts catalogs for a listing of the no. 2174 lamp and its current requirements, I could not find one. Some replacement bulbs were requested from Heath and arrived promptly. I was informed by Heath that the lamps each draw 40 mA! That surprised me. The 12-V, 25-mA bulb available from Radio Shack (272-1141) might be a suitable replacement.

There are some transceivers that feature built-in automatic antenna-matching networks, but these are limited to a maximum power-handling capability of 100 to 200 W. If you're going to

be running much more power than that, want a heavy-duty matching network and are looking for automatic (or semiautomatic) control, you should consider the SA-2500. It's available from the Heath Company, Benton Harbor, MI 49022, tel. 800-253-0570. Price class: SA-2500, \$600; SA-2500-1 balun accessory, \$40. — Paul K. Pagel, N1FB

KLM ELECTRONICS, INC. 2M-16LBX 2-METER BEAM

□ As interest in VHF operation grows, so does interest in high-performance VHF antennas and equipment. KLM is no stranger to the VHF crowd. This California-based company has been known for high-performance antennas for the past decade. Over the years, KLM antennas have grown in length and changed in design; these improvements are reflected in the 16LBX.

This antenna is based on design and development work done by DL6WU, whose high-performance beams are widely known in Europe. Amateurs on this side of the Atlantic have recently become familiar with his work, and KLM is the first U.S. manufacturer to bring these high-gain, low-side-lobe designs to the marketplace.

The 2M-16LBX arrived at ARRL Hq. in a surprisingly small package. The elements were securely bundled together, and the hardware was packaged in separate bags, so it didn't take long to determine that everything was present and accounted for. KLM included an itemized packing slip that was checked off as the box was packed at the factory, further ensuring a complete antenna. Nothing is more frustrating to a builder anxious to get a new antenna into the air than missing parts.

Hardware

KLM provided first-class hardware with this antenna. The nuts, bolts and lockwashers are all stainless steel. All holes were deburred, and the general machine work was above average for a commercially manufactured antenna.

The 2M16LBX features a tapered 28-ft boom.¹ The tapering is said to reduce wind loading while

¹m = ft × 0.3048; mm = in × 25.4.

providing adequate strength. The center of the boom is made from two 5-ft lengths of 1½-in-OD aluminum tubing spliced with a 2-ft section of 1-3/8-in-OD tubing. One end of each 1½-in section is swaged to accept a 5-ft section of 1¼-in OD tubing. The 1¼-in sections are in turn swaged to accept 5-ft sections of 1-in-OD tubing.

A 3/16-in-thick aluminum plate comprises the boom-to-mast bracket. Plated steel U-bolts and saddles (with stainless-steel nuts) secure the plate to boom and mast. The mast U-bolts provided fit pipes ranging from 1½ to 2 in OD. A truss made from nonconductive guy cable supports the boom. This truss attaches to the mast approximately 1 foot above the boom and is necessary to prevent boom sag. Turnbuckles allow proper tensioning of the boom support cables.

All parasitic elements are made from 3/16-in aluminum rod. These elements are mounted through the boom and are insulated from it by plastic shoulder washers — a big improvement over previous KLM element-mounting schemes. Pushnuts secure the elements once they are in place.

The 16LBX employs a log-cell driven element to achieve a low SWR across the band. The two driven elements are interconnected by aluminum straps. These elements, made from 3/8-in aluminum tubing, mount on top of the boom and are insulated from it by molded plastic blocks. The feed-point impedance is 200 ohms, so KLM includes a 4:1 balun made from RG-303 coaxial cable. This cable features silver-plated conductors and Teflon dielectric, so it weathers well.

Assembly

It took me about three hours to assemble the 2M16LBX. The instruction manual is clear, and there are sufficient illustrations to guide the builder. The boom is assembled first. Although the tubing did not fit together snugly, the boom was sturdy once all the hardware was tightened. I was pleased to see that all of the holes were drilled properly, so the screws went in easily.

The parasitic elements taper continuously — that is, the reflector is the longest element, and the elements get progressively shorter; the last director is the shortest element. This feature made it simple to determine which element went where. It eliminated the tedious and accurate measurements usually associated with VHF antennas. The insulators fit snugly, so the elements feel secure.

The only departure I made from the manual was the way I centered the elements in the boom. KLM supplies a chart showing the center point for each element. Rather than try to measure from element tip to the center of the boom, I measured the length of element protruding from each side of the boom and adjusted the element until the length was equal on each side. I was able to center each element perfectly with minimum work.

After completing the element and boom assembly, I put some RTV silicone sealant over each nut to keep the hardware in place. The coaxial feed line connects to solder lugs, so it is especially important to do a good weatherproofing job to keep water out.

Installing the 2M16LBX was easy. Although the antenna is long, the short elements make it easy to guide around guy wires. The boom is quite flexible without the truss, so I had to be careful not to place excessive stress on it. I installed the review antenna above a 20-meter Yagi at 110 feet and fed it with 130 feet of hardline.

On-the-air testing indicates that KLM has a

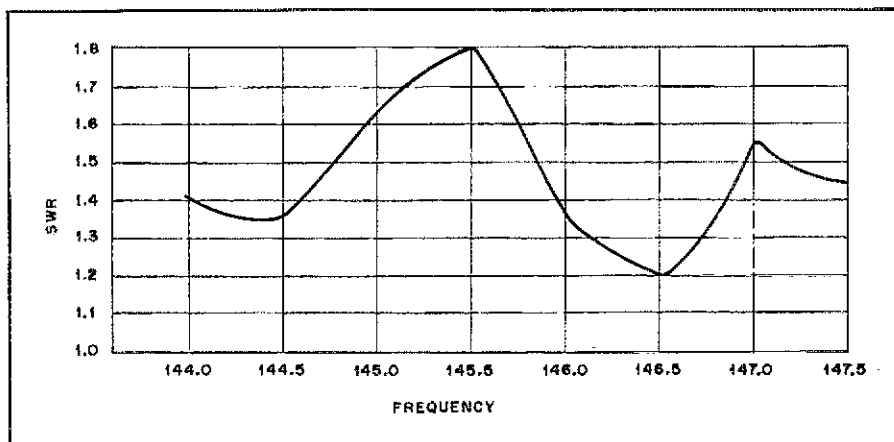


Fig. 3 — SWR curve of the KLM 2M16LBX 2-meter beam.

KLM 2M16LBX 2-Meter Beam

Manufacturer's Claimed Specifications

Frequency of operation: 143-148 MHz.
 Longest element: 40.625 in.
 Boom length: 28 ft 1 in.
 Weight: 10 lb.
 Turning radius: 185 in.
 Wind load: 1.75 sq. ft (horizontally polarized);
 2.44 sq. ft (vertically polarized).
 SWR: Not specified.

ARRL Evaluation

As specified.
 As specified.
 As specified.
 As specified.
 As specified.
 Not measured.
 See Fig. 3.

real winner here. During the review period, I worked many stations in the first, second, third and fourth call areas, as well as in VE1, VE2 and VE3. The pattern is clean, so I have little trouble hearing weaker stations even with several "big gun" 2-meter

stations within my line of sight.

If you're after a high-performance 2-meter antenna, this one's worth a close look. Price class: \$120. Manufacturer: KLM Electronics, Inc., P.O. Box 816, Morgan Hill, CA 95037. — Mark Wilson, AA2Z

Strays

QST congratulates...

the following radio amateurs on 50 years as a member of ARRL:

- Kermit R. McCardle, W4BTA, of Louisville, Kentucky
- John V. Ellison, W0ERZ, of Kirkwood, Missouri
- Albert C. Gifford, K4DUZ, of Bradenton, Florida

RTTY ART CONTEST

Are you a RTTY operator with a creative streak? The Wireless Institute of Australia is sponsoring the International RTTY Art Competition as part of its 75th anniversary celebration. Entries must not contain more than three underlinings, and must be submitted with a hard-copy printout and Baudot tape. The three categories are best hand-generated original RTTY picture by a non-VK; best hand-generated original by a VK; and best hand-generated or computer-generated nonoriginal. Entries, which must be received no later than August 31, 1985, should be sent to WIA 75 RTTY Art

Competition, Wireless Institute of Australia, 412 Brunswick St., Fitzroy, Victoria 3065, Australia.

ROANOKE PLANNING SESSION MAY 11-12

This year's Roanoke Division League Planning Session, sponsored by the Raleigh and Cary North Carolina Radio Clubs, will be held May 11-12 at the Ramada Inn South, U.S. Hwy. 1, Apex, North Carolina. Among the topics to be discussed are ARRL Section-level activities, technical and legal matters, and the Volunteer Examiner Program. All ARRL members are invited, and clubs are urged to send a representative. Preregistration information is available from LPM-85, Sherman Starnes, W4TZU, Rte. 1, Box 99, Franklinton, NC 27525.

I would like to get in touch with...

any amateurs capable of working space communications who are interested in assisting with a research project. Independent Space Research Group, P.O. Box 1246, Troy, NY 12180.

Hints and Kinks

Conducted By Larry D. Wolfgang,* WA3VIL

CHECKING THE OUTPUT FROM YOUR 2-METER HAND-HELD RIG

□ How many times have you wondered if your 2-meter hand-held rig is putting out full power or if the batteries are getting low, greatly reducing the power output? This "power checker" is a simple device that will let you check that rig in just seconds. It is neither difficult nor costly to construct. In fact, most of the parts to build the unit shown in Fig. 1 were in my "treasure chest." Construction time was only a few hours.

This unit consists of a simple load resistor and an output indicator. The load resistor is designed to present as near a 50-ohm load as practical, and the output meter shows the voltage across this resistor. It is not a precision device, so if you demand perfect test equipment, forget this project. On the other hand, if you would like a device that can give a relative output reading for comparison, this piece of gear can tell you if your rig is working. Check your rig and note the output at high- and low-power levels; a later check will show if the rig is still producing the same output power. The effects of any adjustments or the battery condition can also be checked quickly.

I wanted a unit to work with my Kenwood TR-2500 transceiver, which has a maximum output power of 2.5 W into a 50-ohm load. You could adapt the same idea to other power levels, or build your checker on a different type of connector.

To obtain a 50-ohm load using easily available film resistors, I chose to wire three 270-ohm resistors and three 330-ohm resistors in parallel. Carbon-composition resistors should also work fine. By using 1/2-W resistors, the combination should be able to handle 3 W, at least for brief periods. The calculated resistance of my combination is 49.5 ohms — close enough to 50 ohms for my needs. Careful hand selection of the components allows you to come close to the prescribed value.

Other resistor values can be used to obtain different power ratings. Calculate a combination that will get you as close to 50 ohms as possible. For example, you could use ten 510-ohm resistors in parallel to produce a 51-ohm dummy load at 5-W dissipation. I have had good luck using small carbon-composition or film resistors in applications like this. By soldering the resistors directly to the connector, I have obtained low SWR readings up through the VHF range. Larger-wattage resistors and other construction techniques may not be as good.

The 49.5-ohm calculated value for the load resistor is only the apparent load. It does not take into account the capacitance or inductance of the components. Those factors must be considered if you want to know the exact load impedance. But for the average ham, the six 1/2-W resistors will be fine.

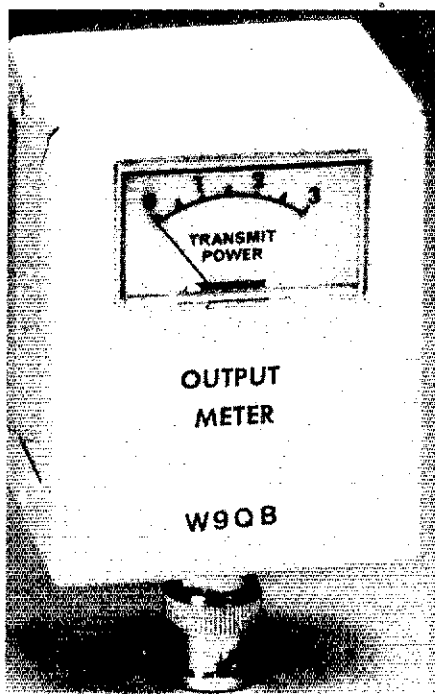


Fig. 1 — Photo showing the small power checker built by Harry Neben to measure the output from his 2-meter hand-held transceiver.

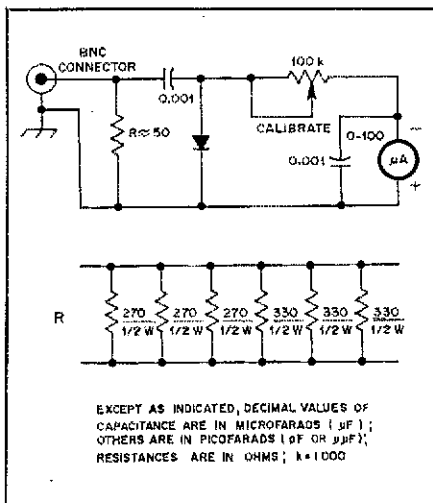


Fig. 2 — Schematic diagram of a small dummy load and power-measuring device useful to 2 meters and higher.

How do we measure the output from the radio? I used a simple RF-probe circuit, consisting of a good high-frequency diode, a 100- μ A meter movement and a couple of other components. The circuit, shown in Fig. 2, can be

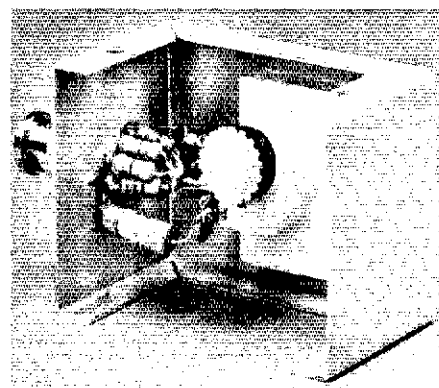


Fig. 3 — Photo showing the internal construction of W9QB's power checker.

found in numerous handbooks, and is nothing new.

I used a 1N34A diode, known for good HF characteristics, but other diodes would probably work as well. The coupling capacitor in my circuit is a 0.001- μ F mica disc type, but almost any disc capacitor close to this value will do. A 100- Ω potentiometer provides a sensitivity adjustment that can be used to calibrate the meter. I bought the meter at a hamfest for \$1, but almost any sensitive meter can be used.

The original meter scale was unusable, but by carefully taking the meter apart and removing the existing scale, I was able to make a new one. Since I wanted my meter to read 3 W full scale, I simply marked the new scale 0, 1, 2 and 3. Later I realized that since my unit measures voltage, which is proportional to the square root of the power, I should have used a logarithmic scale, with the lower-power readings compressed at the bottom of the scale. The 3-W reading is accurate, but lower readings are used just for comparison. When you mark a new scale, you should take this into account, and try to use a few more calibration points if possible. Of course, you do not have to mark a new scale if you simply want to compare readings with ones you have logged previously.

Construction is simple. Radio Shack has small aluminum chassis boxes for a very low price. Radiokit and other suppliers also carry a line of project cases, or you can make one yourself. A male BNC connector must be mounted on one end of the box. Drill a hole just large enough to pass the body of the connector nut. Then drill a series of small holes into the body of the nut. These will be used to hold the resistor leads. I drilled six holes because I was using six resistors to make up the dummy load. Be careful, and use a drill bit just large enough to accommodate the resistor leads.

After mounting the BNC connector to the project case, solder a piece of the inner conductor and insulation from some RG-58/U cable to the conductor center pin. Slip a piece of the outer insulation from the coaxial cable over the center

*Assistant Technical Editor

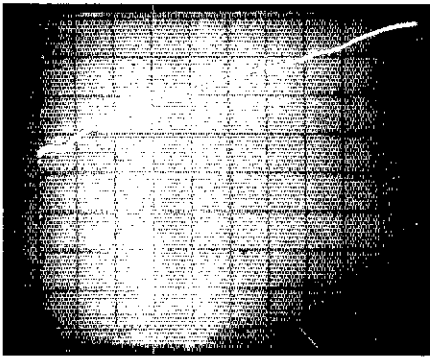


Fig. 4 — Spectrum analyzer display of the swept return loss measurement of the load presented by W9QB's power checker. The horizontal scale is 50 MHz/division, with a center frequency of 250 MHz, and the vertical scale is 10 dB/division. The SWR is less than 2:1 up to about 350 MHz and is less than 1.2 across the 2-meter band.

conductor. You now have a piece of cable with no braid. Press the BNC center pin into the connector as far as it will go. Trim both layers of insulation from the wire at a point below the connector nut that is about the length of your load resistors.

Install each resistor between a hole in the BNC nut and the center conductor. Keep all leads as short as possible to minimize any stray inductance or capacitance. After all six resistors are mounted, solder the leads to the BNC nut and then the center conductor. Next, solder the coupling capacitor to the center conductor, and then solder the diode anode and calibration-potentiometer lead to the other capacitor lead. Solder the diode cathode to a "grounded" resistor lead and add the meter leads. Place a 0.001- μ F capacitor across the meter terminals to bypass any stray RF, and the construction is complete. Fig. 3 shows how I wired my unit.

To calibrate the meter, I compared the reading to the power reading shown on my Swan WM-6200. First I measured the output from my TR-2500 with the Swan meter, then I adjusted the calibration potentiometer on the power checker to give the same reading (2.6 W, in my case). As I mentioned earlier, you should check several different power levels when marking the new scale, if possible. This will help describe the logarithmic markings required for accurate power readings.

Even if you don't have an accurate method

for making a scale and calibrating your meter, this power checker can still be a handy tool. There is nothing wrong with simply adjusting the calibration potentiometer for a convenient reading on the existing scale and using that for reference. Then, when the output does not come up to the predetermined mark, you know it is time to check the batteries or look for a more serious problem with your rig. By using a connector that mates directly with the one on your transceiver, you eliminate any question about having a bad piece of coaxial cable when making your test. — *Harry Neben, W9QB, Dunedin, Florida*

Editor's Note: Fig. 4 shows a photo of the "swept return loss" measurement made on the author's power checker in the ARRL lab. The spectrum-analyzer tracking generator is used to sweep a wide range of frequencies. A directional coupler samples the power reflected from the device under test, and the analyzer display shows this reflected power. If the displayed trace is more than 10 dB below the top of the graph, then the SWR is less than 2:1.

MULTIPLE OUTPUT VOLTAGES FROM FIXED-VOLTAGE REGULATORS

I have found a good application for surplus 5-V IC regulators — use them as 9- or 12-V regulators. This is not as absurd as it may sound! Many precision units with temperature compensation and automatic current limiting are available. Any three-terminal regulator can be adapted to operate at a higher output voltage by adding a voltage-reference device (such as a Zener diode, forward-conducting diode or even a battery) in the IC ground lead. To determine the new regulated output voltage, just add the normal regulator output voltage to the reference-device voltage. Many projects require a power source with a 9- or 12.6-V output. I developed the 1.5-A, multivoltage supply shown in Fig. 5 to meet these needs.

You must ensure that the unregulated dc from the rectifier is at least a few volts above the maximum supply output voltage. Add a heat sink to the regulator IC, and insulate it electrically from the chassis. Besides an ON/OFF indication, the LED and series resistor provide additional bias current to the Zener diodes. For larger output currents, several similar IC regulators could be connected in parallel, using a common reference voltage. The total current can be divided among the regulators by using a small-value resistor (0.05 to 0.2 ohms) on the output lead from each IC. Join the other leads of these

resistors at the power-supply output terminal. — *Terry L. Lyon, K3GCG, Edgewood, Maryland*

PLASTIC DIP COATING FOR EARCUSHION REPAIR

Have you ever found yourself with a pair of earphones that are in fine condition except for the foam or plastic-covered foam material over the earpieces? Here is a way to make them like new. I have found that a material called Plasti Dip is ideal for the job. This is a flexible, air-dry plastic coating intended primarily for coating tool handles to form a soft, insulated grip.

To repair minor holes or tears in an ear-cushion, you can use a small paintbrush to apply a light coating of Plasti Dip over the damaged area. For larger holes you can dip the earcushion right into the material. Remove the earcushions from the headphones before dipping them! The plastic coating will be dry enough to reassemble the earphones in an hour or so.

Because this material is so viscous, it can even be used to insulate wire joints. Just put a dab of Plasti Dip over the soldered connection. Plasti Dip or other similar plastic-coating products are available at many hardware or tool stores. — *Jim Knoppow, NE7B, Kent, Washington*

SAFE AND INEXPENSIVE CONTINUITY TESTER FOR IC CIRCUITS

The ohmmeter on a digital multimeter may be safely used as a continuity tester on solid-state circuits, but what about your conventional multimeter? The ohmmeter in these meters can often introduce excessive voltages or currents in sensitive components, destroying them. So how can you check for continuity in a circuit that uses ICs or other easily damaged components? Here is the method I use.

Connect a sensitive meter (I have a 50- μ A meter) in series with two opposing D-cells. A pair of cells will usually differ slightly in voltage. To choose cells, first connect a 10-ohm resistor across the voltmeter leads. Measure the voltage for several cells, and select a pair that differ by about 0.2 V. This should provide a reading of about 40 μ A with the tester leads shorted. You should be able to detect any added series resistance greater than about 50 ohms. A two-cell battery holder simplifies construction and use of the instrument. — *Ferdinand J. F. Gunther, K7FG, Moses Lake, Washington*

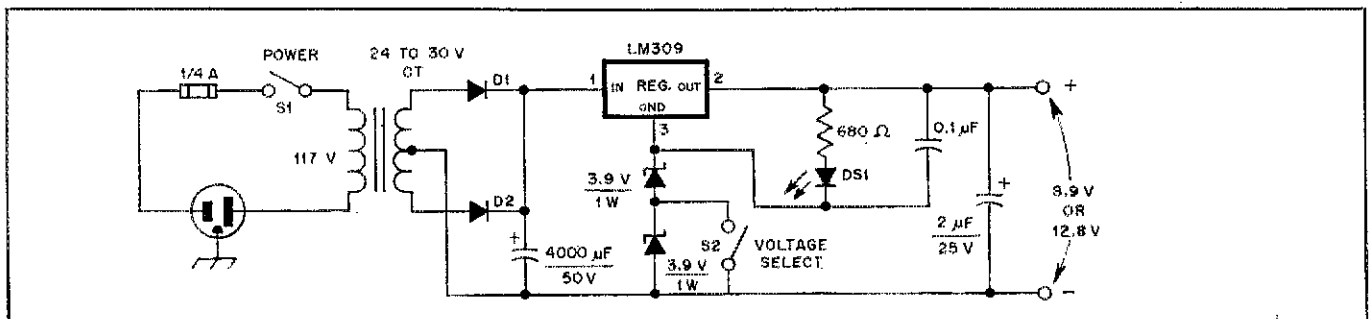


Fig. 5 — Schematic diagram showing how a surplus 5-V IC regulator can be used with a voltage reference to build a higher-voltage regulated-output supply.

D1, D2 — Silicon rectifier diodes, 1N5402 or similar.

DS1 — LED, any color.

Technical Correspondence

Conducted By
Bob Schetgen,* KU7G

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

HOW DOES A TRANSMATCH WORK?

□ In the Technical Correspondence column for October 1984, Clifford Ward, WA5LVG, tells us there is confusion concerning the use of a Transmatch. Comments from amateurs I have encountered during my lectures on this subject verify that he is correct. Unfortunately, his attempt to dispel the confusion fails because most of the remarks that follow his initial statement are simply not true. He tells us that, with a Transmatch: (1) only feed line tuning is accomplished (not true; the antenna is also tuned); (2) antenna system performance is increased only when the Transmatch is located at the antenna feed point (not true); (3) we are providing a proper load only for the transmitter and not improving the antenna system efficiency (also not true). Many amateurs avoid using a Transmatch because they misunderstand these points. Let us examine some aspects of impedance matching to understand why Ward's statements are incorrect and learn the true advantage of Transmatch use.

The same principles of transmission-line impedance matching apply, and the same wave actions and reflections occur, whether a match is achieved with a tuned stub or a network of inductors and capacitors.¹ In either case, the impedance match achieved is a *conjugate match*. Let us review the classical network theorem of the conjugate match, and its definition, as a basis for an evaluation of Mr. Ward's statements.

The Conjugate Matching Theorem²

If a group of four-terminal networks containing only reactances are arranged in tandem to connect a generator to its load, then if at any junction there is a conjugate match of impedances, there will be a conjugate match of impedances at every other junction in the system.

The term "conjugate match" identifies a condition where the impedances on opposite sides of a junction have identical resistive components, and reactive components that are equal in magnitude, but opposite in sign. For example, a conjugate match exists when a source impedance of $50 + j10$ ohms feeds a load impedance of $50 - j10$ ohms. When a conjugate match is accomplished at *any* of the junctions in a system, *all* reactances in the system are cancelled, *including any reactance in the load*. This reactance cancellation establishes *resonance in the entire system*, and the generator delivers its maximum available power to the load. Since the Conjugate Matching Theorem states that maximum power transfer occurs equally well with the matching operation performed at any junction in the system, it is clear that Ward's statements violate the Theorem, and are therefore incorrect.

I can illustrate the principles of the Theorem with an example: Imagine an ideal system in which a Transmatch and transmission line that feed an antenna are both lossless. (It is customary

to assume lossless lines and components while discussing the principles and treat the effects of attenuation and loss later.) A Z_0 mismatch exists at the feed-line/antenna junction, meaning that the line impedance, Z_0 , does not match the input impedance, $R + jX$, of the nonresonant antenna.³ The RF power source, or generator, is adjusted to deliver its maximum available power to the line impedance, Z_0 .

First, consider the case where the generator is connected directly to the line input, with no Transmatch. There are two mismatches at the antenna/feed-line junction — a Z_0 mismatch and a conjugate mismatch. The Z_0 mismatch causes a reflection loss that is transferred back along the line to the generator, presenting the same magnitude of Z_0 mismatch at the line input.^{4,5} This mismatch causes the generator to deliver less than its maximum available power by an amount equal to the reflection loss. There is no power lost to dissipation in the line — only a reduction in power delivered by the generator. See notes 4 and 5. (A point to remember: All power delivered to a lossless line is absorbed in the load regardless of mismatch.) The antenna absorbs 100% of the reduced power delivered by the generator.

Next, consider the case where a Transmatch at the antenna feed point is adjusted to obtain a conjugate match. By the Conjugate Matching Theorem, an antenna input impedance of $R + jX$ is matched by a Transmatch output impedance of $R - jX$. Thus, the initially reactive antenna is now tuned to resonance, because the $+jX$ reactance of the antenna is cancelled by the $-jX$ reactance at the output of the Transmatch. The input impedance of the Transmatch is Z_0 , which provides the line with a Z_0 match: The reflection loss is zero, thus the generator "sees" both a conjugate match and a Z_0 match at the line input and delivers the maximum available power. As before, the antenna absorbs 100% of the power delivered by the generator. Now, however, the antenna current flowing through the resonant-antenna resistance has increased to a maximum, in proportion to the square root of the power increase delivered by the generator.

What happens when the Transmatch is placed at the input of the feed line, with the feed-line output connected directly to the antenna terminals? (We'll ignore the effects of omitting a balun.)⁷ If the feed-line length is a multiple of an electrical half wavelength, the antenna impedance, $R + jX$, is repeated at the line input. The impedance looking back into the Transmatch is $R - jX$ as before, and the Transmatch needs no readjustment to provide a conjugate match. Any other line length transforms the antenna input impedance to a new value, $R' + jX'$, at the line-input terminals. Therefore, the Transmatch must be adjusted to again obtain a conjugate match. The result: Since the antenna impedance is $R + jX$, the impedance looking back into the feed-line output terminals is $R - jX$. However, where the $+jX$ antenna reactance was previously cancelled by the $-jX$ reactance at the Transmatch output, the antenna reactance is now cancelled by the $-jX$ reac-

tance at the feed-line output. Thus, the antenna is again tuned to resonance. The Transmatch output impedance is now $R' - jX'$, the conjugate of the line-input impedance. The input impedance of the Transmatch is again Z_0 , the generator delivers the same maximum available power into the Transmatch as it previously delivered into the matched line, and the Transmatch delivers this power into the line. Since the line and Transmatch have no losses (ideal case, remember?), the antenna absorbs 100% of the power delivered by the generator. Hence, the same antenna current flows as when the Transmatch was placed at the antenna feed point.

How can this be? Even though we have a conjugate match at the feed-line/antenna junction, don't we again have a Z_0 mismatch at that junction, producing the same reflection loss as without the Transmatch? True. To obtain a better understanding of how the conjugate match transfers the maximum available power from the generator to the load, despite a Z_0 mismatch in the path, we must examine the wave actions and reflections resulting from Z_0 mismatches.

Whether it be a tuned stub or a lumped-constant network, the matching device itself presents a mismatch to the line. When adjusted to achieve the conjugate match, the matching network generates a new reflected wave of opposite phase, but the same magnitude as that of the reflected wave arriving from the antenna mismatch. These two waves combine in the Transmatch and produce a resultant wave that is in phase with the voltage and current components of the generator source wave. All of the power reflected at the antenna Z_0 mismatch is added to the source power at the matching point, to be subtracted later when it again reaches the antenna (see notes 1, 5 and 6).^{8,9} The reflection of power in the Transmatch results in what is called *reflection gain*, which equals and cancels the reflection loss of the Z_0 mismatch (see notes 4,5). This addition of the reflected power to the source power results in forward-power measurements (between the Transmatch and the antenna) that may far exceed the source power level. When the reflected power is subtracted by reflection at the antenna mismatch, the remainder, absorbed by the antenna, equals the source power exactly (see notes 1, 5 and 8). It may come as a surprise, but these same wave actions and reflection-loss cancellations also occurred in the Transmatch when it was placed at the antenna terminals. Indeed, it is the multiple reflections produced by a controlled mismatch that form the basis for all impedance matching operations (see notes 1 and 9).

Now, consider the effects of attenuation and loss. In lines having attenuation, all power entering the line is absorbed in the load, except for that lost through attenuation, regardless of the mismatch or SWR. (See notes 5 and 6). Of course, the attenuation is greater when there is a mismatch, because in addition to the attenuation of the forward power, the reflected power is attenuated during its return. This is the only significant difference in performance between

¹Notes appear on page 46.

*Technical Editorial Assistant

Transmatch placement at the input and output end of the feed line. The power lost to attenuation increases as the SWR on the line increases when the Transmatch is at the line input. When the matched-line attenuation is low, as it is in typical amateur installations, the additional loss from Z_0 mismatch is so small that the difference in radiated power cannot be discerned by a receiving station. The attenuation added as a result of high SWR can be calculated from information available in Fig. 9 of the reference in note 5 and in *The ARRL Antenna Book*, 14th edition, page 3-12, Fig. 23. A study of these references shows that the logical place for a Transmatch is on the operating desk, not at the antenna. More detailed discussions of the wave and reflection mechanics involved in impedance matching appear in the references listed in my footnotes. — *Walt Maxwell, W2DU, ARRL Technical Advisor, DeLand, Florida*

□ A recent Technical Correspondence item from Ward, WA5LVG (Oct. 1984, p. 41), raises the questions of what a Transmatch is, and where it should be used. A discussion of antenna operation can help us understand the situation.

Current is a most important parameter in determining antenna efficiency. The larger the radiator current, the greater the power radiated. If an antenna is "naturally resonant," there is an integral number of current loops on it. The length of a resonant linear antenna is an integral multiple of a half wavelength. A resonant closed loop has a perimeter equal to an integral multiple of 1 wavelength.

Current and resistance vary with position on a resonant antenna. Resistance is a maximum where current is zero, and a minimum where current is a maximum. The phase of the current is constant over a current loop, changing abruptly by 180° when the current magnitude passes through zero. If the antenna element is broken at a place where its radiation resistance equals the characteristic impedance, Z_0 , of the balanced feed line, the antenna is "matched" to the feeder. Any driving energy then excites the same current distribution on the antenna as would exist if it were illuminated by an electromagnetic wave at the resonant frequency. Such an antenna radiates and reradiates efficiently.

Current and voltage on a resonant radiator are 90° out of phase: For a half-wave antenna, current is maximum at the center of the antenna and zero at the ends (see my Technical Correspondence of Oct. 1984), whereas voltage is zero at the center and maximum at the ends. The relationship between current, voltage and resistance is calculated by the usual expressions. The power radiated is

$$P_r = I_x^2 R_r = \frac{V_x^2}{R_r} \quad (\text{Eq. 1})$$

where I_x and V_x are the current and voltage at a distance x along the radiator where R_r is measured or inferred. Thus, it is clear that there is no discontinuity in power when the magnitude of current or voltage passes through zero. It is also clear that an antenna can be current fed or voltage fed, depending on the placement of the feed point.

A nonresonant antenna is a relatively ineffective radiator. It does not take much power from a transmitter or absorb much power from an incident wave. There is current induced on such an element by an electromagnetic wave, but the phase is not constant throughout a current loop.

If the antenna is to be an effective radiating element, resonance must be established. A nonresonant dipole or loop antenna must be driven by a balanced, tuned feeder (which, if considered to be effectively a part of the antenna length, establishes resonance), such that the phase of the current is constant over the standing wave of current on the radiator. To achieve this, the feeder must be pruned to the right length, or the transmission line must be tuned by an ATU. As Louis Varney, G5RV, stated in an update article on his multiband antenna (*Radio Communication*, July 1984, p. 572): The transmission line, in effect, acts like a "make up" section to accommodate that part of the standing wave of current that cannot be accommodated completely on the radiating parts of the antenna (the flat-top or inverted V for linear antennas, or the conductor of a closed loop).

When a low-loss transmission line is used, which is usually the case at HF, it matters little whether the ATU is at the transmitter end of the transmission line or at the antenna. The former is the most convenient location. An ATU "tunes" the antenna and transmission line and "matches" the radiating system to the transmitter. The tune and match operations are different.

[Belrose's terms, "tune" and "match" are equivalent to Maxwell's terms, "conjugate match" and " Z_0 match," respectively, in the previous letter — Ed.] An antenna can be tuned but not matched to the transmitter as is required for maximum power transfer. — *John S. Belrose, VE2CV, ARRL Technical Advisor, Ayler, Quebec, Canada*

Notes

- 1. M. W. Maxwell, "Another Look at Reflections — Part 4," *QST*, Oct. 1973.
- 2. W. L. Everitt, *Communication Engineering*, 2nd ed. (New York: McGraw-Hill, 1937).
- 3. Z_0 is an abbreviation for the characteristic impedance of a transmission line.
- 4. P. H. Smith, *Electronic Applications of the Smith Chart in Waveguide, Circuit and Component Analysis* (New York: McGraw-Hill).
- 5. M. W. Maxwell, "Another Look at Reflections — Part 6," *QST*, Dec. 1974, p. 12, Fig. 9 (plot of Eq. 9).
- 6. M. W. Maxwell, "Another Look at Reflections — Part 5," *QST*, April 1974.
- 7. M. W. Maxwell, "Some Aspects of the Balun Problem," *QST*, March 1983.
- 8. M. W. Maxwell, "Another Look at Reflections — Part 7," *QST*, Aug. 1976.
- 9. M. W. Maxwell, "Wave Reflections in Attenuators, Filters and Matching Networks," *QST Technical Correspondence*, Nov. 1981, p. 47.

Feedback

✉ Maurice Limes, F6ELM, has noticed an error in "Coaxial Cables: Their Construction and Use" (Nov. 1984 *QST*). Maurice points out that the maximum voltage on a transmission line is equal to the voltage in the matched condition multiplied by the square root of the SWR. The maximum voltage on page 20, column two, paragraph three, should be 836 V, not 1106 V.

✉ The emitter of Q1 in Fig. 1B, "Beginners' Bench" (Jan. 1985 *QST*, p. 22), should be shown connected to the junction of C1, C2, C3 and RFC1.

✉ Henry Wellburn, WA2JOX, points out an error on Fig. 2 of Barry King's article, "A Complete Morse-Code System for the VIC 20™ Computer," page 14, Oct. 1984 *QST*. R2 should be 360 ohms, not 360 kilohms as indicated in the drawing. Many readers probably found this error by using the author's program to calculate filter-component values.

Author King also points out a discrepancy in the text. On page 16, at the top of the right-hand column, the article describes the process of modifying the program listing. If you edit the 80th character of a line on a Commodore computer, the cursor moves to the first position on the next line without sending a carriage return to the screen editor. For the screen editor to change the line in program memory, move the cursor back up to any point on the edited line and type a carriage return. List and check any edited lines to be sure that the changes were made. In an effort to eliminate that problem, the technical editor added a line to the text, which says, "Be sure to copy over the remainder of these lines when you make the changes." That addition is incorrect.

✉ There were some errors in, "A Simple 10-Meter FM Receiver" (Jan. 1985 *QST*). L1,

in Table 2, p. 20, should be a Zenith Radio Corporation no. 20-3946-05 inductor. The pin-connection labels on U1 (Fig. 2, p. 20) are incorrect. Pin 6 is the mixer output (IF); pin 7 is the mixer input (LO). Pins 8 and 9 are connections to an AFC diode not used in this circuit. All pin numbers and connections are correct as shown in the diagram.

Regarding parts substitution: The inductance of L1 is 0.175-0.300 μ H. Coilcraft (1102 Silver Lake Rd., Cary, IL 60013) part no. T7-146 (unshielded, carbonyl-I core) is a suitable substitute for the Zenith part. The Sylvania ECG853 and Motorola MC3357 are equivalent to the RCA SK7645 IC. As shown in Fig. 1 of the January article, the second LO may operate at 10.245 MHz, rather than 11.155 MHz. Crystals for the lower frequency are easier to procure, as they are used in some CB sets. A & A Engineering, mentioned as a circuit-board supplier in the original article, now sells partial kits as well.

Radio Shack no longer supplies the 455-kHz ceramic filter. The author, Jonathan Towle, is looking for a suitable replacement part. If you know of one, write to Jon at ARRL Hq. A replacement should have the following characteristics: 3-dB bandwidth, 10 kHz \pm 3 kHz; Insertion loss, 5 dB maximum; Input and output impedance, 3 kilohms; size $5/16 \times 1/4 \times 1/8$ (HWD) in (mm = in \times 25.4.)

✉ There are two corrections to last month's World Above 50 MHz column. Those interested in obtaining an STI unit from ARRL Hq. should write to Greg Bonaguide, WA1VUG, stating your request and outlining some of the experiments you intend to conduct. Also, in the 1 1/4-Meter Standings, disregard the listing for KB0QR.

Amateur Radio Licensing: A Seven-Decade Overview

That ticket you're holding today has its own share of Amateur Radio history to tell.

By Neil D. Friedman,* N3DF

Prior to 1912, there was no licensing, no regulations, no governing body to oversee "wireless" activities on the airways. Before long, however, it became evident to federal authorities that some regulation was needed to maintain order: Conflicts between amateur stations and those used by the Navy and commercial services were on the increase. The first regulation came in the form of licensing.

The era of mandatory licensing began when the Department of Commerce and Labor,¹ under the authority of the Radio Act of 1912, created the Amateur First Grade and Amateur Second Grade operator licenses. The two classes bestowed identical privileges and, at least theoretically, required identical qualifications.

Amateur First Grade applicants took written tests on radio laws, regulations, and the proper adjustment and operation of equipment. The code sending and receiving tests, originally 5 WPM, increased to 10 WPM by 1919. Candidates for Amateur Second Grade, in contrast, certified to Radio Inspectors by mail that they could meet these requirements but were unable to attend an examination.

Until 1933, station and operator licenses were issued as separate, diploma-sized certificates. The type of *station* license held (originally General, Special or Restricted) determined permissible operating wavelengths and power.

In 1923, the Department of Commerce created the Amateur Extra First Grade, a license so special it was printed on pink paper! Only Amateur Extra First Grade licensees thereafter qualified for "Special" station licenses, which had distinctive call signs and conveyed CW privileges on wavelengths longer than 200 meters.

Qualifications for the new class included two years' experience as a licensed operator and a written examination that, among

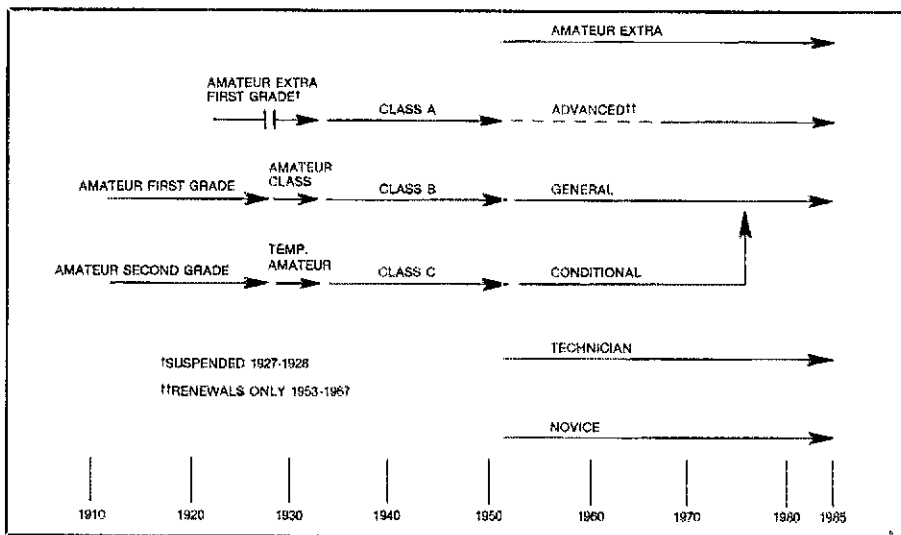


Fig. 1 — The evolution of Amateur Radio licensing over the past seven decades.

other items, required the applicant to diagram a transmitter and receiver and then explain their principles of operation. The code tests were given at 20 WPM, the speed required of Commercial First Class operators.

As amateur interests shifted to short waves, the Amateur Extra First Grade's popularity declined. Only six such licenses were issued in 1926, and the class was discontinued the following year. Reinstated in 1928 with new privileges (described below) added in 1929, the class attracted several hundred licensees most years until its permanent deletion in 1933.

The Radio Act of 1927 transferred the power to issue station licenses to the Federal Radio Commission while preserving the authority of the Commerce Department's Radio Division to issue operator licenses. Months later, the Radio Division redesignated the Amateur First and Second Grade classes as Amateur Class and Temporary Amateur, respectively. To First Grade licensees, the change meant little more than a new name. Temporary

Amateur differed from the previous Second Grade, however, in that the former expired in one year and (after 1932) could not be renewed. Hams could no longer indefinitely avoid taking an examination.

In late 1929, the Radio Division began endorsing Amateur Extra First Grade licenses for "unlimited radiotelephone privileges." Initially, the endorsement authorized voice privileges on the 20-meter band. In 1932, the endorsement became available to other amateurs having at least one year of experience, upon passing a special test on radiotelephone subjects. At the same time, phone use of 75 meters was also reserved to holders of endorsed licenses.

The Radio Division merged with the Federal Radio Commission in 1932. A year later, the FRC completely revised the amateur regulations. Station and operator licenses were thereafter combined on a single, wallet-sized card.

The Amateur's basic license was endorsed as Class A, B or C. All three classes required code tests at 10 WPM (13 WPM

¹Renamed the Department of Commerce after 1913.

*503 Kalmia Ave., Boulder, CO 80302

after 1936). Class A conveyed exclusive phone use on 20 and 75 meters. It required one year of prior experience and a written examination on radiotelephone and radio-telegraph theory and amateur regulations.

Classes B and C conveyed all privileges other than those reserved to Class A. The written test for those classes was less comprehensive than that for Class A with regard to radiotelephone theory. The two classes differed in that Class C written examinations were furnished by mail to applicants residing at least 125 miles from the nearest FRC quarterly examining point. Class C code tests were administered by Class A and B licensees acting as volunteer examiners.

Amateur Extra First Grade licensees qualified for Class A privileges upon renewal. Amateur Class licensees were grandfathered into Class B. Temporary Amateur licenses could not be renewed, however, so holders of this class had to qualify anew in Class B or C upon expiration of their licenses.

The Federal Communications Commission succeeded the FRC in 1934. It revised the regulations in 1951 to create the license class names that are familiar today. Advanced, General and Conditional licenses replaced Classes A, B and C, respectively. The Advanced class was closed to new applicants in January 1953, although renewal

of existing licenses continued. A month later, the 20- and 75-meter "Class A Phone Bands" were opened to General and Conditional licensees.

The same rule-making action also created the Amateur Extra, Novice and Technician classes. The Amateur Extra Class originally required two years' experience as a Conditional (or Class C) licensee or higher, code tests at 20 WPM and a theory examination more comprehensive than that previously given for Class A. No exclusive privileges were reserved for the new class.

The Technician ticket originally conveyed all amateur privileges above 220 MHz. Novices were initially restricted to CW operation on portions of the 11- and 80-meter bands, and voice at 145-147 MHz, at 75-W input, crystal-controlled. The first Novice licenses expired after one year and could not be renewed. After 1954, Novice and Technician exams were obtained from the FCC by mail and administered through volunteer examiners. In 1976, the system changed again: Potential Technician class licensees were required to appear before an FCC examiner, although existing Technician licenses were grandfathered in.

A glimpse at our current regulations reveals that the licensing system has undergone many changes since 1951. While it is beyond the scope of this article to ex-

amine them all, some of the most important have been the establishment of license upgrading incentives in 1967; the reopening of the Advanced class to new licensees in 1967; elimination of activity and code-speed requirements for renewal; the expansion and realignment of Novice and Technician frequency privileges, notably in 1976; the increase of the Novice power level, the removal of the crystal-control requirement and the merger of Conditional licenses into the General class in 1976; and the extension of license terms to 10 years, in 1983.

With the sound defeat of the FCC no-code-license proposal in 1983 and the changeover to volunteer examining for all amateur license classes in 1984, the Amateur Radio licensing structure appears to have entered a period of stability. But ever since the early days, the Amateur Service has been in a constant state of evolution, and there is every reason to believe that the Amateur Radio of another decade from now will look quite different.

Neil D. Friedman, N3DF, was first licensed as WA2VOR, at age 19. He collects early radio equipment and periodicals, and frequently writes on historical communications topics. Neil is an active RTTY operator, a glider pilot and a stereoscope collector. Currently a Regional Counsel of the U.S. Department of Commerce for the Rocky Mountain states, Neil holds BA, MS, JD and LLM degrees.

New Products

NATIONAL AUDIO AMPLIFIERS

□ Three new monolithic audio power amplifiers are available from National Semiconductor: the LM1875, LM831 and LM2879. The LM1875 delivers 20 W into a 4- or 8-ohm load with 22-V supplies. Using an 8-ohm load and a 30-V supply, over 30 W of output may be obtained. Typical total harmonic distortion at 20 W is 0.015% (measured at 1 kHz). Device overload protection consists of internal current limiting and thermal shutdown.

Other features of the LM1875 include high gain, fast slew rate and a wide power bandwidth (70 kHz); large output-voltage swing; high current-handling capability; and a wide supply-voltage range. The amplifier is internally compensated, and is stable for gains of 10 or more. This device is offered in a five-lead TO-220 package. Price: \$4.60 in quantities of 100 and more.

The LM831 is optimized for very low voltage operation — 1.8 to 6 V. Using two independent amplifiers, the LM831 gives stereo or high-power bridge operation from

two- or three-cell power supplies. A patented compensation technique is used to reduced high-frequency radiation for optimum performance in AM radio applications. This compensation also results in lower distortion and less wide-band noise. The input is directly coupled to the LM831, eliminating the usual coupling capacitor. Voltage gain is adjustable by means of a single resistor. Packaged in a 16-lead DIP, the LM831 features high power (400 mW, 8-ohm load, 3-V supply), low noise and low THD. Price: \$1.94 in lots of 100 or more.

A dual power amplifier, the LM2879 can deliver 9 W per channel into an 8-ohm load. The amplifier contains an internal bias regulator to bias each amplifier, and employs internal current-limiting and thermal shutdown protection. Supply voltage may range from 10 to 34 V. This amplifier is packaged in an 11-lead TO-220 package. Price: \$3.10 in lots of 100 or more.

For more information, contact Dan Shockey, National Semiconductor Corporation, 2900 Semiconductor Dr., Santa Clara, CA 95051, tel. 408-721-6937. — Paul K. Pagel, N1FB

Strays



I would like to get in touch with...

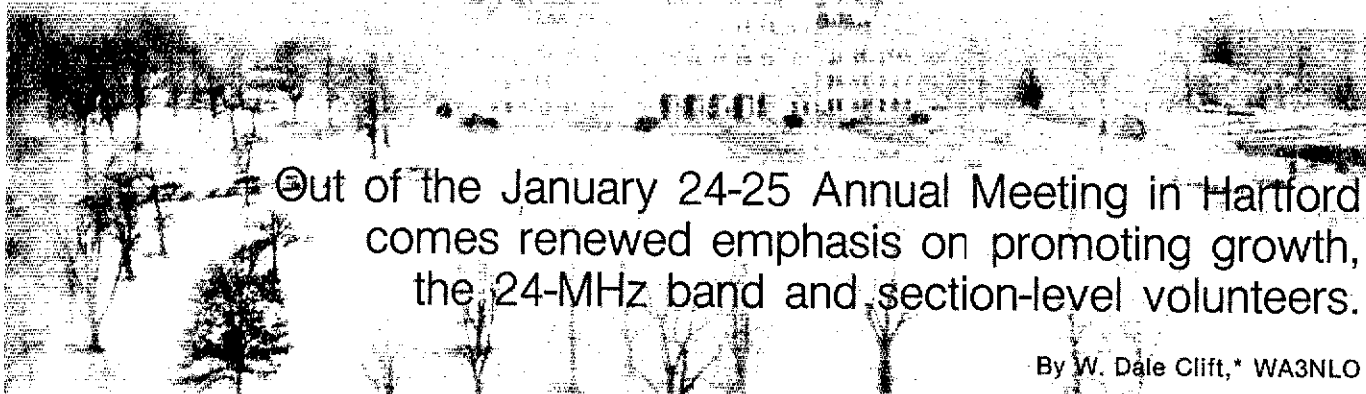
□ anyone with a schematic diagram or manual for a Hallicrafters FPM 300. Ferg Alleman, N4DXE, 1300 Country Club Drive, Orlando, FL 32804.

□ anyone with information on using a Commodore 64 computer with 1541 disk drive for RTTY and filing. Saul F. Alvarez, LU5DOF, C.C. 44, 7631 Quequén, Argentina.

□ anyone with information on adding RIT and QSK capabilities to the Atlas 180 transceiver. Jeff Rininger, KA6ZBU, 920 N. Fifth St., San Jose, CA 95112.

□ anyone who has a service manual and circuit diagram for a WWII Hammarlund Super Pro 120 Communications Radio Receiver. R. K. Joshi, VU2RWZ, I.T.C. Flats, 1/3, Lavelle Rd., Bangalore 560 001, India.

ARRL Board Gives Impetus to New Programs



Out of the January 24-25 Annual Meeting in Hartford comes renewed emphasis on promoting growth, the 24-MHz band and section-level volunteers.

By W. Dale Clift,* WA3NLO

The 1985 Annual Meeting of the Board of Directors of the American Radio Relay League was held at the Parkview-Hilton Hotel in Hartford, Connecticut on January 24-25. Representatives from each of the 16 regional ARRL divisions were present, including the two newly elected directors from the Hudson and New England Divisions. Attending a Board Meeting as ARRL directors for the first time were Linda S. Ferdinand, N2YL, and Thomas W. Frenaye, K1KI. (The names and addresses of all directors appear on page 8 of this *QST* under the headings of their respective divisions.)

Sumner Named to New Post; Williams to Secretary

Among the highlights of this meeting were the adoption of a \$7 million budget for 1985, and the making of fundamental changes to the Articles of Association and Bylaws. One of the more far-reaching changes, however, at least with regard to historical continuity, is the Board's decision to retire the title "General Manager" from the Articles of Association. To be more in keeping with today's standards, the office of "Executive Vice President" was created. David Sumner, K1ZZ, formerly ARRL General Manager and Secretary, is now ARRL Executive Vice President. The Board also established that the offices of Executive Vice President (formerly General

Manager) and Secretary should be accorded separate status. To carry out this objective it elected Perry Williams, W1UED, to the post of corporate Secretary. Williams, a 31-year League employee, is also ARRL Washington (DC) Area Coordinator. This move to separate status for corporate

secretary, too, more accurately tracks with common practice in the business world.

New Board Committees

The most far-reaching changes enacted, however, deal with the structure of the Board itself. In place of the old standing

Board Committees

Executive Committee (Minute 38)

Larry E. Price, W4RA, Chairman
Paul Grauer, W0FIR
Hugh A. Turnbull, W3ABC
Thomas B. J. Atkins, VE3CDM
William J. Stevens, W6ZM

Administration and Finance Committee (Minute 46)

Edmond A. Metzger, W9PRN, Chairman
Tod Olson, K0TO, Alternate Chairman
Clyde O. Hurlbert, W5CH
James E. McCobb, Jr., K1LLU
Leonard M. Nathanson, W8RC, Secretary

Membership Services Committee (Minute 46)

Mary E. Lewis, W7QGP, Chairman
Raymond B. Wangler, W5EDZ, Alternate Chairman

Jay A. Holladay, W6EJJ
Thomas W. Frenaye, K1KI, Secretary

Publications Committee (Minute 46)

Frank M. Butler, Jr., W4RH, Chairman
Gay E. Milius, Jr., W4UG, Alternate Chairman
Fried Heyn, WA6WZO
Gar A. Anderson, K0GA, Secretary

Volunteer Resources Committee (Minute 46)

George S. Wilson, III, W4OYI, Chairman
Lys Carey, K0PGM, Alternate Chairman
Linda S. Ferdinand, N2YL
Thomas W. Comstock, N5TC, Secretary

President
Midwest Division
Atlantic Division
Canadian Division
Pacific Division

Central Division
Dakota Division
Delta Division
Treasurer
First Vice President

Northwestern Division
West Gulf Division

Vice President
New England Division

Southeastern Division
Roanoke Division
Southwestern Division
Vice President

Great Lakes Division
Rocky Mountain Division
Hudson Division
Vice Director, West Gulf Division

The impressive photo of the State Capitol in Hartford, taken from the hotel, and the other photos, are courtesy of N4MM.

*Executive Associate, ARRL

ARRL Organizational (Regarding Articles of Association and Bylaws)

Minute	Purpose	Disposition
26	Delete Bylaw 35	Withdrawn
28	Amendment of Articles 6,8,12, and Bylaws 4,14,15,31-34,36-44	Adopted
82	Amendment of Bylaw 25	Tabled
Other ARRL Organizational Matters		
16	RFI function be removed from OO/RFI coordinator	Adopted
17	OO/RFI coordinator renamed OO Coordinator	Adopted
18/57	Establish Asst. Technical Coordinator (ATC)	Tabled/Adopted
19	Recall provisions for Section Manager	Adopted
25	1985 Budget	Adopted
38	Election of Executive Committee	Elected
39	Election of Secretary	Elected
40	Election of Executive Vice President	Elected
41/42	Election of ARRL Foundation directors	Elected
46	Appointment of Committees	Appointed
55	Study of and funding for Advisory Committees	Adopted
58	Technical Information Service made Field Organization function	Adopted
68	Change date and time of next Board Meeting	Tabled
81	Study possible station appointment to administer ARRL Awards	Adopted
83	1985 Directors' Division Budgets	Adopted
84	Supplemental allocation for SW Division	Adopted
85	Committees' 1985 Budgets	Adopted
86	1985 ARRL Foundation Administrative Budget	Adopted
87	QSL Bureau Mgr. Travel Budget	Adopted
88	National Traffic System Travel	Adopted
89	ARRL liaison with IARU	Adopted
90	IARU President as observer at ARRL Board Meetings	Tabled

Amateur Radio Operations

23/71	Review process re DXCC country status	Tabled/Adopted
35	Approval of revised 23 cm Band Plan	Adopted
48	Revision of 33-cm Band Plan	Adopted
51	Contests and awards for 24-MHz band	Tabled
59	Early release of 24-MHz Band	Adopted
61	Results of 40-meter band survey	Adopted
62	Study 160-meter-Band operation	Adopted
65	Survey membership re DXCC country status	Withdrawn
69	Separate country status for 4U1VIC	Tabled
70	Re-examine 420-430 MHz Band Plan	Adopted
73	DXAC asked to reconsider 4U1VIC question	Adopted

Legal and Regulatory (Non operating)

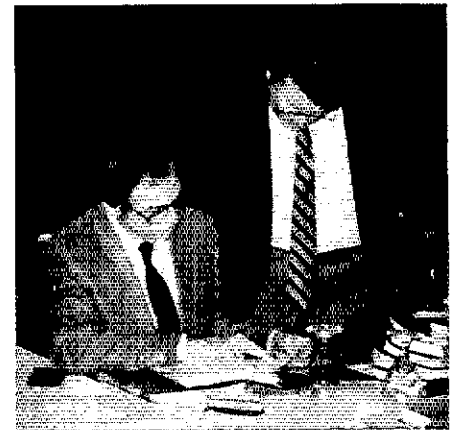
52	Pursue assisting FCC re call signs	Adopted
63	Advanced class as volunteer examiners for General	Tabled

Publications/Media

49	Increase availability of QST, other ARRL publications	Adopted
50	Amateur Radio Program for students	Adopted
54	Pictorial pamphlet on Amateur Radio	Adopted
74	Amateur Radio slide show	Defeated
78	Study payment for QST articles	Adopted
79	Plan for 75th Anniversary of ARRL	Adopted

Miscellaneous

22/91	Nominal charge for DXCC pins	Tabled/Adopted
44	1988 ARRL National Convention	Adopted
47	Commendation of League employees	Adopted
60	Former ARRL officials' QSL cards	Adopted
64	Commendation of QSL Bureau workers	Adopted
80	ARRL name badge	Adopted
93	Approval of ARRL Conventions	Adopted



Vice President Jay Holladay, W6EJJ, and New England Division Director Tom Frenaye, K1KI, go over the wording of a planned motion.

the authority to act for the Board between Board Meetings, will remain structurally the same as before. Because of the importance the Board is placing on getting new recruits into both Amateur Radio and the League, the Executive Committee will be monitoring and advising the staff Office of Development. Membership on the Executive Committee is by election; membership on the standing committees is by appointment. A list of the membership of these committees appears elsewhere in this article.

ARRL Foundation

The ARRL Foundation is a separate corporation closely affiliated with the League. It exists to raise funds for worthwhile projects that promote the benefits of Amateur Radio to the public. Its primary emphasis is to see that these benefits are carried to future generations. The Board filled four posts for ARRL Foundation Director. Thomas W. Frenaye, K1KI, and Linda S. Ferdinand, N2YL, were elected to positions that are restricted to ARRL directors. Two other vacancies were filled by Irv Emig, W6GC, and F. George duPont, WA1SVY. The latter two positions were not restricted to ARRL Board members. Though not directly related to the ARRL Board Meeting, it should be reported that the following day Robert York Chapman, W1QV, resigned as President of the ARRL Foundation. Paul Grauer, W0FIR, was elected as ARRL Foundation President, and Mr. Chapman continues as a director of the Foundation.

Following This Article ...

Tables summarizing the actions taken by the ARRL Board of Directors appear elsewhere in this article. These charts are only thumbnail descriptions of what happened, and we urge you to read the whole text of what interests you in the official Minutes. The official Minutes immediately follow this article.

committees (Management and Finance, Membership Affairs, and Plans and Programs Committees) the Board created four new ones. These new Board committees parallel the recent Headquarters reorganization into Offices of Administrative Services, Membership Communications Services, Publications, Volunteer Resources and Development. (See page 9 of last month's QST.)

The new Administration and Finance Committee, which is described more fully in Minute 28, will review League management performance and the budget. The

Membership Services Committee will perform studies and make recommendations to the Board and Executive Vice President with regard to services provided to individual members. The Publications Committee will perform studies and make recommendations regarding QST and other publications. Finally, the new Volunteer Resources Committee will study and advise in the area of volunteer programs. This committee will also nominate or select individuals to receive awards for outstanding volunteer service or outstanding achievement. The Executive Committee, which has

Moved and Seconded...□□□

MINUTES OF THE 1985 ANNUAL MEETING OF THE BOARD OF DIRECTORS THE AMERICAN RADIO RELAY LEAGUE, INC. JANUARY 24-25, 1985

AGENDA

- 1) Roll call
- 2) Moment of silence
- 3) Consideration of the agenda for the meeting
- 4) Approval of Minutes of 1984 Second Meeting
- 5) Oral reports of the officers
- 6) Receive reports and consider recommendations of the committees
- 7) Acceptance of reports
- 8) Election of Executive Committee
- 9) Appointment of committees
- 10) Election of ARRL Foundation Directors
- 11) Directors' motions
- 12) Authorizations of certain administrative expenses for 1985

1) Pursuant to due notice, the Board of Directors of the American Radio Relay League, Inc., met in annual session at the Parkview-Hilton Hotel in Hartford, Connecticut, on January 24, 1985. The meeting was called to order at 8:41 A.M., with President Larry E. Price, W4RA, in the Chair and the following directors present: Thomas B. J. Atkins, VE3CDM, Canadian Division; Frank M. Butler, Jr., W4RH, Southeastern Division; Lys J. Carey, KØPGM, Rocky Mountain Division; Linda Ferdinand, N2YL, Hudson Division; Thomas W. Frenaye, K1KI, New England Division; Paul Grauer, WØFIR, Midwest Division; Clyde O. Hurlbert, W5CH, Delta Division; Mary E. Lewis, W7QGP, Northwestern Division; Edmond A. Metzger, W9PRN, Central Division; Gay E. Milius, Jr., W4UG, Roanoke Division; Tod Olson, KØTO, Dakota Division; Wayne Overbeck, N6NB, Southwestern Division (Vice Director, acting until 9:07 A.M.); William J. Stevens, W6ZM, Pacific Division; Hugh A. Turnbull, W3ABC, Atlantic Division; Raymond B. Wangler, W5EDZ, West Gulf Division; George S. Wilson, III, W4OYI, Great Lakes Division.

Also in attendance as members of the Board without vote were Leonard M. Nathanson, W8RC, First Vice President; Garfield A. Anderson, KØGA, Vice President; Jay A. Holladay, W6EJJ, Vice President; Richard L. Baldwin, W1RU, International Affairs Vice President; and David Sumner, K1ZZ, General Manager. Also in attendance at the invitation of the Board as observers were the following Vice Directors: Richard P. Beebe, K1PAD, New England Division; Rush S. Drake, W7RM, Northwestern Division; Evelyn D. Gauzens, W4WYR, Southeastern Division; John C. Kanode, N4MM, Roanoke Division; and Stephen A. Mendelsohn, WA2DHF, Hudson Division. There were also present Harry J. Dannals, W2HD, President Emeritus; Honorary Vice President Robert York Chapman, W1QV; Treasurer James E. McCobb, K1LLU; Counsel Christopher D. Imlay, N3AKD; Canadian Counsel Robert Benson, Q.C., VE2VW; Assistant to the General Manager W. Dale Clift, WA3NLO; Stephen C. Place, WB1EYL, Volunteer Resources Manager; John Lindholm, W1XX, Membership Communications Services Manager; Paul Rinaldo, W4RI, Publications Manager; William L. Lazzaro, N2CF, Development Manager; Michael R. Zeigler, Controller; and Washington Area Coordinator Perry Williams, W1UED.

2) The assembly observed a moment of silence in recollection of amateurs who have passed away since the previous Meeting of the Board.

3) On motion of Mr. Grauer, seconded by Mr. Atkins, it was VOTED that the agenda as presented, with the addition of new agenda item 10(a), "Supplementary Report of the ARRL Foundation President," be adopted.

4) On motion of Mr. Wilson, seconded by Mr. Stevens, it was VOTED to approve the minutes in the form in which they appeared in December 1984 QST, with the following amendment: At Minute 46, in the last sentence, the word "Board" should be substituted for the word "Committee."

5) Moving now to agenda item 5, written and oral reports of the officers were presented. President Price welcomed newly elected Directors Linda Ferdinand,

N2YL, and Thomas Frenaye, K1KI, and newly elected Vice Director Rush Drake, W7RM. The Chair also welcomed, as first-time attendees of the meeting, Controller Zeigler and Development Manager William Lazzaro, N2CF. President Price then presented his written report, remarking that the year 1984 began on a note of sadness and concern over the untimely death of Victor C. Clark, W4KFC, and went on to be a year of challenge. He highlighted Washington representation of the League, including ARRL's assuming the role of Volunteer Examiner Coordinator in all 13 regions. Internationally, the report focused on adoption of the new IARU Constitution; nomination to the Administrative Council of Richard Baldwin, W1RU, to be President, and Carl L. Smith, WØBJW, to be Vice President of IARU under the new Constitution, and the subsequent confirmation of the nominations by the IARU societies for terms running to 1988; and a new active role for ARRL in IARU affairs, as a major member-society in addition to its duties as the Secretariat. The report concluded with a summary of 1984 travel. During the course of the above, Marshall Quiat, AGØX, Vice Director from the Rocky Mountain Division, joined the assembly, at 8:48 A.M.

6) The written report of First Vice President Nathanson summarized changes in the leadership during 1984, details of committee work, and his travel to amateur conventions and hamfests, the Administrative Council meeting of IARU in Paris, and the annual meeting of the Association of Public Safety and Communications Officers (APCO). He also took note of the challenges facing the League in the federal-preemption matter, and in achieving goals of 50,000 new amateurs and 25,000 new League members. In his oral remarks, Mr. Nathanson presented some ideas for membership growth.

7) Vice President Anderson presented his annual written report highlighting the work of the Ad Hoc Committee on Volunteer Examining, which culminated in the League's being certified as a Volunteer Examiner Coordinator for all 13 regions. Work with the Member-

ship Affairs Committee both at an in-person meeting and by mail was also included in the report.

8) Vice President Holladay presented a brief oral report concerning developments regarding the 23-cm band plan; the AMSAT annual meeting; and the meeting of the Plans and Programs Committee. He also expressed satisfaction over staff involvement in the introduction of Senate Resolution 36, concerning federal preemption.

9) The next report was that of the Vice President for International Affairs, Mr. Baldwin. Highlights included attendance at the first session of the World Administrative Radio Conference on high frequency broadcasting, the Region 1 International Amateur Radio Union conference at Cefalu, Sicily (see July 1984 QST), the annual meeting of the Belgian Society at the invitation of its President (at personal expense) and discussions with the IARU Region 1 chairman and secretary; the IARU Administrative Council meeting in Paris; and a visit to the People's Republic of China as a guest of the Chinese government and as an observer at the Chinese National Amateur Radio Direction Finding Championships. The report noted that 1985 will be the 60th anniversary of the founding of IARU; details of its recent history followed. A plea was made for deeper involvement by ARRL as a member-society, particularly with respect to Region 2, in addition to its work as Secretariat. With the new IARU Constitution, it is no longer necessary for nominees to IARU offices to be officers of ARRL. Thus, the position of International Affairs Vice President is superfluous. Mr. Baldwin's election as President (together with Carl L. Smith's election as Vice President) cleared the way for Mr. Baldwin's resignation as International Affairs Vice President, and his recommendation that the office be abolished.

10) General Manager Sumner highlighted certain sections of his written report for the assembly, including reports on action items from the previous Board Meeting; personnel matters, including staff turnover, a formal job evaluation program, and a problem identification and resolution process; finances, with the prediction that 1984 will finish slightly in the black, thanks to strong sales of 1985 Handbooks; promotion and recruitment, highlighting the hiring of Bill Lazzaro, N2CF, as Development Manager and the launching of the affiliated-club incentive program; publications schedules and plans; the League's renewed attention to its volunteer resources, touching both on new programs and new support for old programs; and the role of Advanced class licensees in the Volunteer Examiner Program, focusing especially on the exact language of the enabling legislation. During the course of the above, at 9:07 A.M., Southwestern Division Director Fried Heyn, WA6WZO, was welcomed to the meeting and took his seat at the table. Following an extensive discussion of the General Manager's report, the Board was in recess from 10:10 to 10:39 A.M.

11) Treasurer McCobb presented a brief oral report, touching on the League's investment portfolio noting that the 1.6 million dollar general fund balance of the League is the healthiest ever.

12) Counsel Imlay began his report by summarizing actions taken in response to Board motions: A petition to FCC for F2 emissions from 29.5 to 29.7 MHz for identification of repeaters (RM-4880); a request for reduction in the waiting period following test failure from 30 to 27 days; seeking issuance of a Public Notice by FCC concerning RF filtering devices for video cassette recorders; the filing of an approved draft petition for automatic control of amateur digital communications above 30 MHz (RM-4879); and amendment of Part 97 to reflect alterations and additions to amateur microwave assignments adopted at WARC-79. Other regulatory matters in progress included addition of 24.890-24.990 and 902-928 MHz to the table of authorized frequencies in the Amateur Service (Docket 84-960); F1 emissions for digital communications in the 160-meter band; proposed radiolocation use of the 1900-2000 kHz band; possible land mobile use of frequencies in the 220 MHz band (RMs-4829 and -4831); Broadcast Docket 79-47, retransmission of amateur communications by broadcast stations; and Mass Media Docket 84-706, use of 7100-7300 kHz by non-government hf broadcast stations in Region 3. A third section of the report dealt with amateur radio legislative matters, focusing on Senate Bill 66 and Senate Resolution 36 (both introduced on January 3, 1985 by Senator Goldwater), which latter legislation urges FCC to pro-



The Board hears from newly elected Secretary Perry Williams, W1UED. At the head table, from the left, Jay Holladay, W6EJJ, Vice President; David Sumner, K1ZZ, Executive Vice President; Larry Price, W4RA, President; Len Nathanson, W8RC, First Vice President; and Gar Anderson, KØGA, Vice President.



Mary Lewis, W7QGP, Northwestern Division Director, makes a point. Seated in foreground, l to r, are Directors N2YL, WØFIR and K1KI.

vide some protection for amateurs from overzealous regulation by local authorities. Information on local antennas and RFI matters, and our earlier Federal preemption matter, PRB-1, rounded out the report.

13) Canadian Counsel Benson concluded the section on reports by officers and Counsel by submitting a brief written account of his activities, including work done on trademarks, exploration of Federal preemption with the Department of Communications, counseling to Canadian members in respect of RFI and radar detector litigation and municipal zoning problems, and revision of the Canadian tariff schedules.

14) At this point the Chair named Mr. Nathanson as Parliamentarian of the assembly.

15) Reports and recommendations of standing committees, agenda item 6, was the next topic of business. Mrs. Lewis, as Alternate Chairman, read the report of the Plans and Programs Committee regarding activities and awards in the 24-MHz band; a study of the advisory committee concept and recommending changes; and the possibility of using inserts in QST shipping envelopes for Director communications with the members. The Committee also gave a preliminary report on the study of the feasibility of ARRL's assisting FCC in the maintenance of amateur licensing records and the administration of special call sign requests.

16) Mr. Butler, as Chairman, presented the report of the Membership Affairs Committee, whose work was to be summarized in a series of formal actions. On motion of Mr. Wangler, seconded by Mr. Heyn, it was VOTED that the RFI function in the Field Organization be removed from the OO/RFI Coordinator and placed under the Technical Coordinator.

17) It was moved by Mr. Wangler, seconded by Mr. Butler, that the title of OO/RFI Coordinator in the Rules and Regulations of the Field Organization be changed to OO/AAS Coordinator (Amateur Auxiliary Service). After discussion, on motion of Mr. Wilson, seconded by Mrs. Lewis, it was VOTED to amend the motion so that it would end: "... be changed to OO Coordinator." Whereupon, a roll call vote being required, the question was decided in the affirmative with all Directors voting aye. So the Rule was AMENDED.

18) It was moved by Mr. Wangler, seconded by Mr. Butler, that the field appointment of Assistant Technical Coordinator (ATC) be established, and that the General Manager is directed to prepare an Assistant Technical Coordinator job description detailing the ATC's responsibility in (1) resolving RFI problems locally and (2) performing as a general technical resource to local individuals with technical questions. After discussion, on motion of Mr. Hurlbert, seconded by Mr. Stevens, it was moved that the matter be laid on the Table.

19) It was moved by Mr. Hurlbert, seconded by Mr. Butler, that the Rules and Regulations of the ARRL Field Organization be amended to add a new paragraph, 3f, to read as follows: "5f) The Section Manager shall, within his section, be subject to the provisions of Bylaw 24 and Article 7 of the Articles of Association and Bylaws regarding recall petitions, except that the cutoff date shall be not less than six months prior to the expiration of the Section Manager's term of office, and the territory embraced shall be the Section represented, rather than the Division." After discussion it was moved by Mr. Carey, seconded by Mr. Grauer, that the matter be laid on the Table, but the motion to Table failed. Whereupon, a roll call vote being required, the question was answered in the affirmative, with all the Directors voting aye except Messrs. Carey, Grauer and Turnbull, who voted nay. So the Rules and Regulations were AMENDED.

20) The Board was in recess for luncheon from 11:56 A.M. to 1:09 P.M., reassembling with all persons hereinbefore mentioned present except Mr. Lindholm.

21) Without dissent, the question of consideration of the site for the 1988 ARRL National Convention was added to the agenda, as item 10(b).

22) Returning to the recommendations of the Membership Affairs Committee, it was moved by Mr. Grauer, seconded by Mr. Butler, that the General Manager is authorized to charge a nominal fee for DXCC membership pins. After discussion, on motion of Mr. Stevens, seconded by Mr. Olson, it was VOTED that the matter be laid on the Table.

23) It was moved by Mr. Milius, seconded by Mr. Butler, that the review process for applications for separate DXCC country status, as described in a letter dated January 15, 1985 from the ARRL Awards Committee to the Membership Affairs Committee, be continued, and that a summary of this policy be given widest dissemination through the pages of QST and in letters to the publishers of all known DX publications. After discussion, it was moved by Mr. Wilson, seconded by Mrs. Lewis, that in the event that the Awards Committee would choose not to accept DXAC recommendations on country status, then the Awards Committee would advise the Board of its intent and delay implementation until after the next meeting of the Board. On motion of Mr. Wangler, seconded by

Mr. Carey, it was VOTED, 9 votes in favor to 7 votes opposed, that the matter is laid on the Table. Messrs. Wilson, Hurlbert, Olson, Milius and Mrs. Lewis were recorded as voting opposed.

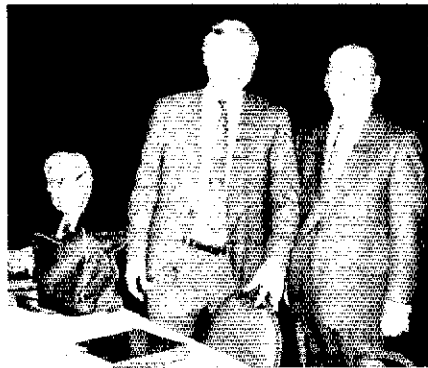
24) Mr. Butler concluded his report with reference to a standard operating procedure for advisory committees that had been drafted and would be presented later.

25) Mr. Metzger, as chairman, presented the report of the Management and Finance Committee. On his motion, seconded by Mr. Milius, it was VOTED that the proposed 1985 Budget be approved.

26) It was moved by Mr. Metzger, seconded by Mr. Atkins, that Bylaw 35 be deleted in its entirety. It was moved by Mr. Hurlbert, seconded by Mr. Wilson, that the matter be laid on the Table, but the motion to Table was lost, 7 votes in favor to 9 votes opposed. After further discussion, with the consent of his second, Mr. Metzger withdrew the motion.



ARRL President Emeritus Harry Dannals, W2HD, left, listens to a point being made by Gay Milius, W4UG, Roanoke Division Director.



Ed Metzger, W9PRN, Central Division; Tod Olson, K0TO, Dakota Division; and Hugh Turnbull, W3ABC, Atlantic Division, during a break in the meeting.

27) Staff members Lazzaro and Zeigler left the meeting at this point. The meeting was in recess from 2:08 to 2:32 P.M.; staff members Cliff, Place, Rinaldo and Williams were excused temporarily from the meeting.

28) It was moved by Mr. Metzger, seconded by Mr. Stevens, that the Articles of Association and Bylaws of the League are amended as follows:

a) In Article 6, at the end of the first sentence, the term "Executive Vice President" is substituted for "General Manager."

b) Article 8 is amended to read: "The officers of the corporation shall be a President, a First Vice President, an Executive Vice President, an International Affairs Vice President, not more than two additional Vice Presidents, a Secretary, and a Treasurer, who shall be elected by a majority of the Directors at the annual meeting on even-numbered years."

c) In Article 12, in the first two sentences, the term "Executive Vice President" is substituted for "General Manager" wherever the latter appears. In the eleventh

sentence, the term "general manager" is substituted for "General Manager."

d) In Bylaw 4, the term "Executive Vice President" is substituted for "General Manager" in the two places where the latter appears.

e) Bylaw 14 is amended to read as follows: "14. The members of the Board of Directors shall be the President, the Vice Presidents, the Treasurer, and one Director from each of the several territorial Divisions of the League."

f) Bylaw 15 is amended to read as follows: "15. The President, the Vice Presidents, and the Treasurer shall possess all of the rights and duties of Directors save the right to vote and the right to participate in the call of a special meeting of the Board, as referred to in Article 4 of the Articles of Association, provided, however, that the President shall be required to cast a vote on any matter as to which a tie is found to exist."

g) In Bylaw 31, the term "Executive Vice President" is substituted for "General Manager."

h) Bylaw 32 is amended to read as follows: "32. In the absence or disability of the President the First Vice President shall preside at meetings of the Board of Directors and in general act in his stead. Should the First Vice President be also absent or unable to act, the additional Vice Presidents, not including the Executive Vice President, shall succeed in the order of their election."

i) In Bylaw 33, the term "Executive Vice President" is substituted for "General Manager."

j) In Bylaw 34, the term "Administration and Finance Committee" is substituted for "Management and Finance Committee" wherever the latter appears; the term "Executive Vice President" is substituted for "General Manager" wherever the latter appears.

k) Bylaws 36 through 41 are deleted in their entirety, and replaced with the following: "36. The following standing committees are established:

- Administration and Finance
- Membership Services
- Publications
- Volunteer Resources.

Each standing committee shall consist of three Directors and a Vice President or Vice Director, or both. No elected member of the Executive Committee shall serve as a member of a standing committee. Additionally, the Treasurer shall serve as a member of the Administration and Finance Committee. Appointment shall be made by the President at the Annual Meeting and shall be for a term of one year. The President shall designate the chairman of each committee. Standing committees shall make written reports at least 30 days prior to each regular meeting of the Board of Directors. Standing committees may originate studies in their fields and may generate recommendations to the Board on their own initiative.

"37. The Administrative and Finance Committee:

- Reviews League management performance and effectiveness, including League finances, on a continuing basis.

- On an annual basis, reviews the operating budget prepared by the Executive Vice President for the coming year and, after approval, forwards to the Board of Directors for ratification.

- Reviews intermediate and long term budgetary projections as prepared by the Executive Vice President and makes appropriate recommendations to the Board of Directors.

- Makes recommendations to the Board in connection with audit and tax matters, and acts as a Board audit committee.

- Makes recommendations to the Board and the Executive Vice President in areas of staff management, procedures, and remuneration.

- Acts as advisor to and supervisor of the Treasurer in regard to the investment of the League's funds.

"38. The Membership Services Committee performs studies and makes recommendations to the Board, and acts as advisor to the Executive Vice President, with regard to services provided to individual members, other than publications. These services include but are not limited to the following:

- Operating and membership service awards
- On-the-air contests
- Information services, including WIAW
- Incoming and outgoing QSL bureau services
- Repeater operating practices and registration
- Band planning

"39. The Publications Committee performs studies and makes recommendations to the Board, and acts as advisor to the Executive Vice President, with regard to the League's publications programs, including QST and other periodicals.

"40. The Volunteer Resources Committee performs studies and makes recommendations to the Board, and acts as advisor to the Executive Vice President, with regard to volunteer programs, including, but not limited to, the following:

- The section level Field Organization
- Affiliated clubs

- Volunteer examiners
- Public service communications
- The ARRL Interference Reporting System (AIRS)
- The Volunteer Counsel Program

The Volunteer Resources Committee also serves as a nomination and/or selection committee for the awards bestowed by the Board for outstanding volunteer service or outstanding achievement."

l) Bylaws 42 through 44 are renumbered 41 through 43, respectively.

m) In Bylaw 42, the term "Executive Vice President" is substituted for "General Manager."

After extended discussion, a roll call vote being required, the question was decided in the affirmative, with all of the Directors voting aye except Mr. Frenaye, who voted nay. So the Articles of Association and Bylaws were AMENDED.

29) Mr. Metzger, as Chairman, presented the written report of the Management and Finance Committee. After extended discussion, on his motion, seconded by Mr. Milius, it was VOTED that the report of the Management and Finance Committee of January 15, 1985 be adopted and ratified by the Board. During the course of the above, the Board was in recess from 4:25 to 4:36 P.M. At 4:41 P.M., the staff members returned to the meeting.

30) Mr. Turnbull, as Chairman, presented the report of the Ad Hoc Committee on a More Continuous Washington Presence. Mr. Atkins as Chairman, reported briefly for the Ad Hoc Committee on the Strengthening of CRRL. The next meeting of the Committee is in May; no written report was submitted. Mr. Wilson, as Chairman, spoke briefly for the Ad Hoc Committee on Monitoring, indicating that he expected the final report of the Committee to be made in July and the Committee to be discharged at that point. Mr. Turnbull, as Liaison, presented the report of the Goldwater Scholarship Committee. Mr. Turnbull, as Chairman, presented the report of the RFI Task Group.

31) Mr. Wangler, as Chairman, spoke briefly for the Committee on the Biological Effects of RF Energy. Mr. Nathanson, as Chairman, spoke briefly for the Task Force on Federal Preemption, calling attention to that portion of the Counsel's report that dealt with Senate Resolution 36.

32) Mr. Butler, as Liaison, presented the report of the VHF/UHF Repeater Advisory Committee. In the absence of Mr. Huntington, there was no report from the Contest Advisory Committee.

33) Mr. Kanode, as Liaison, presented the report of the DX Advisory Committee. It was moved, by Mr. Hurlbert, seconded by Mr. Wilson, that the Board does not accept paragraph 6 of the DX Advisory Committee report. After discussion, Mr. Hurlbert, with the consent of his second, withdrew the motion.

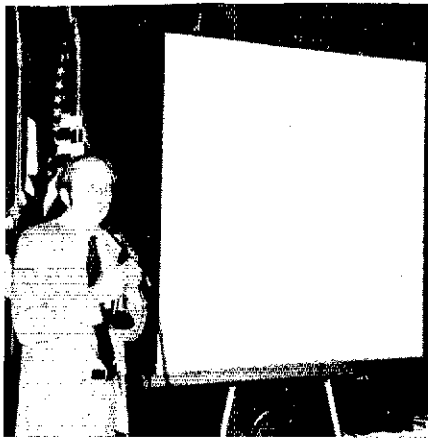
34) Mr. Price, as Acting Liaison, spoke briefly for the Emergency Communications Advisory Committee which had no written report. Mr. Mendelsohn, as Liaison, presented the report of the Public Relations Advisory Committee, highlighting sections dealing with public service announcements to be recorded by a leading personality, preparation of a slide show for government officials, and intention to introduce a motion calling for production of an introductory comic-book style pamphlet.

35) Mr. Overbeck, as Liaison, presented the report of the VHF/UHF Advisory Committee. On motion of Mr. Heyn, seconded by Mr. Butler, it was VOTED that the revised 23-cm band plan submitted to the Board by the VUAC and VRAC be approved and published in the ARRL Repeater Directory and elsewhere as appropriate.

36) Moving now to agenda item 7, on motion of Mr. Wangler, seconded by Mr. Atkins, it was VOTED that the reports of the committees are accepted and placed on file. Mr. Hurlbert requested to be recorded as voting opposed to accepting the report of the DXAC.

37) The Board was in recess for dinner from 5:36 P.M. to 8:20 P.M., reconvening with all persons hereinbefore mentioned present except Messrs. Lazzaro, Lindholm, McCobb and Zeigler.

38) Moving to agenda item 8, the Chair declared nominations open for the election of Directors to the Executive Committee for a term of one year. Mr. Metzger nominated Mr. Grauer. Mr. Hurlbert nominated Mr. Milius. Mr. Heyn nominated Mr. Atkins. Mr. Wilson nominated Mr. Stevens. Mr. Olson nominated Mrs. Lewis. Mr. Stevens nominated Mr. Turnbull. Mr. Heyn nominated Mr. Frenaye. On motion of Mr. Metzger, seconded by Mr. Olson, it was VOTED that nominations be closed. The Chair appointed Messrs. Beebe and Mendelsohn as tellers. Nine votes were required for election; at the end of the first ballot, the President announced that Messrs. Grauer and Turnbull were elected. On the second ballot, Mr. Atkins and Mr. Stevens were elected; accordingly, the Chair announced that the Executive Committee members for the following year would be Messrs. Grauer, Turnbull, Atkins, and Stevens (applause).



Executive Vice President David Sumner, K1ZZ, presents the rationale for some of the changes to the ARRL Articles of Association.

39) The Chair announced that the resignation of David Sumner as Secretary had been received. Nominations were declared open for the office of Secretary. Mr. Metzger nominated Mr. Williams. On motion of Mr. Turnbull, seconded by Mr. Metzger, it was VOTED that nominations are closed. Whereupon, on voice vote, Mr. Williams was elected as Secretary (applause).

40) The Chair announced the opening of nominations for the Office of Executive Vice President. Mr. Metzger nominated Mr. Sumner. On motion of Mr. Milius, seconded by Mr. Wangler, it was VOTED that nominations are closed. Whereupon, by voice vote, Mr. Sumner was elected as Executive Vice President (applause).

41) The Chair announced that agenda item 9, Appointment of Committees, would be addressed the following day. Accordingly, the opening of nominations for Director of the ARRL Foundation was announced. With respect to a position as Director for a three-year term, with nominations being restricted to ARRL Directors, Mr. Stevens nominated Mrs. Lewis, and Mr. Butler nominated Mr. Frenaye. On motion of Mr. Stevens, seconded by Mr. Wangler, it was VOTED that nominations are closed. The tellers found 9 votes for Mr. Frenaye and 7 votes for Mrs. Lewis. With respect to a position filling a vacancy created by the resignation of George Diehl, W2LHA, likewise restricted to a member of the Board of Directors, for a term expiring in 1987, Mr. Turnbull nominated Mrs. Ferdinand. Mr. Carey nominated Mrs. Lewis. On motion of Mr. Stevens, seconded by Mr. Carey, it was VOTED that nominations are closed. The tellers found 12 votes for Mrs. Ferdinand and 3 votes for Mrs. Lewis.

42) With respect to two vacancies for three-year terms, with no restrictions on who could be nominated, Mr. Heyn nominated Mr. Irv Emig, W6CC, Mr. Grauer nominated Mr. F. George duPont, WA1SVY. Mr. Milius nominated Mrs. Lewis. Mr. Atkins nominated Mr. John C. Sullivan, WIHHR. On motion of Mr. Stevens, seconded by Mr. Wangler, it was VOTED that nominations are closed. At the conclusion of the first ballot, the Chair announced that Mr. duPont had been elected. A second ballot was inconclusive. The Board of Directors was in recess from 9:03 to 9:14 P.M. The Chair announced that Mr. Sullivan had withdrawn by telephone. A third ballot being taken, the tellers found 9 votes for Mr. Emig, and 6 votes for Mrs. Lewis. Thus, the Chair declared Mr. Frenaye, Mrs. Ferdinand, Mr. duPont and Mr. Emig elected as Directors of the ARRL Foundation (applause).

43) Mr. Chapman, as President, reported briefly for the ARRL Foundation.

44) Turning next to agenda item 10b, the Chair called for consideration of the location for the 1988 National Convention. On motion of Mr. Heyn, seconded by Mr. Butler, after extended discussion, it was VOTED that a secret ballot be conducted to decide between Portland and Denver as the site of the 1988 National Convention, inasmuch as groups from each area had submitted an application. The tellers found 9 votes for Portland, 7 votes for Denver; accordingly, the 1988 National Convention will be held in Portland, Oregon, in August of that year.

45) The Board was in recess for the night at 9:32 P.M., reconvening on the morrow at 8:30 A.M., with all persons hereinbefore mentioned present, except Messrs. Lazzaro, McCobb, Lindholm and Zeigler.

46) Returning to Item No. 9 on the Agenda, Appointment of Committees, Mr. Price announced the following appointments:

Administration and Finance: Mr. Metzger, Chairman; Mr. Olson, Alternate Chairman; Mr. Hurlbert; Mr. McCobb; Mr. Nathanson, Secretary.

Membership Services: Mrs. Lewis, Chairman; Mr. Wangler, Alternate Chairman; Mr. Holladay; Mr. Frenaye, Secretary.

Publications: Mr. Butler, Chairman; Mr. Milius, Alternate Chairman; Mr. Heyn; Mr. Anderson, Secretary.

Volunteer Resources: Mr. Wilson, Chairman; Mr. Carey, Alternate Chairman; Mrs. Ferdinand; Vice Director Comstock, Secretary.

Contest Advisory Committee: Mr. Randall A. Thompson, KSZD; Mr. Drake, Board Liaison. DX Advisory Committee: Mr. Robert W. Thompson, K6SSJ, Chairman; Mr. Kanode, Board Liaison.

Emergency Communications Advisory Committee: Mr. Joel I. Kandel, K14T, Chairman; Mr. Beebe, Board Liaison.

Public Relations Advisory Committee: Mr. Richard S. Moseson, N2BFG, Chairman; Mr. Mendelsohn, Board Liaison.

VHF Repeater Advisory Committee: Mr. Joseph I. Eisenberg, WA0WRI, Chairman; Mr. Butler, Board Liaison.

VHF/UHF Advisory Committee: Mr. James E. McKim, W8CY, Chairman; Mr. Overbeck, Board Liaison.

47) Moving now to item no. 11 on the agenda, Directors' Motions, on motion of Mr. Olson, seconded by Mr. Wangler, the following resolution was unanimously ADOPTED:

WHEREAS, during calendar year 1984 the following took place:

- Establishment of the Volunteer Examiner Program

- Establishment of the Volunteer Monitoring Program

- Publication of a new, dramatically improved Handbook

- Reorganization of League Headquarters to improve operating effectiveness and implementation by staff of a number of other activities through which Amateur Radio has been considerably enriched;

NOW THEREFORE, BE IT RESOLVED that the Board of Directors commends the General Manager and the employees of the League, one and all, for their dedicated efforts which resulted in these significant achievements (applause).

48) On motion of Mr. Atkins, seconded by Mr. Butler, it was unanimously VOTED that the interim ARRL 33-cm (902-928 MHz) Band Plan adopted in October 1984 be revised by the addition of the following footnotes applicable to Canadian amateurs:

9 Canadian Amateurs Note: The Amateur Service will continue to have secondary status in the band 902-928 MHz throughout Canada.

10 Before operating in this band, Canadian Amateur licensees are required to consult with their local DOC District Office to ensure interference will not be caused to other services operating in the band as per Section 45 of the General Radio Regulations Part II, given in TRC 25.

11 Government of Canada shipborne radiolocation service is permitted within 150 km of the East and West coasts, Arctic Ocean, Hudson Bay, James Bay, and up the St. Lawrence River as far as Rimouski on pre-coordinated channels in the band 902-928 MHz.

49) On motion of Mr. Wilson, seconded by Mr. Milius, it was VOTED that the Executive Vice President endeavor to make QST and such other publications as he may feel desirable widely available to the general public at bookstores and magazine stands, including those at airports.

50) On motion of Mrs. Ferdinand, seconded by Mr. Wilson, it was VOTED that the Executive Vice President be requested to have the Development Office develop a plan, or program, for reaching junior and senior high school level audiences and explain the benefits of the Amateur Radio hobby.

51) It was moved by Mrs. Lewis, seconded by Mr. Heyn, that the CAC and the DXAC be asked for input in regard to DXCC awards and contests on the proposed 24.89-24.99 MHz band and report any recommendations back to the Board at the July 1985 meeting. After discussion, on motion of Mr. Olson, seconded by Mr. Carey, it was VOTED that this matter be laid on the Table. Mrs. Lewis requested to be recorded as having voted opposed to laying the matter on the Table.

52) On motion of Mr. Stevens, seconded by Mr. Milius, it was unanimously VOTED that the Executive Vice President with the assistance of Counsel, pursue

the acquisition of all necessary statutory and regulatory authority to provide assistance to the Commission in the area of call sign issuance, especially relative to club and special-event call signs, and to explore the potential cost to the League and recommend an appropriate cost for this service.

53) It was moved by Mr. Milius, seconded by Mr. Carey, that the funds allotted to the ARRL Advisory Committees be increased by \$750 per year per committee in order to enable the committees to function more efficiently. After discussion, moved by Mr. Hurlbert, seconded by Mr. Grauer, that this matter be laid on the Table, but the motion to Table was LOST. After further discussion, it was moved by Mr. Nathanson, seconded by Mr. Hurlbert, that the motion on the floor be amended so as to refer the matter to the Volunteer Resources Committee, with consideration given to Minute 86 of the Second Board Meeting of 1984, but the motion to amend was LOST. Mr. Hurlbert requested that he be recorded as having voted in favor of the amendment. After further discussion, it was moved by Mr. Wilson, seconded by Mr. Hurlbert, that the motion on the floor be amended by substituting a comma for the period at the end of the motion and adding the words "and to further refer the matter to the Volunteer Resources Committee." The Chair ruled this amendment out of order, whereupon Mr. Wilson appealed to the Parliamentarian. The Parliamentarian advised the Chair that its ruling was correct; whereupon Mr. Wilson appealed the ruling of the Chair. It was VOTED by the assembly that the ruling of the Chair is sustained. The Board was in recess at 9:46 A.M., reconvening at 10:08 A.M. At this point Mr. Milius, with the consent of his second, withdrew the motion on the floor.

54) On motion of Mr. Carey, seconded by Mrs. Ferdinand, it was VOTED that the Public Relations Advisory Committee shall study the feasibility of producing a pictorial style pamphlet about Amateur Radio for use at the junior and senior high school level. The committee shall report its findings to the Board no later than the 1986 Annual Meeting of the Board.

55) On motion of Mr. Milius, seconded by Mr. Carey, it was VOTED that it is the sense of the Board that the volunteer Advisory Committee structure can and should be improved; to that end the Board directs the Volunteer Resources Committee to study and recommend changes at the July 1985 meeting. In the interim the Board authorizes each Advisory Committee a budget of up to \$500 for Committee purposes.

56) It was moved by Mr. Wangler, seconded by Mr. Butler, that "RFI Coordinator" be deleted from paragraph 9 of the Rules and Regulations of the ARRL Field Organization in the ARRL Articles of Association and By-Laws. A roll call vote being required, the question was decided in the affirmative. All the Directors voted in favor, so the Rules and Regulations were AMENDED.

57) On motion of Mr. Wangler, seconded by Mr. Heyn, it was VOTED that the motion dealing with the field appointment of Assistant Technical Coordinator (ATC) be lifted from the Table. On motion of Mr. Wangler, seconded by Mr. Heyn, it was VOTED that the motion be amended by striking the complete text and substituting therefor the following:

Moved, that the field appointment of Assistant Technical Coordinator is inserted in paragraph 10 of the "Rules and Regulations of the ARRL Field Organization" in the ARRL Articles of Association and Bylaws, after "... Official Observer ..." and before "... and Public Information Assistant"; and that the Executive Vice President is directed to prepare a job description detailing the ATC's responsibility in (1) resolving RFI problems locally and (2) performing as a general technical resource to local individuals with technical questions.

After discussion, a roll call vote being required, the question was decided in the affirmative; all Directors voted in favor, except Mr. Frenaye, who voted opposed; so the Rules and Regulations were AMENDED.

58) It was moved by Mr. Wangler, seconded by Mr. Butler, that the Executive Vice President, working with the appropriate section leadership officials and affiliated clubs, recruit qualified individuals as ATCs and, once a pool of ATCs is established, change the Technical Information Service from a Headquarters Technical Department function to a Field Organization referral service. After discussion, a tie vote being found to exist, the Chair voted in favor; so the motion was ADOPTED. The following Directors wished to be recorded as voting opposed: Messrs. Milius, Wilson, Metzger, Grauer, Frenaye, Stevens, Mrs. Lewis and Mrs. Ferdinand.

59) On motion of Mr. Hurlbert, seconded by Mr. Olson, it was unanimously VOTED that the President and Executive Vice President mobilize all resources

available, including the services of Communications Counsel and the Washington Area Coordinator, to the end of immediate release of 12 meters for U.S. amateur use. Further, that the release of 12 meters be considered a priority item by the Washington Area Coordinator and Counsel, and that their activities toward this end be reported in each Directors' Letter hereafter until this objective is obtained. Mr. Atkins abstained.

60) On motion of Mr. Wilson, seconded by Mr. Grauer, it was VOTED that Past Directors, Vice Directors and Officers be permitted to obtain, at cost, officials' QSL cards indicating their former status.

61) On motion of Mrs. Ferdinand, seconded by Mr. Carey, it was VOTED that the Board share the results of the 40-meter-phone-band trend as of the count, April 1, 1985. Mr. Atkins abstained.

62) On motion of Mr. Frenaye, seconded by Mr. Stevens, it was VOTED that in view of significant changes in the 160-meter-band operation (both in regard to frequency/mode allocations worldwide and operating preferences) since the Board last addressed this matter, that the Membership Services Committee seek member input regarding recommendations for modifying the ARRL Band Plan.

63) It was moved by Mrs. Lewis, seconded by Mr. Stevens, that the Executive Vice President is directed, with the assistance of Counsel, to pursue as necessary either an amended rule interpretation or rule change to permit Advanced class Volunteer Examiners to administer both written and Morse code elements of the General class license examinations, in accordance with the clear wording of Public Law 97-259. After discussion, on motion of Mr. Olson, seconded by Mr. Metzger, it was VOTED that the matter is laid on the Table. Mr. Wilson and Mrs. Lewis requested that they be recorded as voting against the motion to Table.



Legal Counsel Chris Imlay, N3AKD, keeps 'em entertained during a break. Clockwise, from Imlay (with hands clasped): Frank Butler, W4RH, Southeastern; Clyde Hurlbert, W5CH (with hand on railing), Delta; (with backs to camera) President Larry Price, W4RA and Ed Metzger, W9PRN, Central; and Paul Rinaldo, W4RI, Hq. Staff.

64) On motion of Mr. Milius, seconded by Mr. Grauer, the following resolution was unanimously ADOPTED:

WHEREAS, the volunteers working in and with the incoming QSL bureaus throughout the USA and Canada have devoted and continue to spend many hours of their personal time in unselfish service to Amateur Radio,

NOW THEREFORE, the ARRL Board of Directors extends its sincere appreciation to the volunteers for a job well done.

65) It was moved by Mr. Wangler, seconded by Mr. Butler, that the Membership Services Committee conduct a study, including a survey of the membership, with particular emphasis on the criteria for determining country status. After discussion, Mr. Wangler, with the permission of his second, withdrew the motion.

66) On motion of Mr. Hurlbert, seconded by Mr. Milius, it was VOTED that insofar as any previous minute or standing order of this Board may be concerned, wherever the title "General Manager," or "GM," may be used, that the minute or standing order now be read and interpreted to read and mean "Executive Vice President." The Board was in recess at 11:43 A.M. until 1:03 P.M. reconvening with Mr. Nathanson in the Chair and all persons hereinbefore mentioned present except Messrs. Lazzaro, Lindholm, McCobb and Zeigler.

67) It was moved by Mr. Hurlbert, seconded by Mr. Milius, that the Rules and Regulations of the ARRL Field Organization be amended as follows:

a) In paragraphs 5a) and 5c), change "5:30 P.M." to "4:00 P.M. Eastern Time."

b) In paragraphs 5 and 6, change "General Manager" to "Field Services Manager" whenever the former appears.

c) In paragraph 9, change the last sentence to read "Complete details of the qualifications for these appointments shall be provided to appointees and be published in appropriate ARRL publications."

d) In paragraph 10, change the last sentence to read "Complete details of the qualification for these appointments shall be contained in appropriate ARRL publications."

e) In paragraph 11, delete all text after "These rules and regulations shall have the force and effect of the By-Laws of the League."

A roll call vote being required, the question was decided in the affirmative. All the Directors voted in favor, so the Rules and Regulations were AMENDED.

68) It was moved by Mr. Wilson, seconded by Mr. Stevens, that the date and location of the 1985 Second Meeting of the Board be changed to October 2-3, 1985, in Louisville, Kentucky. On motion of Mr. Metzger, seconded by Mrs. Lewis, it was VOTED that this matter is laid on the Table.

69) On motion of Mr. Stevens, seconded by Mrs. Lewis, it was moved that the following resolution be adopted:

WHEREAS, the President is in receipt of a copy of a communication originated by the United States Department of State dated January 11, 1985, which communication proposes to establish a third party traffic agreement with the United Nations, permitting such communications through 4U1VIC at the United Nations' Vienna International Center, and which communication was not available to the DXAC in its recent balloting,

AND WHEREAS, if the United States government considers the Vienna International Center to be a separate country, the League should do likewise.

NOW THEREFORE, the United Nations' Vienna International Center, 4U1VIC is granted "separate country" status for DXCC purposes, with QSL submissions to be accepted for DXCC credit effective June 1, 1985.

On motion of Mr. Heyn, seconded by Mrs. Ferdinand, it was VOTED that this matter be laid on the Table. Mr. Hurlbert, Mrs. Lewis, Messrs. Metzger, Milius and Olson requested that they be recorded as voting against the motion to Table.

70) On motion of Mr. Butler, seconded by Mr. Wangler, it was VOTED that the VIJAC be tasked to reexamine the ARRL Band Plan for 420-450 MHz, in light of recent FCC restrictions on use of the 420-430 MHz portion of this band near the Canadian border.

71) On motion of Mr. Wangler, seconded by Mr. Butler, it was VOTED that the motion pertaining to the role of the ARRL Awards Committee be lifted from the Table. On motion of Mr. Wangler, seconded by Mr. Milius, it was VOTED that the motion is amended by striking the complete text and substituting therefor the following: "That the study directed at Minute 105 of the second 1984 meeting be continued by the Membership Services Committee with particular emphasis on the criteria for determining DXCC country status." After discussion, it was VOTED that the motion as amended is ADOPTED.

72) On motion of Mr. Wangler, seconded by Mr. Butler, it was VOTED that the Executive Vice President prepare for future Board meetings a summary of action items under study with scheduled completion date.

73) On motion of Mr. Olson, seconded by Mr. Price, it was VOTED that the motion dealing with DXCC country status for the Vienna International Center be lifted from the Table. It was moved by Mr. Olson, seconded by Mr. Wangler, that the motion be amended so that the last section of the motion would read:

"NOW THEREFORE, the DXAC is asked to reconsider whether or not the United Nations' Vienna International Center, 4U1VIC should be granted 'separate country' status for DXCC purposes." After discussion, it was moved by Mr. Carey, seconded by Mr. Frenaye, that this matter be laid on the Table, but the motion to Table was LOST. After further discussion, it was VOTED that the motion is amended. The question thereupon being on the main motion as amended, the same was ADOPTED.

74) It was moved by Mr. Olson, seconded by Mr. Grauer, that the PRAC is directed to create and distribute to each Director, prior to May 1, 1985, a script and set of 35-mm slides which constitute the "C.O.R.E. of Amateur Radio" presentation. The cost of development of the slides to be funded from the Hq. budget. After discussion, the motion was LOST. The Board was in recess from 2:10 to 2:30 P.M., after which Mr. Price resumed the Chair.

75) On motion of Mr. Hurlbert, seconded by Mrs. Ferdinand, it was VOTED that in paragraph 6 of the "Rules and Regulations Concerning American Radio Relay League Conventions," the term "Executive Vice President" is substituted for the term "General Manager"; that in the "Rules and Regulations Concerning Advisory Committees" the term "Executive Vice President" is substituted for the term "General Manager" wherever it appears; and that in the "Rules and Regulations Concerning Affiliated Societies" the term "Executive Vice President" is substituted for the term "General Manager" wherever it appears.

76) On motion of Mr. Hurlbert, seconded by Mrs. Lewis, it was VOTED that in the "Terms and Conditions Governing the Availability of Mailing Lists" from Headquarters the term "Executive Vice President" is substituted for the term "General Manager" wherever it appears.

77) On motion of Mr. Hurlbert, seconded by Mr. Metzger, the following resolution was unanimously ADOPTED:

WHEREAS, there have been numerous amendments made to the Articles of Association of The American Radio Relay League, Inc. during the past several years;

WHEREAS, the Board of Directors of The American Radio Relay League desires to make certain additional amendments to the Articles of Association; and

WHEREAS, it is desired by the Board of Directors of The American Radio Relay League, Inc. that the Articles of Association on file with the Secretary of State of Connecticut be in a form which facilitates reference; now therefore,

BE IT RESOLVED; that the Board of Directors, assembled on January 25, 1985 at Hartford, Connecticut hereby amends and restates the Articles of Association of The American Radio Relay League, Inc., in their entirety, to read as follows:

[complete Articles of Association]

BE IT FURTHER RESOLVED: that the officers of The American Radio Relay League, Inc. are directed to cause a certificate of such amendment and restatement to be filed with the Secretary of State of the State of Connecticut, and to pay all filing fees due thereon.

78) On motion of Mrs. Ferdinand (on behalf of herself and Mr. Hurlbert), seconded by Mr. Heyn, it was VOTED that

A. The Publications Committee study the question of compensation *vel non* for authors of articles printed in League publications, particularly QST.

B. That the Publications Committee is particularly charged with considering, among other things, the following:

a) Whether there is need to compensate authors in order to increase the quality or quantity (or both) of contributions;

b) Whether there would be an ethical consideration which would preclude contributions by any class of League Volunteer for compensation;

c) Any legal or tax consequences;

d) Any other factors deemed pertinent by the Committee.

C. That the Committee report its findings and recommendations to the next Board session, if possible.

79) It was moved by Mr. Stevens, seconded by Mr. Milius, that the following resolution be adopted:

WHEREAS, the year 1989 marks the Diamond (75th) Anniversary of the American Radio Relay League, and

WHEREAS, it would be appropriate to mark this occasion with a National Convention organized around the Diamond Anniversary theme,

RESOLVED, that the Volunteer Resources Committee is instructed to formulate a recommendation, for presentation to the Board at its second 1985 meeting, as to the manner in which the League should use the occasion of its 1989 National Convention to observe its Diamond Anniversary. It was moved by Mr. Wilson, seconded by Mrs. Ferdinand, that the motion be amended by deleting some text so that the last section of the motion would read "RESOLVED, that the League should use the occasion of its 1989 National Convention to observe its Diamond Anniversary."

After discussion, it was moved by Mr. Carey, seconded by Mr. Olson, that the amendment to the motion be amended by adding the words "in Denver, Colorado" to the end of the motion. A roll call vote being requested, the motion to amend the amendment, was LOST, with all Directors voting nay except Messrs. Carey, Grauer, Hurlbert, Milius and Olson, who voted aye, and Mr. Heyn, who abstained. After further discussion, a roll call vote being requested, the motion to amend was ADOPTED with all Directors voting in favor of the amendment except Mr. Carey and Mr. Stevens. The question thereupon being on the main motion, the same was unanimously ADOPTED.

80) It was moved by Mr. Butler, seconded by Mr. Carey, that the ARRL name badge submitted to the Board by the Executive Vice President at the 1985 Annual Meeting be approved and issued to all present and future ARRL Officers, Directors, Vice Directors and

staff. After discussion, it was moved by Mr. Metzger, seconded by Mr. Grauer, that this matter be laid on the Table, but the motion to Table was LOST. After further discussion, on motion of Mr. Frenaye, seconded by Mrs. Ferdinand, it was VOTED that the motion be amended by the addition of the words "Section Managers". The question then being on the motion as amended, the same was unanimously ADOPTED.

81) On motion of Mr. Butler, seconded by Mr. Frenaye, it was VOTED that the Volunteer Resources Committee study the feasibility of a station appointment within the Field Organization for the purpose of administering some ARRL awards. The study should include a review of existing awards and their applicability to such a program.

82) It was moved by Mr. Heyn, seconded by Mr. Atkins, that Bylaw 25 be amended by replacing the phrase, "fourth Thursday of January" with "third Friday of January", and by replacing the phrase, "fourth Thursday of July" with "third Friday of July." After discussion, on motion of Mrs. Lewis, seconded by Mr. Carey, it was VOTED that this matter be laid on the Table.



On the backbenches are, l to r, Vice Directors Richard Beebe, K1PAD, New England; and Rush Drake, W7RM, Northwestern Divisions.

83) Moving now to item no. 12(a) on the Agenda, Administrative Expenses of Directors for 1985, the Chair reminded the Directors of a new policy adopted by the Management and Finance Committee under which certain items heretofore not charged against Directors' Division accounts would be charged during the year 1985. On motion of Mr. Stevens, seconded by Mr. Carey, it was VOTED that the Executive Vice President is hereby authorized to reimburse the Division Directors for actual expenses incurred by them during the year 1985 in the proper administration of ARRL affairs in their respective division, and in accordance with Board policy, up to the amounts as follows:

Canadian Division	\$ 9500
Atlantic Division	11,500
Central Division	7500
Dakota Division	3500
Delta Division	10,000
Great Lakes Division	11,000
Hudson Division	5600
Midwest Division	6000
New England Division	8500
Northwestern Division	13,000
Pacific Division	10,500
Roanoke Division	10,500
Rocky Mountain Division	6000
Southeastern Division	9500
Southwestern Division	10,900
West Gulf Division	7500

During the course of the above, the Board was in recess from 3:44 P.M. to 4:00 P.M.

84) On motion of Mr. Holladay, seconded by Mr. Wilson, it was VOTED that the maximum amount authorized for reimbursement of expenses incurred by the Southwestern Division Director during 1984 be increased by \$600 to cover costs resulting from the change of administration during that year.

85) On motion of Mr. Turnbull, seconded by Mr. Atkins, it was VOTED that the Executive Vice President is hereby authorized to reimburse the following Committees, Task Groups and Task Forces created by the Board for expenses incurred by them during the year 1985 in the proper execution of their duties, and in accordance with Board policy, as follows:

Ad Hoc Committee on Washington Presence	\$ 2000
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Ad Hoc Committee on Strengthening of CRRL	6000
Ad Hoc Committee on Monitoring Goldwater Scholarship Committee	1700
RFI Task Group	1000
Committee on the Biological Effects of RF Energy	2500
ARRL Committee on Amateur Radio Digital Communication	3500
Task Force on Federal Preemption	12,250
	10,000

At this point, 4:20 P.M., Messrs. Anderson and Wangler departed from the meeting under the necessity of returning to their homes.

86) On motion of Mr. Grauer, seconded by Mr. Carey, it was VOTED that, to implement the policy of the Board to assume the administrative expenses of the ARRL Foundation, the Executive Vice President is hereby authorized to pay during the year 1985 a total amount not to exceed \$5000 in accordance with ARRL standing policies with respect to travel, accounting procedures and auditing.

87) On motion of Mr. Turnbull, seconded by Mr. Grauer, it was VOTED that to continue the Board's policy of reimbursing QSL bureau managers of the League for certain travel in furthering ARRL organizational objectives, the Executive Vice President is hereby authorized to pay during the year 1985 a total amount not to exceed \$4000 under terms prescribed by the general pattern established by the Board.

88) It was moved by Mrs. Ferdinand, seconded by Mr. Frenaye, that, to continue the Board's policy of reimbursing National Traffic System officials above the section level for certain approved expenses in furthering ARRL organizational objectives, the Executive Vice President is hereby authorized to pay during the year 1985 a total amount not to exceed \$16,000 under terms prescribed by the Field Services Manager following the general pattern established by the Board. On motion of Mr. Olson, seconded by Mr. Atkins, it was VOTED that the motion be amended by striking the number "\$16,000" and substituting the number "\$12,000". Mr. Hurlbert and Mrs. Ferdinand asked to be recorded as voting against the amendment. The question then being on the motion as amended, the motion was ADOPTED.

89) On motion of Mr. Baldwin, seconded by Mr. Carey, it was VOTED that, on a continuing basis, the ARRL President or his nominee be responsible for liaison with other IARU societies and regional organizations, not only worldwide but especially in Region 2.

90) It was moved by Mr. Baldwin, seconded by Mr. Heyn, that on a continuing basis the President of IARU, no matter from what country he originates, be invited to participate in each ARRL Board meeting as an observer and to provide such international expertise as may be appropriate. After discussion, on motion of Mr. Olson, seconded by Mr. Hurlbert, it was VOTED that this matter be laid on the Table. The following Directors wished to be recorded as voting against the motion to Table: Mrs. Ferdinand, Messrs. Atkins, Butler, Carey, Frenaye, Heyn and Turnbull.

91) On motion of Mr. Grauer, seconded by Mr. Butler, it was VOTED that the motion regarding charging a nominal fee for DXCC membership pins be lifted from the Table. After discussion, it was VOTED that the Executive Vice President is authorized to charge a nominal fee for DXCC membership pins. Mr. Frenaye and Mrs. Ferdinand asked to be recorded as voting opposed to the motion.

92) Mr. Baldwin was recognized by the Chair, and he thereupon withdrew his resignation as ARRL Vice President for International Affairs, which was to have taken effect at the close of the Board Meeting.

93) On motion of Mr. Wilson, seconded by Mr. Butler, it was VOTED that the following ARRL conventions are hereby approved:

Colorado State	March 17, 1985	Aurora, CO
Michigan State	April 13, 1985	Muskegon, MI
Arkansas State	April 13-14, 1985	North Little Rock, AR
Mississippi State	April 20-21, 1985	Jackson, MS
South Carolina State	May 4-5, 1985	Greenville, SC
Northwestern Division	May 31-June 2, 1985	Seaside, OR
Rocky Mountain Division	August 2-4, 1985	Jackson, WY
New England Division	October 4-5, 1986	Boxboro, MA

94) There followed an opportunity for all present to make final comments. There being no further business, the Board adjourned *sine die* at 5:43 P.M. Total time in session as a Board: 14 hours, 35 minutes; direct authorizations: \$204,550.

Respectfully submitted,
Perry Williams, WIUED, Secretary

- **Editorial Amendments to Part 97**
- **Malicious-Interference Bill Is Back**
- **FCC Censure-Y Club**

Amateur Antennas — The Debate Continues

ARRL Files Comments in PRB-1

Anyone wishing to file comments in PRB-1, the League's request for preemptive relief from restrictive antenna ordinances, got a last-minute reprieve on December 20. The FCC announced that several offices, including the office of the Secretary, would close early on December 24 and that any filings due on that day would be considered if received by the close of business December 26. At last count, more than 1400 comments had been filed, including supportive comments from the West Virginia Wing of the Civil Air Patrol and the Headquarters of the Middle East Region CAP. The CAP comments state that the Civil Air Patrol operates one of the largest volunteer communications networks in the world, and that "In order for Civil Air Patrol to maintain this type of communications network in support of the Emergency Services missions PROPER ANTENNA SYSTEMS are necessary. Throughout the country Civil Air Patrol members in communications have to deal with local restrictions and ordinances that make such installations difficult or impossible."

League comments filed by ARRL Counsel Chris Inlay, N3AKD, address the FCC's jurisdiction to preempt certain local land-use regulations, and the appropriateness of the exercise of this jurisdiction. Citing the recent FCC declaration of preemption of local regulation of SMATV (Satellite Master Antenna Television) systems, the comments state "the Commission has unquestioned jurisdiction to preempt local amateur antenna regulation . . . The appropriate analysis in preemption cases is not the degree of state and local interest in the regulation, but the local regulation's impact on federal objectives. When local regulation impacts on operational aspects of amateur communication, federal

preemption is available." The comments continue, "Local administrative remedies, and state and federal judicial remedies, are ineffective as a matter of fact in providing relief to amateurs beset with local land use problems. The requested ruling will cause municipalities to accommodate the needs of amateur radio licensees in land use planning efforts."

The comments cite several specific antenna ordinances as examples for the Commission, and state that "Because the Commission has been silent on the subject, the courts have found no limit to local jurisdiction over amateur antenna systems." The League concludes,

The flexibility inherent in Part 97 of the Amateur Rules, designed to provide an unregulated environment for technical self-training and enhancement of the radio art, should not be permitted to be defeated by municipalities which do not understand or intend to make adequate provision for amateur radio within their boundaries. Equipped with the requested Commission declaratory ruling, amateurs can establish on their own behalf the effect of proposed or enacted municipal ordinances on their ability to effectively communicate. They will do so with some assurance that their ability to communicate via amateur radio will not be summarily regulated away, and that less burdensome alternatives to blanket height and area restrictions will be seriously explored and enacted where consistent with safety of the citizenry.

The ARRL again respectfully requests that the Commission issue at the earliest possible date a declaratory ruling which states the Commission's intent to preempt all local ordinances which provably preclude or significantly inhibit effective, reliable amateur radio communications, and which are not necessary to carrying out a clearly articulated and affirmatively expressed compelling governmental interest related to the health and safety of the community.

Complete copies of ARRL comments are available from Hq. for an s.a.s.e. with 90¢ U.S. postage affixed.

Goldwater Introduces Antenna Bills

On January 3, 1985, Senator Barry Goldwater, K7UGA, introduced two antenna-related resolutions. One of them (S. Res. 36), if adopted, will declare the sense of the U.S. Senate that the FCC should affirm that state and local regulations must not unreasonably restrict communications from Amateur Radio stations. The other resolution (S. Res. 35) pertains to the rights of citizens to erect and maintain television receive-only (TVRO) satellite dishes.

The amateur resolution reads:

Resolution — To express the sense of the Senate relative to unduly restrictive state and local regulation of amateur radio antennas.

Resolved, That it is the sense of the Senate that, consistent with the policy of the United States to recognize and enhance the value of the Amateur Radio Service as a voluntary noncommercial communication service which provides public service and emergency communications, the Federal Communications Commission should affirm that state and local regulatory authority, including, but not limited to, zoning, public safety or health authority, and authority to grant a license or permit, must be exercised so that it does not: (1) discriminate unreasonably among amateur radio antennas and other types of home communications and/or reception antennas, or (2) have the effect of prohibiting or frustrating the transmission or reception of amateur radio communications by Federally-licensed amateur radio stations, except as may be necessary to carrying out a clearly articulated and affirmatively expressed compelling governmental interest related to the health and safety of the community.

This resolution, if adopted, will send a clear message to the FCC that favorable action on PRB-1 would meet with the approval of the U.S. Senate. Capitol Hill staff have been advised by Commission staff that consideration of PRB-1 by the full Commission should take place sometime in March.

FCC EDITS PART 97

The FCC has released two Orders that amend Part 97. Since these amendments are purely editorial, the usual notice and comment provisions do not apply.

On December 6, 1984, the Commission released an Order designed "to correct omissions, remove obsolete terms and provide better editorial uniformity." To update Part 97 in your copy of *The FCC Rule Book*, make the following changes:

1) In Subpart B of the Table of Contents, under the heading OPERATOR LICENSE EXAMINATIONS, add: Section 97.36 Reimbursement for expenses, and remove the headings: CALL SIGNS and DUPLICATE

LICENSES AND LICENSE TERM.

2) In the Table of Contents, change the entry for Section 97.114 to read: Limitations on third-party traffic.

3) In Section 97.3(d), remove the definition entitled *Interim Amateur Permit*.

4) In Section 97.5, delete the references to the Conditional Class operator license, and delete the word "Class" from the operator license classes. As amended, Section 97.5 reads as follows:

97.5 Classes of operator licenses.

Amateur Extra.
Advanced.
General.
Technician.
Novice.

5) In Section 97.7, delete paragraph (c), which refers to the obsolete Conditional Class operator license, redesignate paragraph (d) as paragraph

(c) and redesignate paragraph (e) as paragraph (d).

6) Change the heading of Section 97.114 to read "Limitations on third-party traffic," and add a hyphen between the words "third" and "party" in paragraph (a), where they first appear in paragraph (b), and in paragraph (c).

7) Add the following to the end of Appendix 2:

RESOLUTION No. 641

Relating to the Use of the Frequency Band 7000-7100 kHz

The World Administrative Radio Conference, Geneva, 1979, considering

a) that the sharing of frequency bands by amateur and broadcasting services is undesirable and should be avoided;

b) that it is desirable to have worldwide exclusive allocations for these services in Band 7;

c) that the band 7000-7100 kHz is allocated

*Information Services Assistant

on a worldwide basis exclusively to the amateur services; resolves that the broadcasting service shall be prohibited from the band 7000-7100 kHz and that the broadcasting stations operating on frequencies in this band shall cease such operation.

On January 18, 1985, the Commission released an order that states: "Section 97.121 of the Amateur Radio Service Rules provides that an operator shall not transmit any call sign which has not been assigned to the station which is being operated. A literal reading of the rule prevents an amateur from transmitting another station's call sign when responding to a CQ or using his own call sign for identification purposes when operating a station having lesser privileges. This, of course, is not the intent of the rule. The purpose of the rule is to preclude the illegal use of a false call sign as an unlicensed station or to avoid detection. This Order amends the rule to make it clear that in appropriate circumstances the call sign of another amateur station may be transmitted."

To update Part 97 in your copy of *The FCC Rule Book*, make the following changes:

The entire Section 97.121 is replaced with the following:

97.121 False Signals

(a) An amateur radio station must not transmit:

(1) False or deceptive signals or communications by radio; *NOR*

(2) For purposes of identifying the station, any call letter which has not been assigned to it. Notwithstanding the foregoing, when a station is operated within the privileges of the operator's class of license but which exceed those of the station licensee, station identification must be made by following the station call sign of the station being operated with the operator's primary station call sign in accordance with Section 97.84 (b).

(b) In responding to a general call (CQ), an amateur station may transmit the call sign of the station initiating the call.

On January 15, 1985, the Commission released a correction to a previous Order: "On November 8, 1984, the FCC released an Order which deleted the 2310-2390 MHz frequency band from the table of frequencies allocated to the Amateur Radio Service. Section 97.61, entitled Authorized frequencies and emissions, listed A3B in its table of emissions for the remaining 2300-2310 and 2390-2450 MHz band. A3B should be corrected to read A2B."

MALICIOUS-INTERFERENCE BILL REINTRODUCED

Senator Barry Goldwater has reintroduced the Senate bill to add a prohibition against malicious interference to the Communications Act of 1934. First introduced last year as S.2975 (see Happenings, Nov. 1984 *QST*), the bill provided for the seizure of equipment within the control of persons accused of malicious interference. The new bill, S. 66, does not contain the seizure provision, and simply adds a new Section 333 to the Communications Act to read "No person shall willfully or maliciously interfere with or cause interference to any radio communication."

FCC RELEASES FINAL REPORT AND ORDER IN CABLE TV RFI DOCKET

On November 9, the FCC released a second Report and Order in Docket 21006 (see Happen-

Are You a Lawyer? Amateur Radio Wants You!

Your legal expertise is needed in the Amateur Radio community to help build and maintain the legal foundations for our hobby. The League has initiated a Volunteer Counsel Program, designed to help stem the tide of overly restrictive regulations on Amateur Radio. You can help. If you have an interest in this exciting area of communications law, are a reputable member of the bar of at least one state and are a League member, please contact us. As a Volunteer Counsel, you will be kept well informed about areas of law affecting Amateur Radio. For further information, write to the ARRL Volunteer Counsel Program, 225 Main St., Newington, CT 06111.

ings, March 1982 *QST*, for details on the original docket). This final order adds frequency-channeling requirements and restrictions, and requires monitoring for signal leakage from cable television systems operating in the aeronautical bands 108-136 MHz and 225-400 MHz.

In finalizing a long-outstanding proceeding, the Commission has amended its rules to prevent cable television signal interference to aeronautical communication and navigation radio systems. Before cable television systems can operate on frequencies allocated for aeronautical radio, they must meet the following frequency offset, monitoring and cumulative signal leakage requirements:

In the aeronautical communication and navigation bands 108-136 MHz and 225-335.4 MHz, cable companies must adhere to strict channel requirements that place the cable signals approximately halfway between the aeronautical com/nav channels. In addition, cable systems must show compliance with signal leakage criteria by use of ground-based or air-space measurements as a prerequisite for operation in the aeronautical radio bands.

Because the Commission feels that the frequency-offset requirements provide adequate protection for the aeronautical communication and navigation channels, the power level limit for carriers or signal components in cable systems operating in aeronautical bands is increased from 10 microwatts to 100 microwatts.

Cable operators using frequency bands 108-136 MHz or 225-400 MHz will have to provide for regular monitoring for signal leakage covering all portions of the cable system at least once every three months.

Cable systems in operation before adoption of this Order will be allowed to operate under the existing rules for five years, after which all cable systems will be subject to the new rules.

The Commission stated that the primary goal in this proceeding was to determine the best way to ensure the protection of aeronautical navigation and safety radio services from harmful interference. The FCC further stated, "While the record does not support prohibiting cable operation on frequencies used by aeronautical radio services, it does support technically well-maintained cable system operation on aeronautical radio frequencies. If systems comply with frequency offset, monitoring, and cumulative leakage requirements, no harmful interference should result."

The original docket proposed to relax the leakage standards for cable TV systems. The ARRL filed comments opposing this action, and the Commission declined to approve the relaxation. The FCC also turned down a League re-

quest to ban cable TV operations from amateur frequencies (RM-4040; see Happenings, August 1984 *QST*).

The National Cable Television Association (NCTA) has filed a Petition for Reconsideration in this Docket, basing its request on the grounds that signal leakage is not the problem some have made it out to be. The group points to a statement made by the FCC in the Second Report and Order that there have been only five allegations of noncompliance with the existing FCC leakage rules between 1976 and 1980. (The context of the FCC's statement, however, was limited to harmful interference caused to the aeronautical and marine radio services.) According to NCTA, the new cable leakage rules will impose unjustifiably excessive burdens on cable operators.

FCC CENSURE-Y CLUB

The following information is taken from FCC news releases.

Effective June 17, 1984, the FCC suspended the Advanced Class Amateur Radio operator license of Dave H. Meehan, W7TVK, Las Vegas, Nevada, for one year. Following the one-year suspension, Meehan will be barred from operating in the frequency band 7235-7280 kHz. The Commission commenced proceedings against Meehan on May 18, 1984 for willfully interfering with the communications of other amateurs operating in the vicinity of the frequency 7255 kHz in violation of Section 97.125 of the Commission's Rules. After the beginning of the proceedings, Meehan agreed to a one-year suspension and to being restricted (after the suspension) from operating in the frequency band from 7235 kHz to 7280 kHz.

Francis P. Allen, Sr. (KB6DPX), San Jose, California was caught operating SSB substantially outside the 10-meter band at 12:42 A.M. March 30 and fined \$1000 for willful violation of the Communications Act. Allen surrendered his Novice license, and because of his subsequent candor and cooperation, he was permitted to make monthly payments starting in June. The final installment was received in mid-October.

Responding to complaints of random improper "business" communications by a "Bill" identifying as "WB6DLD" over the WA6QFR repeater, the FCC San Francisco office determined at 8:19 A.M. September 25 that a portable transceiver at 14th and Dutton Streets in San Leandro, California, was being operated on 146.250 MHz by Dave Goto, of that city. He was fined \$750 for willful unlicensed operation. Goto has not replied nor paid the fine. If standard procedures are fruitless, the case will be referred to the United States Attorney for collection action in U.S. District Court. WB6DLD is a valid amateur station call sign held by an unrelated Technician class operator in San Leandro.

Following several complaints of a "Rick" identifying as "WD6BJC" over the WA6TWX repeater, FCC San Francisco district office personnel traced a pickup truck commuting between Marin County and Berkeley on June 29. Rick Dwayne Mendell, of Corte Madera, California, was fined \$750 for his unlicensed operation. Based on subsequent cooperation and other factors in his candid reply, the fine was reduced to \$400, payable in \$100 monthly installments. Three payments have been filed on time, and should the full amount be received no further sanction action is contemplated, absent further violations by Mendell.

Responding to a complaint, an FCC San Francisco district office field investigation

Be a Contributor to the Goldwater Scholarship Fund

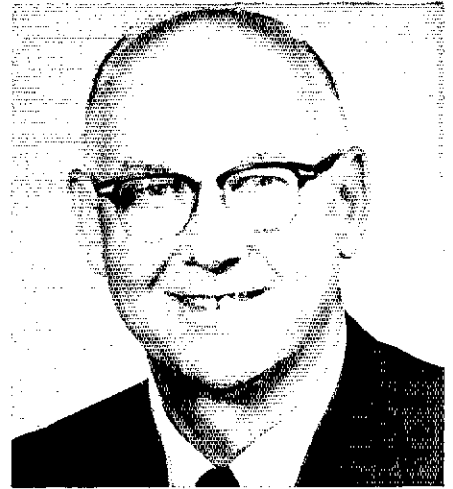
Here's your opportunity to thank Barry, K7UGA, for his long-term staunch support of the Amateur Radio Service and to let him know of your appreciation. Send in your contribution now.

If your contribution is \$25 or more, we will list your name and call in QST. If your contribution is \$100 or more, in addition to your name and call appearing in QST, you will receive a signed photograph of the Senator, suitable for display in your ham shack. And for contributions of \$1000 or more, in addition to the above, we'll put your photo in QST and you'll receive a personal thank you call from Robert York Chapman, W1QV, President of the ARRL Foundation, which is administering the Goldwater Scholarship Fund.

We welcome all contributions, regardless of size. Please help us achieve our goal of building an endowment sufficient to fund the Goldwater Scholarship in perpetuity. What better way to honor a great amateur, a great statesman and a great human being? Please make your check payable to the ARRL Foundation Goldwater Scholarship Fund, and send to ARRL Foundation, 225 Main St., Newington, CT 06111.

Recent contributors of \$25 or more include:

Allen D. Ballentine, W1TRS; Azimuth Communications Corp.; Forrest Barr, K6BV; Beacon Radio Amateurs, in memory of Herman Lukoff, W3HT/W3HTF; Bergen Amateur Radio Assn.; Parvez (KA2JZX/AP2PA) & Nayer Bukhari; Art Charlap-Hyman, W6ZNO; Jerrold (W9CZI) & Kathryn (K9CLM) Colten; Cracker Net Members; Lawrence R. Eicher, KB4EPK; Joseph A. Fährner, KA2BIW; Edwin V. Faulhaber, KA2FXM; Carl A. Felt, Jr., N2XJ; William F. Fenn, N4TS; Fox River Radio League Inc.; Issaquah Amateur Radio Club; George Kuhnbaum, W2QHU; Gay E. Millus Jr., W4UG in memory of Gertrude E. Ernst; Nashua Area Radio Club Inc., in memory of Laurence Barker, N1ANC; James (K1VII) & Andrea (K1WLX) Parker; James R. Parker, W4EKB; James F. Starkey, W0KGY; Robert J. Templin, W8ZSX; Doug Tidwell, K4UUW; Allan D. White, W1EYI; L. Phil Wicker, W4ACY.



L. Phil Wicker, W4ACY, the latest \$1000 contributor to the Barry Goldwater Scholarship Fund.

established that James E. Rich, WD6CJB, a General class operator, operated the amateur station in his Millbrae, California, home for unauthorized business purposes in violation of Section 97.100 of the Rules and failed to properly identify the transmissions (Section 97.84). Rich was fined \$500 for willful violation; the full amount was paid in November, and the matter is considered closed.

RAY MEYERS, W6MLZ

We regret to report the death of Ray Meyers, W6MLZ. An ARRL Southwestern Division Director from 1959 to 1965, Ray's radio career was very colorful, and included a stint as a radio operator on the privately owned submarine *Nautilus*. Manager of radio operations at Lockheed Corporation, he was president of the North Bay Amateur Radio Club, Lockheed Employees Radio Club and Ramona Radio Club, as well as chairman of the San Francisco Council of clubs and vice chairman of the Los Angeles Council of Clubs. Ray was host of the 1961 ARRL Board Meeting in Anaheim, California. After leaving the Director position in 1965, Ray served as Executive Secretary of the Old-Timers Club. Ray's "nose for news" was legend — he made sure ARRL got the publicity it deserved, and he turned in some great publicity photos for QST. We will miss him.

AIRS UPDATE

Based on reports gathered in October, November and December, the ARRL Interference Reporting System has submitted data to the FCC on the following signals: 7001 to 7005 kHz (lin-complex emission, location thought to be Tahiti); 7050 kHz (A3E emission, identifies as Radio Quince de Septiembre); 14,073 to 14,078 kHz (F1B emission, no ID); 14,169 kHz (F1B emission, no ID); 14,218 kHz (F1B emission, location thought to be USSR); 14,226 kHz (F1B emission, location thought to be USSR); 3600 kHz (A3E emission, location thought to be Cuba); 7100 kHz (A3E emission, Radio Moscow, with lower sideband extending downward into the exclusive amateur segment); 7120 kHz (A1A emission, thought to be a spur from a Mexican point-to-point transmitter on

7575 kHz); and 14,160 kHz (F1B emission, no ID, location thought to be USSR); 7014 kHz (A1A emission, UHF3, location USSR); 7018 kHz (F1B emission, UMS, location USSR); 7048 kHz (F1A, F1B emissions, UHF3, location USSR); 14,003 kHz (F1B emission, no ID); 14,118 kHz (F1B emission, Y5K); 14,216 kHz (F1B emission, bearing Havana, no ID).

The latest AIRS alerts are for 3600, 7100 and 7120 kHz. AIRS members have submitted 11,000 reports to date.

SECTION MANAGER APPOINTMENT

In the Kentucky Section, Rose Marie Perciful, KA4SAA, has been appointed to complete the term (until March 31, 1985) of Anna I. Jackson, KA4GFU (resigned).

In the West Indies Section, Carlos Flores, NP4KA, has been appointed (after Hq. received no response to two resolicitations in QST) for the term April 1, 1985 to October 1, 1986.

THREE CORDLESS-PHONE DISTRIBUTORS FINED

Three distributors of cordless telephones have been fined \$2000 each for repeated sales of telephones that fail to meet the FCC's radiated-power limitations. Based on measurements taken by the Office of Science and Technology, the Field Operations Bureau has sent Notices of Apparent Liability for Monetary Forfeiture to TAD Avanti, Dynascan and Uniden.

The FCC Laboratory has tested representative, commercially available samples of the new 46/49-MHz cordless telephones as part of its upgraded sampling program. The staff of OST's Sampling and Measurements Branch is continuing to test cordless phones and other devices in order to determine whether equipment, once approved for marketing, continues to comply with the technical standards throughout its manufacturing period.

F2 REQUESTED FOR 10-METER REPEATERS TO FACILITATE ID

On November 27, 1984, the League filed a petition for rulemaking (RM-4880) requesting the FCC to authorize F2 emissions on 29.5 to


29.7 MHz. This would allow 10-meter FM repeaters to identify in that mode. Presently, 29.5 to 29.7 MHz is the only segment authorized for repeater operation that does not also include F2 emission. The petition states, in part, "Thus, to facilitate the development of FM repeater technology in the 29.5 to 29.7-MHz subband the standard means of repeater identification should be authorized. The same is hereby requested."

KP4AM ASKS FOR 7075-7100 PHONE FOR PUERTO RICO

David Novoa, KP4AM, has filed a petition for rule making with the FCC requesting that the Commission authorize phone operation on 7075-7100 kHz in Puerto Rico and other U.S. Caribbean territories. KP4AM states that use of this segment would facilitate contact with South American amateurs, and cites the "local unique situation," that Puerto Rico and the Caribbean territories are the only U.S. possessions not allowed to use phone in this segment. He also says that "during nighttime, the segment above 7100 kHz is almost useless, due to the above-mentioned interference especially from nearby broadcasting stations. This particular situation does not exist in the continental states."

Supportive comments have been filed by the DX Club of Puerto Rico. The comment deadline has passed, and we are awaiting Commission action.

NEW MODE DESIGNATORS ADOPTED

On November 27, 1984, the FCC released its third Report and Order in Docket 80-739, in which it places the mode designators adopted at WARC '79 into the general (Part 2) and individual service rules (Parts 15, 21, 22, 23, 74, 81, 87, 90, 95, 97 and 99). See the *ARRL 1985 Handbook for the Radio Amateur* for complete details on the new designators. Although these changes officially became effective on January 3, 1985, they will be implemented gradually. For example, people filing type-acceptance applications will not have to use the new mode designators until April 1, 1985. Candidates preparing for amateur examinations will not be tested on their knowledge of the new mode designators until the next scheduled revision of the various examination elements. 



Let's Simplify the DXCC

At year's end, W5DV submitted the following comments to Headquarters. He notes that for many years he has been disturbed by the level of animosity generated by the competitiveness of the DXCC. He acknowledges that "although it is by far the most popular operating achievement in Amateur Radio today, no one is happy with it." His comments were generated in keeping with the precept that, indeed, the amateur is helpful. Your column editor read it and chuckled all the way through having, in truth, heard many similar suggestions over the years — suggestions made by the applicant in good faith. Enjoy reading W5DV's comments and keep in mind that like many of life's enigmas, there really isn't a simple answer that will satisfy everyone.

As one who has been licensed for more than 25 years, and a member of the DXCC for 16 of those years, I have seen my share of controversies. Usually, they boil down to a single issue: Do contacts with a certain station count for DXCC, or not? The answer is perceived to be crucial, for on it hangs a person's standing in the DX Century Club. Naturally, a given DXCC applicant may see the rules as being narrow and inflexible when one of his hard-fought battles does not produce any DXCC credit. Generally, the result is acrimony, in keeping with the well-known propensity of DXers to settle their disputes like children.

The trouble is the DXCC rules. They are just too rigid, with no allowance for individual situations. The result is that many well-meaning and earnest DXCC aspirants are frustrated in their efforts to progress. The obvious answer, then, is to modify the DXCC rules so that good intentions are duly rewarded while minor personal shortcomings are mercifully forgiven. With these noble objectives in mind, I hereby propose the following additions to the DXCC rules. These proposals are segregated into various broad categories so that similar concepts may be studied within an overall context.

Operating

1) Telephone conversations may be substituted for actual QSOs when the solar flux drops below 80.

2) Individuals may count contacts made while "guest operating" another station during a contest.

1985 INTERNATIONAL DX CONVENTION

Without doubt, this is the largest DX-oriented convention held. It has attracted DXers from all continents

3) Contacts may be made for credit by an applicant's friend, as long as the friend uses the same phonetics as the applicant customarily uses.

4) Where third-party agreements exist, credit may be granted for contacts made via phone patch.

5) In the event that a DX station works stations by call areas, a QSO will be deemed to have occurred as long as the applicant called with his respective area, whether a QSO actually resulted or not.

6) Credit will be automatically given for any attempted QSO in which the applicant signs "QRP" after his call.

7) Credit may be given for contacts with *Slim* as long as the applicant acted in good faith, but was fooled.

DXpeditions

1) DXCC members may be given full endorsement credit for any DXpedition taking place while the member is away from home on business or vacation, or has his tower cranked down.

2) Credit may be given for working a DXpedition if an applicant attends the slide show presentation of that DXpedition at a recognized convention.

3) If a DXpedition is announced in any nationally recognized DX bulletin, it will be deemed to have occurred, and credit may be granted for QSOs with that station to any bulletin subscriber in the event that the DXpedition fails to materialize.

4) Bonus countries may be obtained by presenting evidence of having worked a given DXpedition more than five times on the same band and mode (i.e., six 20-meter phone contacts with Antigua will enable an applicant to select another country for credit, such as Albania).

Confirmation Procedures

1) In the event that a QSL is returned stamped "not in the log," credit will be given if the candidate furnishes a signed statement that he thinks he worked the station.

2) In the case of a DXCC country considered to be "too dangerous" to activate, an applicant may be given credit for that country upon presenting satisfactory evidence that he has worked another country on the same approximate great

circle bearing but at a greater distance, either short path or long path.

3) Contacts with stations in any Islamic country may be substituted and counted for Libya, at the applicant's option.

Lists

1) Stations who fail to contact a certain DX station, due to their inability to get on the list, will be given full credit for that country. A busy signal at the Listmaster's home may be construed as "inability."

2) Any station who hears both sides of a list QSO well enough to shout "good contact" will be considered to have worked that DX station.

Honor Roll

1) Persons reaching 65 years of age will automatically be granted sufficient credits to enable them to attain Honor Roll status.

2) For first-time Honor Roll applicants only, contacts made on Doctor DX™ may be substituted for credit.

Special Awards

1) Phone contacts may be substituted for the purposes of the CW DXCC if the DX station will acknowledge a recognition of either dits or dahs.

2) CW contacts may be substituted for the purposes of the Phone DXCC if the DX station had laryngitis within two years before or after the QSO.

DX Advisory Committees

1) The DX Advisory Committee will consist of all active and inactive members of the DX Century Club. Passage of any amendments to these rules will require unanimous approval of committee members.

Inclusion of the above proposals in the DXCC rules would all but eliminate the controversies and bitterness associated with DXing today. Let's admit it: We need to do something. When is the last time you heard someone waxing eloquent about the unfairness of BPL? Yet one hears nothing but gripes and complaints at any and every gathering of DXers, on the air or in person. If the ARRL would make things fair, as the above proposals attempt to do, just about everyone could say that he had a realistic chance of making the Honor Roll.

Of course, no one would care.

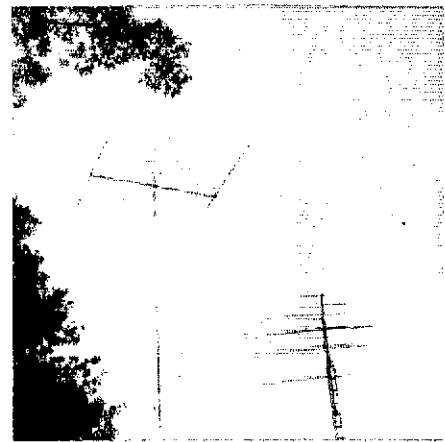
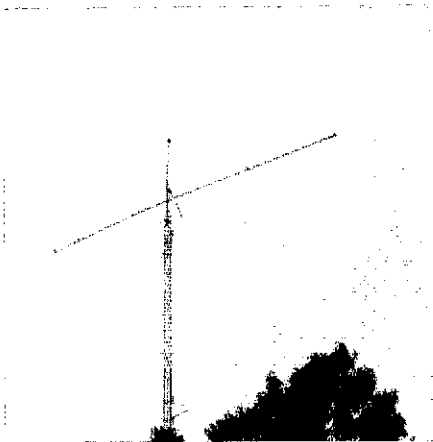
over the years and has been growing at a yearly rate of 10%. If you're *serious* about your DXing, this is an event you won't want to miss!

Mark your calendar now for April 19-21, 1985: the Center Plaza Holiday Inn (a brand-new venue), 2233 Ventura Ave., Fresno, CA 93721, tel. 209-268-1000. Publicity Chairman K6SSJ strongly recommends im-

mediate reservations, using the aforementioned number (instead of the 800 number) to avoid hassles. One of the main attractions will be the returning Clipperton Island DXpedition Group (scheduled to return to the West Coast on the Wednesday preceding the convention).

A Contest Forum, as well as the big DX Forum, are

*19620 SW 234 St., Homestead, FL 33031



K4JPD somehow finds time to tool around Atlanta when not radiating from these monsters.

on the agenda. A technical program on computerized 20-meter beams will be presented by both OH8OS and W6KPC. (After five years, both antennas are working with their associated computers — OH8OS operational with 48 elements, and W6KPC with 36 elements; the antennas are steerable in both azimuth and elevation.)

The Northern California DX Club, Inc. is hosting the 1985 extravaganza, with N6ST as general chairman. Additional convention information is sure to appear in the weekly DX bulletins as we can approach convention time. Hope to see you in Fresno!

TWO-METER DX

A major DXpedition is currently being planned by the West Kent Amateur Radio Society, to take place over a two-week period beginning August 7. The major objective is to establish a station at a favorable (but somewhat inaccessible) location on the west coast of the Republic of Ireland to attempt a first-ever direct transatlantic contact with North America. If you're located on the East Coast and can run high power on 144 MHz, contact the group ASAP — Dave Green, G4OTV, 13 Culverden Down, Tunbridge Wells, Kent TN4 9SB, U.K., tel. 0892-28275 — to set up HF skeds

to make preliminary arrangements.

K4JPD

K4JPD recently shared photos of his new QTH with this editor — a location about 10 acres on top of a hill, 35 miles from Atlanta. As the accompanying photos clearly show, Steve believes in *big* antennas! 160 meters, a dipole at 130 ft; 80 meters, a 2-element KLM beam (40-ft boom, 90-ft elements) at 155 ft; 40 meters, a rotary dipole at 133 ft; 20 meters, a 6-element beam on a 58-ft boom at 115 ft. Oh, yes, there is a small tower holding four elements for 15 and three elements for 10 at 65 ft and three elements on 20 at 60 ft. There is still another 130-ft tower to go before Steve is finished. He has been licensed 26 years, and enjoys contesting and DXing. He has operated portable from C6A HH HP1 KH6 KP2 KP4 SU 6Y5 9Y4, and is a member of the Dixie DX Contest Club. As his car license plate shows, he is never far from calling *CQ DX!*

THE CIRCUIT

U. Bouvet: The attempt by the LA DX Group for an early 1985 DXpedition has not been successful — transportation to Bouvet being the problem. The group

thanks everyone for their assistance and interest, and will continue to investigate future possibilities.

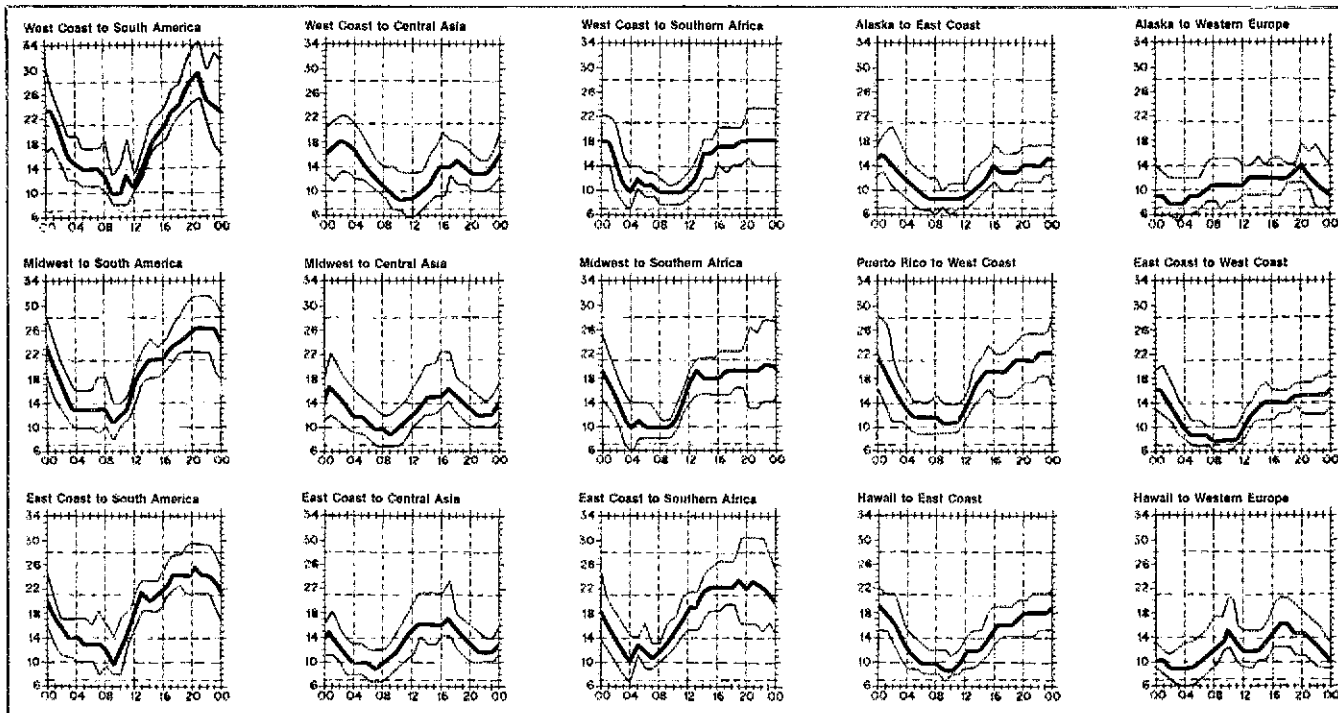
U.K. Cyprus Bases: The ARRL Awards Committee has accepted the DXAC recommendation to recognize the base areas separately from the Republic of Cyprus. Any credit submissions as a result of this action will not be accepted until June 1. Further details elsewhere.

ZF2AY: K9LA operated under this call in the Feb. CW event. Cards go to him (and not N8AA as indicated in the *Foreign Callbook*).

Navassa: Upcoming is a 6Y3 DXpedition, with Coast Guard approval.

XW8BP: The *DX Family Newsletter* brings good news about Feng, XW8BP, who was very active on both phone and CW from Laos up to 1975. He now resides in Taipei, and passed the Formosa Amateur Radio examination late last year. (JH1ARJ still has XW8BP's old logs.)

Carolina DX Association: New officers include Pres. WA4VCC, V.P. KF4NO, Secy./Treas. KD4RH and Bulletin Editor W4WMO. CDXA holds quarterly meetings in the Charlotte area, and visitors are most



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



Minute 81 of the March 1984 ARRL Board Meeting authorized an appropriate plaque to any amateur who has attained the DXCC Honor Roll as previously published in QST. This handsome red and white on brass, walnut-mounted plaque comes engraved with the member's call. A matching phone and CW sticker denotes mode, if qualified. When ordering, Honor Rollers should include the month/year your call appeared in QST and the totals shown with a check for \$25 to ARRL.

welcome to their repeater, 147.78/18. Contact KD4RH for further information regarding the club.
 Help!: WSTZN is looking for C2INI (April 9, 1978) and VR8O (June 11, 1978). WB4CSK wants 3D2MD (Nov. 1977), TA1AB and OESGT/YK (Dec. 1981), and P29PS (Feb. 1982). QST

QSL Corner

Administered By Joan Hushin, KA1IFO

ARRL-MEMBERSHIP OVERSEAS QSL SERVICE

Send outgoing cards: American Radio Relay League, QSL Bureau, 225 Main St., Newington, CT USA 06111.

This is an "outgoing" service that allows ARRL members to send DX QSL cards to foreign countries at minimum cost and effort. While QSLing direct to foreign amateurs is faster, it is also more tedious. Time spent searching for addresses in the foreign *Callbook*, addressing and stuffing envelopes, and mailing could be better spent operating DX. And, the cost of IRCs, Airmail postage and envelopes can be prohibitive.

An unlimited number of QSLs may be sent for distribution 12 times per year. The fee is just \$1 per pound or portion thereof (155 QSL cards average a pound). Recommended size of QSL cards is 3 1/4 x 5 1/2 in (90 mm x 140 mm).

The ARRL-Membership Overseas QSL Service operates *only* in an "outgoing" capacity. To receive QSLs from DX stations, see "The ARRL DX QSL Bureau System," Dec. 1984 QST, page 67, or send an s.a.s.e. to ARRL QSL Bureau, 225 Main St., Newington, CT 06111.

U.S. amateurs may send SWL reports to foreign shortwave listeners. Unlicensed (associate) members may send SWL cards to foreign amateurs. QSL managers: Write for details.

Note: The ARRL QSL Service should not be used to exchange QSL cards within the 48 contiguous states.

Requirements

1) Presort your DX QSLs alphabetically by call-sign prefix (AP, C6, CE, DL, F, G, JA, LU, PY, 5N, 9Y, and so on).

2) Enclose the address label from your current copy of QST. The label shows that you are a current ARRL member.

3) Enclose payment of \$1 per each pound (or less) or cards — approximately 155 cards weigh 1 pound. In other words, \$1 is the *minimum charge* whether you send 1 card or 155 cards. Please pay by check (or money order) and write your call sign on the check. Do not send cash.

4) Include only the cards, address label and check in the package. Wrap the package securely and address it to the ARRL Outgoing QSL Service, 225 Main St., Newington, CT 06111.

5) Family members may also use the service by enclosing their QSLs with those of the primary member. Include the appropriate fee with each individual's cards and indicate "family membership."

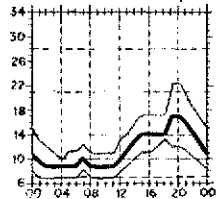
6) Blind members who do not receive QST need only include the appropriate fee along with a note indicating that the cards are from a blind member.

7) ARRL affiliated-club stations may use the service when submitting club QSLs by indicating the club name. Club secretaries should check affiliation papers to ensure that affiliation is current. In addition to sending club station QSLs through this service, affiliated clubs may also "pool" their members' individual QSL cards to affect an even greater savings. Each club member using this service must also be a League member. Cards should be sorted "en masse" by prefix, and a QST label enclosed for each ARRL member sending cards.

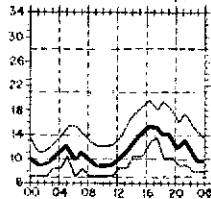
Countries Not Served

A5	Bhutan	V4	St. Christopher and Nevis
A6	United Arab Emirates	VP2E	Anguilla
A7	Qatar	VR6	Pitcairn Island
BV	Taiwan	XT	Burkina Faso
C9	Mozambique	KU	Kampuchea
D6	Comoros	XW	Laos
ET	Ethiopia	XX9	Macao
HZ	Saudi Arabia	XZ	Burma
J5	Guinea-Bissau	YA	Afghanistan
KC4	U.S. bases in Antarctica	ZA	Albania
KC6	Belau	ZD7	St. Helena
KC6	Micronesia	ZD9	Tristan da Cunha
KH1	Baker and Howland Is.	ZK2	Niue
KH3	Johnston Is.	ZK3	Tokelau
KH5	Palmyra and Jarvis Is.	3C	Equatorial Guinea
KH7	Kure Is.	3V	Tunisia
KH9	Wake Is.	3W	Vietnam
KP1	Navassa Is.	3X	Guinea
KP5	Desecheo Is.	4W	North Yemen
P5	North Korea	5A	Libya
T2	Tuvalu	5H	Tanzania
T3	Kiribati	5R	Madagascar
T5	Somalia	5U	Niger
TJ	Cameron	5X	Uganda
TL	Central African Rep.	7O	South Yemen
TN	Congo	7Q	Malawi
TT	Chad	8Q	Maldives
TY	Benin	9G	Ghana
TZ	Mali	9N	Nepal
		9U	Burundi

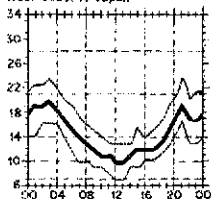
West Coast to Western Europe



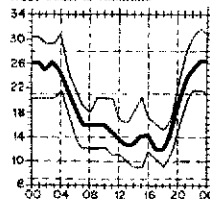
West Coast to Eastern Europe



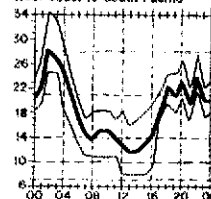
West Coast to Japan



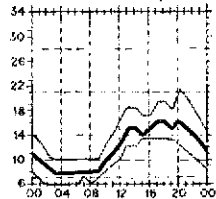
West Coast to Australia



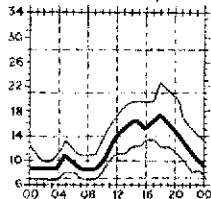
West Coast to South Pacific



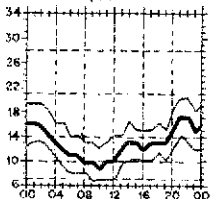
Midwest to Western Europe



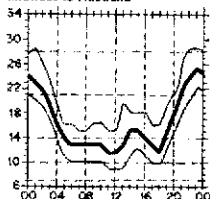
Midwest to Eastern Europe



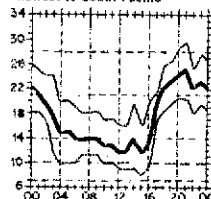
Midwest to Japan



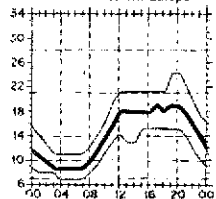
Midwest to Australia



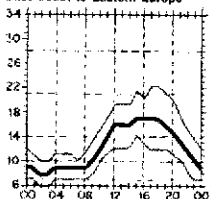
Midwest to South Pacific



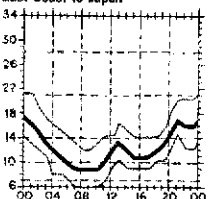
East Coast to Western Europe



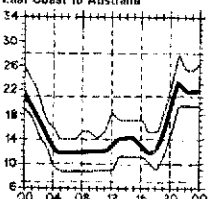
East Coast to Eastern Europe



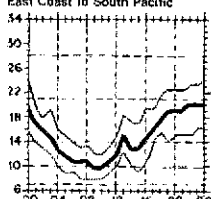
East Coast to Japan



East Coast to Australia



East Coast to South Pacific



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 March 15 to April 15, 1985, assume a sunspot number of 33, which corresponds to a 2800-MHz solar flux of 88.

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 November 16 through December 27, 1984. An s.a.s.e will bring you the rules and application forms for participation in the DXCC program.

New Members

Mixed									
CT2DO/121 DK2JX/155 DL3FAP/121 DL7ABZ/100 DLADK/137 DL8EJ/108 EA4CTU/106	EA6ANT/130 HA5JP/119 I2WJU/175 JF1CKL/248 JA2RGS/109 JR2MKQ/103	JG3MBF/205 JH8XSW/140 OE2YGM/154 OH7AU/110 OH7EU/155 PA3BXC/127	PA3CCE/116 PY4ZU/237 TJ1QS/101 XE3ABC/101 5Z4YV/180 N1CNC/100	W1EP/297 W1IIP/110 WB1EJU/109 K2MFB/103 K3VWP/109 KB2XL/217	KD2CR/103 KY2L/101 NF2K/210 WA2L/WA145 K3VWP/109 KF4IL/137	K14DG/103 W4WYX/123 W14E/104 K5EPA/105 WA5OXK/128 WA5QHX/110	W6MED/106 W6PVD/103 W86FZN/200 KC7HC/100 KG7O/100 N8FUL/110	WA8LXW/174 KD9HK/101 K9W/101 N8NB/201 W9NPI/104 KD9OH/106	
Radiotelephone									
C53BI/101 CE4EBJ/118 CT2CM/106 CT2DR/185 CT2FH/128 DK2JX/150	DL7ABZ/100 EA4CTU/105 EA6ANT/130 F6EUG/110 F6FGJ/185 F6INJ/103	HG5AAP/103 IK1BOB/180 I2WJU/174 O2EAGN/179 JF1CKL/248 JA2GSO/109	JH2AZP/109 JH8XSW/129 LA1SEA/130 OE2KGM/154 OE2YGM/138 PY4ZU/179	VE2GHZ/102 VK7UA/124 VU2CVP/108 VU2DVP/109 5Z4YV/180 9J2JI/106	W1EJU/103 KB2XL/212 K12P/157 K3GMP/110 KC3KE/159 WA3GLA/103	KB4IZB/100 KF4IL/132 K14D/100 W44APM/102 K5EPA/105 W5MUA/123	KG6AQ/100 KG6FG/107 N7BJT/110 W7LZG/101 N8COY/104	N8CQA/105 W88BW/100 KD9CN/104 N9NB/148 WD9CIR/105	
CW									
CX2AQ/110 DF5KU/101 F6JJA/101	HA5JP/102 JA2FXV/194 JR2MKQ/102	JA7BE/106 OK3TAY/101 OE2KGM/107	OH2BFV/111 OK3TAY/101 PY2RRG/102	PY4ZU/164 SM5MO/190 K1NTR/102	N1AFC/116 K12P/110 KS2C/100	NA2G/105 KC3Q/100 KB4CTX/109	W4NM/101 W4WNB/100 N6BLN/102	N7DHA/126 N9BN/103 N9NB/143	
160 Meters									
OZ1LO/101	K1NA/100	W0CD/101							
5BDXCC									
F6BLP AK8Q CP8HD	KE1K AD8J G3RUR	I1JQJ W2HG JR1EBE	HK3DDD PA3FBM	LZ1YE WB9MSV	K2PK W3UM	SP2FAX W0RYW	I0CEP JA6GIJ	I4CSP KS2I	

Endorsements

Mixed									
CE8AE/303 CX2AQ/139 DJ1ND/285 DJ4BE/256 DJ5BN/308 DJ9RQ/318 DK2XX/302 DK5OK/310 DL3GG/153 DL8VN/289 EA3CTI/273 EA6CF/240 E18H/329 F2NB/315 F6EYS/290 F9YZ/328 G3EFS/252 G3HTA/333 G3RUX/326 GM3LYY/237	HA5LV/204 H99CIQ/251 HK3YH/272 I1FNX/312 I2AYN/130 I19KZ/W/314 I0ZG/305 JA2CXK/283 JA6GIJ/300 JH7BRG/297 JA9AA/338 OE2DYL/251 OE2KGM/207 ON4FQ/320 PY1H/346 SM5BMB/261 SM5MO/263 SP2BRZ/256 SM0CCE/350 VE2FEX/283	VE2FT/168 VE3FEA/295 VE3JGC/W/180 VE3LDT/290 VE3NI/283 VE3OX/340 XE1KS/329 XE1OD/195 YU3PO/236 ZL2ACP/315 Z56P/146 AD1V/200 AK1N/255 K1JHU/162 K1QPM/126 KA1UT/261 KM1R/227 KT1H/176 NA2Q/150 KX1AJ/249	N1BVZ/151 W1BFA/324 W1HEO/293 W1KGH/333 W1NG/331 W1ODY/321 WA1KUL/292 WB1ATZ/152 K2AX/153 K2HYN/320 K2SCU/125 K2SX/289 K8E/285 K12P/203 K2R/252 K2JW/125 N2BA/127 N2CIC/203 NA2Q/150 ND2K/180	W2CKR/283 W2GW/358 W2LZX/316 W2MT/296 W2OW/158 W2PK/286 WA2CBB/334 WB2CJY/288 K3SEW/273 KB3MC/250 W3ENL/125 W3EV/305 W3TVB/309 WA3X/319 WA3AFS/201 WA3TXV/162 AA4V/320 AG4S/290 K4FC/231 K4FX/279	K4JPD/297 K4NV/280 K4RD/320 K4RZ/320 K4JH/206 K4BA/124 KN4B/312 N4BSN/263 N4DS/210 N4HBD/180 N4HOH/175 W4FL/257 W4NW/250 W4OWJ/338 W4WZ/292 WA4VCC/300 WB4RFZ/306 WA4VCC/300 K6BZU/325 K6EA/190 N6EA/350 N6IZM/182 K6SDQ/290	K5RO/290 KT5A/299 N5BQO/125 N5OK/319 W5NF/227 W5NW/356 WA5KBB/125 WA5NQJ/200 WA5TOS/272 WD5ELJ/230 WD5AAM/280 WD5CCM/127 K6DT/340 K6PZ/326 K6SD/286 KG6AM/190 KG6E/185 N6EA/350 N6IZM/182 W6FL/152	WC6I/201 K7DXJ/200 KB7OD/251 KC7G/260 W7GJW/344 K88V/325 N8BM/315 W8CT/334 W8PCS/271 W8CZA/290 K9FD/310 K9PY/228 K9CJ/266 K9QO/127 N9BN/141 N9CIC/206 W9EQP/316	W9FD/347 W9FH/320 W9GMS/271 W9HI/200 W9NC/200 W9TC/314 W9ZA/320 K9HQW/272 K9LUZ/319 K9QO/292 K9YRX/328 KB9CN/149 KB9JW/205 KD9IL/200 K9CJ/266 N9JW/260 W9UD/335 WA9QV/150 WD9DDU/189	
Radiotelephone									
CP6IM/199 DJ3QX/323 DJ9RQ/317 DJ9ZB/327 DK2XX/299 DK3HL/318 EA1ABT/260 EA1AWW/184 EA5BCX/252 EA7CEO/242 F5OK/310 F5YU/327 F9MD/338 GM3LYY/136	HB9AHA/330 I1KGF/127 I2JSB/289 I2WTY/304 I3YRN/303 I5WRI/308 I6OLK/325 I0ZG/301 JA2CXK/281 JH8MXH/270 JA9AA/298 LU9DBK/145 OE2DYL/248 ON8XA/334	OZ1ACB/181 OZ3PZ/326 OZ4ZT/179 PA9HBO/353 PJ3DO/189 PZ5JR/181 SM5MO/232 VE2FT/161 VE3FEA/290 VE3NI/276 VE4JK/290 XE1KS/329 XE1OD/195 YV1KZ/332	3D2DM/175 AK1E/228 AK1N/251 KB11/300 KE1K/252 KM1R/210 KT1H/175 N1BPJ/139 W1BFA/310 W1HEO/283 W1NG/323 WA1KUL/280 WB1CTO/185 K2TQC/323	KA2HMJ/161 KC2FC/264 KC2RS/271 KQ2O/260 N2BA/256 N2CIC/203 W2CKR/269 W2LZX/310 WA2CBB/272 WA2OEP/251 WB2CJY/143 W3Y/286 AA4V/312	AK4T/291 K4RSB/307 N4AQA/199 N4BSN/261 N4HBD/175 WBABL/330 WABIM/293 WAJD/285 WAZCB/310 WA4VCC/300 WB4RFZ/305 WQ4O/128 K6SDQ/285	WA5NQJ/193 WA5OXK/127 WD5AAM/279 W5DELJ/190 K6DT/320 K6PZ/319 K6SD/283 N6AT/286 W6BWW/300 WB6FZN/200 KB7SU/282 KC7G/260 KUT7F/177	W7EDA/276 WB7CEH/222 K8SQE/321 K8CN/275 W8ELE/229 W8QFN/217 WA8YTM/200 WD8CZA/286 WD8MRC/233 K9PSN/261 K9PY/201 KF9J/291 K9QO/251	W9DNE/329 W9NZW/177 W9TKD/337 W9VSL/161 W9ZA/298 K9HQW/272 K9CJ/266 K9LUZ/265 K9QO/300 KB9CN/148 K9CJ/266 N9ABE/201 W9PT/302	
CW									
DF1OF/145 DF2ZH/262 DJ1ND/199 DK2UA/181 EA3CTI/221	F6CZL/161 GM3LYY/231 JA1ELY/307 JH2TP/179 JH7BRG/297	LA9PCA/151 OE1TKW/148 OZ7BW/308 SM4FZC/162 SM0CCE/277	XE1VY/178 K1XA/225 W1NG/309 K2SX/260 KY2W/177	W3TVB/280 AA4V/184 AG4S/273 K4NV/280 W4CZU/261	W4JD/280 K5MC/162 KT5A/282 K4NV/280 WD5ELJ/131	K6DT/293 K6PZ/129 W6BJH/290 KC7V/174	W7EDA/276 W7YS/180 W8ZCQ/298 K9HQW/125	K9LUZ/179 K9QO/177 K9LUZ/274 W9PT/256	
RTTY									
WB9AH/125	AA1K/144	160 Meters		K1MEM/129					

DXCC Notes

Honor Roll Reminder

Those wanting to update their Honor Roll standings or make Honor Roll (to appear in June 1985 QST) must have their cards into Hq. no later than March 29, 1985 to be listed.

Annual Listing Corrections

Mixed: W1DA/326, W4FGX/285, NS6B/300, W6SIY/110. Phone: KK2I/305, W3KJ/287, NS6B/299.

DXCC Honor Roll Plaques Now Available

Minute 81 of the March 1984 ARRL Board Meeting authorized an appropriate plaque to any amateur who has attained the DXCC Honor Roll as previously published in QST. This handsome red and white on brass walnut mounted plaque comes engraved with the member's call. A matching Phone and CW sticker denotes mode. If qualified, Honor Rollers wishing to order should note the month/year your call appeared in QST and indicate totals shown. Send with a check for \$25 to ARRL (payable in U.S. funds drawn on a U.S. bank).

New DXCC Country

The ARRL Awards Committee has voted 6 to 1 to ACCEPT the recommendation of the DX Advisory Committee to recognize the UK Sovereign Base Areas on Cyprus as a DXCC country separate from the Republic of Cyprus. When the Republic (formerly a British possession) was established by treaty effective August 16, 1980, the United Kingdom retained sovereignty over both the Akrotiri and Dhekelia military bases. The DXCC Countries List failed to recognize this distinction, which has existed since that time. The Sovereign Base Areas are part of Great Britain and easily meet separate country status by virtue of separation of foreign land (from Great Britain).

Any credit submissions as a result of this action will not be accepted until June 1, 1985, and will be handled in the following manner: Credits for ZC4 contacts made before August 16, 1980, will continue to be credited to the Cyprus listing. All 5B4 credits count for the Cyprus listing. All ZC4 contacts made after the 1960 date were not necessarily with stations operating within the Sovereign Base Areas. Cards that indicate operation from within the Bases will be so credited. The DXCC Desk will make a good-faith effort to ascertain the location of ZC4 stations where the location is not clearly indicated. If in doubt, applicants may submit more than one ZC4 card for potential Sovereign Base Areas credit. DXCC members who presently have Cyprus credit for a ZC4 contact made from the Sovereign Base Areas after the 1960 date may resubmit the card for credit to the Sovereign Base Areas listing as well as submitting an acceptable card for credit to the Cyprus listing (5B4). The DXCC Desk will endeavor to assist any DXCC members in applying these administrative guidelines.



CRRL Officers and Directors

President: Thomas B. J. Atkins, VE3CDM
Vice President and Secretary: Harry MacLean, VE3GRO

CRRL, Box 7009, Station E, London, ON N5Y 4J9, Tel. 519-451-3773
CRRL Outgoing QSL Bureau, Box 113, Rothesay, NB E0G 2W0

Honorary Vice President: Noel B. Eaton, VE3CJ

Directors: G. Andrew McLellan, VE1ASJ
Albert G. Daemen, VE2IJ
Raymond W. Perrin, VE3FN
William A. Gillespie, VE6ABC
William Kremer, VE7CSD

Counsel: B. Robert Benson, Q.C., VE2VW
1010 St. Catherine St. West
Montreal, PQ H3B 3R5

Meet Your CRRL Directors

[Editor's Note: This completes a series of profiles begun last month.]

Albert Daemen, VE2IJ. Al has been CRRL Quebec Director (Eastern Director before expansion of the CRRL Board) since the incorporation of CRRL in 1979. He was first licensed in 1932. At that time, Al's station consisted of a two-tube regenerative receiver and push-pull 45s in a transmitter built from plans in November 1930 *QST*.

Over the years, Amateur Radio has given Al many moments to remember. In 1934, during a major power disruption, Al was the only means of communication between Shawinigan Falls, where the generating station was located, and the outside world. In 1967, during the Centennial, Al was a key organizer of the Montreal ARRL National Convention, the first such convention ever held in Canada. In 1976, Al helped organize the amateur communications at the Montreal Olympics, and in 1983, he organized the amateur communications for the around-the-world flight of VE2WOL, *Wings of Life*, that raised several hundred thousand dollars for cancer research.

Since 1972, Al has been manager of what is now the CRRL VE2 Incoming QSL Bureau. Al figures he handles about 10,000 cards a month, some 120,000 cards a year. He seems to remember something about every card that comes through and finds that, in his mind, he is able to build up the operating profiles of hundreds of Quebec amateurs. They are often surprised at how much he knows about them when they meet him, even for the first time, at a hamfest or convention.

We think Al looks 55, but he admits to 69.



Albert Daemen, VE2IJ



William Kremer, VE7CSD

He says he's had several careers, all related to things electrical or electronic, sometimes in development, sometimes in manufacturing and sometimes in sales. He's supposed to be retired, but former employers keep calling him back as a consultant.

Al is a member of QCWA, the Old-Old-Timer's Club, the Montreal Amateur Radio Club and, of course, CRRL and ARRL. He's active on the air. You'll often find him on 20 and 80 metres, CW and phone. Al lives in Montreal, is married, and has two children, both daughters, and five grandchildren.

William Kremer, VE7CSD. Bill has been CRRL Western Director since expansion of the CRRL Board late in 1982. He was first licensed in 1978. As an amateur, Bill quickly developed an interest in three areas: RTTY, public service and club work.

Until recently, Bill was responsible for trans-

mitting the *CRRL News* bulletins on RTTY, using the call VE7QST, toward the east, on 20 metres every Sunday afternoon. These days, Bill is a regular check-in on the British Columbia Amateur Radio Public Service Corps Net, the ARES Canada Net and DRN7, NTS's West Coast daytime traffic net. In the Burnaby Amateur Radio Club, one of the most active clubs on the West Coast, Bill has served as an Amateur Radio instructor and, for three terms, as its president. Under Bill's leadership, Burnaby Amateur Radio Club produced the first *CRRL Questions and Answers Book*, which has helped countless amateurs across Canada to get their tickets.

Bill finds that other amateurs often call on him for help. Tower work has become a specialty of his that is well-appreciated. When Bill finally put up his own tower, there were easily two dozen fellow amateurs on hand to "pay Bill back" for help he had once given them.

Bill tries to make that helpfulness part of his job as CRRL Western Director. He tries to attend all the hamfests on the West Coast, to set up a CRRL booth and to be on hand to hear concerns and help with problems, which can range from "My *QST* is late ..." to "Our town council wants me to take down my antenna!" At the moment, Bill is busy as chairman of a committee developing guidelines for a CRRL affiliated-club program.

Other interests: travel (especially to the Netherlands, where Bill was born), motorcycles and computers. Bill works as a computer programmer for a local utility company. He is 35 years old and married, and lives in New Westminster, British Columbia.

DOC RAISES LICENCE FEES

On December 19, DOC announced a revised schedule of radio licence fees that will go into effect April 1. The revisions, all increases, reflect the government's desire to reduce its deficit and conform to the Auditor General's recommendation that DOC move toward full recovery of spectrum-management costs through user fees.

On April 1, Amateur Radio station licences will increase from \$13 to \$20 a year. Just for comparison, on that date, GRS (CB) licences will increase to \$19.50 for three years. Aeronautical mobile stations will increase to \$28 a year, maritime mobiles to \$32 a year and most commercial mobiles to \$36 a year. Base stations for aeronautical and maritime mobiles will increase to \$83 a year, and base stations for most commercial mobiles will increase to \$47 or \$94 a year, depending on if they are located in open country or in metropolitan areas. Mobiles and base stations in municipal service will increase to \$118 a year.

CRRL did comment to DOC last year when it was first learned that DOC planned to increase licence fees. In its submission, CRRL pointed out that Amateur Radio was unique in that it did not involve any monetary gain. For that reason, Amateur Radio licence fees ought to remain nominal. It seems they have.

CRRL NEWS

□ Jerry Wells, VE3CDS, and Ray Perrin, VE3FN, of CRRL, and Barc Dowden, VE3TT, and Art Stark, VE3ZS, of CARF, represented amateurs at the 1984 Annual Meeting of RABC, the Radio Advisory Board of Canada, held in Ottawa December 6. Here are some gleanings of interest to amateurs: During 1984, DOC received some 36,000 complaints of RFI, up 25% from 1983, with very few involving amateurs. DOC is considering point-of-sale control of electrical or electronic products capable of producing or being susceptible to RFI. DOC is revising the Radio Act and the Radio regulations to have all rules that apply to a particular radio service grouped together; this certainly isn't the case now.

□ Also in December, CRRL's Ray Perrin, VE3FN, and CARF's Art Stark, VE3ZS, represented amateurs at a government-industry working group that met in Ottawa to prepare a position to take to this year's WARC, a World Administrative Radio Conference that will plan orbits for future geostationary satellites. The message on behalf of amateurs was "Please, don't lock us in!"

□ On behalf of CRRL, your humble servant attended a January 19 meeting held in Fort Wayne, Indiana, to discuss the possible introduction of a "20-kHz 2-metre band plan" for repeaters in the Great Lakes region. Most at the meeting favoured staying with the present "30-15 kHz band plan" using "non-inverted splits." Discussions will continue at the 1985 Dayton Hamven-

tion. At present, in Canada, only British Columbia is on a "20-kHz band plan" for all repeaters in the 2-metre band.

NEW Q & A BOOK AVAILABLE

If you're cramming for the April 17 DOC exams, you'll want a copy of the revised *CRRL Questions and Answers Book*. This book, compiled by Mitch Powell, VE3OT, contains material supplied by Amateur Radio instructors across Canada and material from all recent DOC examinations. Its 12 chapters correspond to the 12 subject areas in DOC's TRC-24. A final chapter explains the DOC diagrams. Cost is \$10 postpaid. Order by writing to CRRL, Box 7009, Station E, London, ON N5Y 4J9, tel. 519-451-3773.

NOTES FROM ALL OVER

□ Remaining dates for DOC examinations this year are April 17, June 19 and October 16. Apply to DOC by March 20, May 22 or September 18, or about one month before the date of each writing.

□ Prefix hunters, take note. To commemorate the 75th anniversary of the Canadian Navy, navy personnel, both active and reserve, may use the following special prefixes from April 1 to May 31: VC in Newfoundland and Labrador, CY in the Yukon, and CF in the remainder of Canada. To commemorate the 100th anniversary of Lethbridge, Alberta, Lethbridge amateurs may use the special prefix VX6 from July 14 to 27. ~~VE~~

The Dos and Don'ts of Business Communications and Third-Party Messages

Third-party traffic is one of the gray areas of Amateur Radio regulation where there is much room for interpretation. It is one of the lesser-understood concepts in Amateur Radio. Accordingly, this month, we will shed some light on this facet of Amateur Radio. We will also examine the extent to which the rules governing business communications affect amateur participation in marathons.

Q. What is third-party traffic?

A. Section 97.3 (v) defines it as "Amateur Radio communication by or under the supervision of the control operator (an Amateur Radio operator designated by the station licensee to be responsible for the proper operation of the station) at an Amateur Radio station on behalf of anyone other than the control operator." Generally, the control operator of a station (first party) transmits a message to another authorized amateur station (second party) for delivery to another person (third party). This third party may or may not be a licensed amateur.

Q. Under what conditions may my nonham friend directly say "hello" to her family in West Virginia?

A. As long as the control operator is present at the station control point to ensure compliance with FCC rules, your friend may talk to her family directly via phone line interconnection ("phone-patch" and "autopatch") or via any authorized emission mode permitted (Section 97.79 [d]). Third-party participation must not be stretched to the point where the third party performs the duties of the control operator.

Q. May my friend legally talk with people all over the world if the control operator is present to ensure compliance with FCC rules?

A. No. Section 97.114 indicates that international third-party traffic is only permitted with those countries that have established agreements with the U.S.

Q. May my friend send a birthday greeting to a person who lives in a country that does not have a third-party agreement with the United States?

A. Not directly. The rules are not concerned about the location of the message's origination or destination; they are only concerned with third-party messages transmitted from a station in the U.S. to a country that has not agreed to such radio communications. Therefore, you could transmit your friend's message to a country that does not share a third-party agreement with us by routing it through an amateur in a country that does.

Q. My friend wants to chat with his brother in Spanish. I don't speak their language. What do I do?

A. While you may tell your friend what he can

and cannot talk about, and hope he understands and complies, the better approach is to refuse to allow your station to transmit messages you can't understand.

Q. My Amateur Radio operator license has been suspended and my station license has been revoked. Under these conditions, may I participate in Amateur Radio activities as a third party?

A. Raymond A. Kowalski, Chief, FCC Special Services Branch, recently addressed this subject. He said, in part, "The answer to this question is no. You cannot operate an Amateur Radio station. The presence or absence of a licensed operator makes no difference. You were formerly a licensed amateur who forfeited the right to operate an amateur station. Therefore, you are not in the class of persons intended to be exposed to Amateur Radio by virtue of Section 97.79 (d); hence, you are prohibited from communicating over amateur radio under any and all circumstances."

Q. May I, a General class licensee, retransmit via my station the transmissions of a Technician's 2-meter signal over the 20-meter General phone band?

A. Yes, but it cannot be an automatic retransmission (97.3[x] and 97.166). When the Technician's message is retransmitted by the General class licensee's station, the operation is third-party traffic to the General class licensee. Such operation is permitted under Sections 97.79 (d) and 97.114 of the Rules, which do not specify the manner in which the third-party traffic is received for relay: by mail, telephone, in person or by 2-meters. For example, you must hold the 20-meter transmitter microphone near the 2-meter speaker and manually key it.

Q. Are there any limitations on the content of third-party traffic?

A. Yes. Sections 97.110 and 97.114 mandate that third-party traffic involving business communication and material compensation, either tangible or intangible, direct or indirect, to any person is prohibited. Emergency communication (any Amateur Radio communication directly relating to the immediate safety of the life of an individual or the immediate protection of property) is the *only* exception to this rule. This point was clarified in a recent letter from FCC Private Radio Branch Chief Robert Foosner to Steven Mendelsohn, WA2DHF, regarding amateur participation in the New York City marathon:

This is in response to your letter of October 15, 1984 concerning providing amateur radio communications at the New York Road Runners Club marathon. The Commission addressed the matter of business communications in the Amateur Radio Service in the Order released July 12, 1983. You will note that the term *business communications*, as defined in Section 97.3(bb) of the Rules, is used in the broadest context. It includes all types of communications which are intended to facilitate the regular business affairs of any party, whether for-profit or not-for-profit, etc. Thus, the determination as to the types of amateur radio communications that your group could provide at a marathon

would not be affected by the profit objectives of the sponsor, nor by the pay status of other participants.


A fundamental guideline that should be observed in these instances is also stated in the Order: "... the Amateur Radio Service should not be used as an alternative to the land mobile, broadcast, maritime or common carrier radio services, all of which have been established by appropriate regulatory processes." To the extent that these other radio services can be used to perform the necessary communications, such communications should not be transmitted by amateur radio.

Section 97.110 of the Rules, which prohibits business communications by amateur radio, does not prohibit amateur radio operators from participating in a marathon as a public service activity. Although some communications transmitted could incidentally benefit a sponsor, we do not view such communications as violations of the rules where their main purpose is to provide a service to the public.

In your letter you describe three specific services which amateur radio could provide. The first is a medical network, by which race authorities could be notified of a runner's need for medical attention. This medical network is, of course, acceptable.

The second service is logistical. Amateur radio operators would provide the communications necessary to facilitate the public's safe observation of the event. Clearly there is benefit to the race sponsor, but it is incidental; the principal beneficiaries of this would be the runners and the public.

Finally, there is the lead-runner position network. As you acknowledge, the purpose of this is to facilitate a system whereby the public, including, presumably, the news media, are informed of the progress of the race via amateur radio. This runs afoul of Section 97.113 of the rules, which prohibits the dissemination of radio communications intended to be received by the public. If you wish to provide this service, we recommend you do it on commercial frequencies with other equipment. Amateur radio operators could participate in this phase, but not by virtue of their amateur licenses.

Please inform your group that their licenses are not endangered by participating in the marathon. They have my support and my personal thanks for serving the public. 

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.

Contest Guidelines	Jan. 1985, p. 72
License Renewal Information	Jan. 1985, p. 45
Major ARRL Operating Events and Conventions - 1985	Jan. 1985, p. 46
MARS Information	April 1984, p. 86
QSL Bureaus	
Incoming	Dec. 1984, p. 66
Outgoing	This issue, p. 61
QST Abbreviations List	Jan. 1984, p. 53
Third-Party-Traffic Countries	Oct. 1984, p. 73
U.S. Amateur Frequency and Mode Allocations	Jan. 1985, p. 45

*Membership Services Assistant, ARRL

Scatter Communication

In the absence of unusual atmospheric conditions, all trans-horizon propagation takes place by scatter mechanisms. The most consistent and reliable scatter mechanism is troposcatter. Fig. 1 shows the geometry of a typical scatter path. The region of the troposphere that can be seen by both the transmitting and receiving antennas is called the scatter volume. Small inhomogeneities in this region, such as differences in temperature, pressure or moisture content, cause scattering of radio waves and enable a small amount of the transmitted power to be scattered toward the receiving antenna. Average signal levels due to troposcatter can be predicted quite easily. An article by Julian Gannaway, G3YGF, in November 1983 *QST*, p. 43, covers the calculation of troposcatter signal levels in some detail, so it will not be repeated here. The level of the received signal depends on the frequency and the scattering angle (θ_s).

In addition to scattering from irregularities in the atmosphere, scattering can also take place from precipitation. Precipitation, or rain, scatter has been used to good effect on the higher microwave bands to cover fairly short (tens of kilometers) but otherwise-unworkable highly obstructed paths. At 24 GHz, absorption by water vapor is significant, and so rain-scatter signals at this frequency may be additionally attenuated.

A third scatter (or reflection) mechanism that can be utilized is aircraft scatter. In this case, an aircraft passing through the scatter volume reflects part of the transmitted power to the receive antenna. Aircraft scatter signals are not consistent in the way that troposcatter signals are. Signal enhancement is only observed as the aircraft passes through the scatter volume, typically over a period of several tens of seconds to a minute. The use of aircraft scatter can enable contacts to be made over otherwise-unworkable paths. As an example, G3WDG quotes a

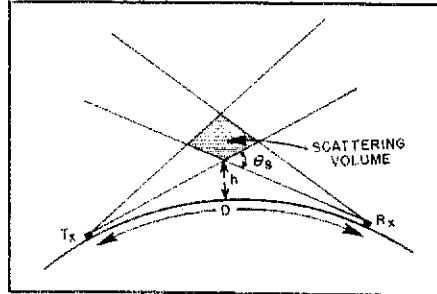


Fig. 1 — Geometry of a troposcatter path.

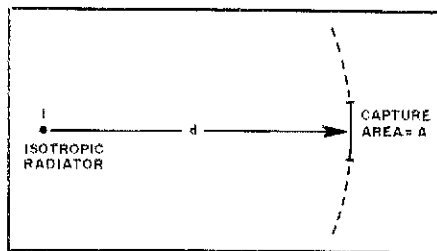


Fig. 2 — Free-space loss.

2.3-GHz contact made over a 500-km path by aircraft scatter. With 20-W Tx power, 5-ft dish antennas at each end and a 2-dB Rx noise figure, no signals were received under normal atmospheric conditions. With aircraft scatter, signals peaked about 10 dB out of the noise for 30-60 seconds at a time.

Careful sequencing, similar to that used in meteor-scatter work, is required for successful contacts. Of course, there is no guarantee that anything will cross the scatter volume, but if the center of the path is on an aircraft flight path,

delivered to the load doesn't change. The problem is in the definition of free-space loss, which is defined as the loss between isotropic antennas, not the loss between an isotropic antenna and an antenna of fixed area (capture area). That given area (A) will be the capture area of the receiving antenna, and is given by the relationship

$$A = \frac{G \lambda^2}{4 \pi} \quad (\text{Eq. 2})$$

where
 G = gain
 λ = wavelength

Thus, it can be seen that to obtain an antenna of given capture area, the gain must increase as the frequency increases. It also follows that the free-space loss (between isotropic antennas) is proportional to the square of the frequency. For example, in going from 10 GHz to 24 GHz, the free-space path loss will increase by $(24/10)^2 = 2.4^2 = 5.76 = 7.6$ dB. It can also be shown (but not here) that the troposcatter contribution to path loss is proportional to frequency. Again, going from 10 GHz to 24 GHz, the troposcatter loss (which is added to the free-space loss) will increase by a factor of $(24/10) = 2.4 = 3.8$ dB. I hope this clears up any confusion on the subject.

sooner or later something will. For paths of around 500 km, the base of the scattering volume will be at about 5 km, rising to about 10 km at 700 km. These figures assume an unobstructed horizon. If there are local obstructions, antennas must be pointed slightly upward, and then the height of the scattering volume will increase. This will increase θ_s (as shown in Fig. 1) and therefore decrease signal strength due to troposcatter (by about 10 dB for each degree of horizon elevation).

Aircraft scatter signals, however, should not decrease as antennas are elevated, since signal strengths are given by the radar equation:

$$P_r = \frac{P_t \cdot G_t}{4 \pi R_1^2} \cdot \frac{\sigma}{4 \pi R_2^2} \cdot \frac{G_r L^2}{4 \pi} \quad (\text{Eq. 1})$$

where

- P_t = the transmitter power (W)
- P_r = the received power (W)
- G_t = the transmit antenna gain
- G_r = the receive antenna gain
- L = the wavelength
- σ = the scattering cross section
- R_1 = the distance from the transmitter to the target
- R_2 = the distance from the receiver to the target

Note: L , R_1 and R_2 must be in the same units of length (e.g., meters).

The only unknown in this equation is σ , the scattering cross section for forward scatter from the target. I do not have information on scattering cross sections, but such information is probably available from commercial radar studies. If any readers have such information and would like to pass it along, I would be pleased to print it here. Whatever the values of σ are, however, aircraft scatter has been used for successful communication at frequencies from VHF to microwave over otherwise-unworkable paths.

SIMPLE MICROWAVE SYSTEM

In the November 1984 column, I mentioned a simple microwave demonstration system designed by Yardley Beers, W0JF. Yardley Beers has written to say that he would be glad to send a reprint of his article (and a few later improvements) to anyone who sends him an s.a.s.e. at 740 Willowbrook Rd., Boulder, CO 80302.

FREE-SPACE PATH LOSS

I recently received a letter questioning a statement in an earlier column concerning increasing path loss with increasing frequency. The correspondent did not see how this could occur, using the following reasoning: "Take an isotropic radiator in free space which has a certain amount of power delivered to it and radiates into space at a frequency of 1 Hz. Now, at distance d (see Fig. 2), place a receiving antenna with an effective aperture (A). This antenna will deliver a certain amount of power into a specified load. Now increase the frequency to light with all other factors held constant. What happens to the power delivered to the load? It doesn't change!"

The reasoning here is quite correct. The power

1296 ACTIVITY DIRECTORY

For the benefit of those who missed earlier announcements and who have written asking about 1296-MHz activity lists, Al Ward, WB5LUA, has available the 1296-MHz roster (rev. A, summer 1984), which he will supply on receipt of a legal-size s.a.s.e. with 56¢ postage. Al's address is Rte. 9, Box 132, McKinney, TX 75069.

2304-MHz NEWS

WB5LUA reports the first Texas-Louisiana contact on 2304 MHz. On December 28, 1984, he worked WA5DBY (mobile in Louisiana). The path was from McKinney (TX) to near Lake Charles (LA), a distance of 300 miles. This is state no. 4 for WB5LUA on 2304 MHz.

1296/2304-MHz CONFERENCE

Don Hilliard, W0PW, is planning a 1296/2304-MHz conference with a tentative date of September 20-22, 1985, and tentative location in Estes Park, Colorado, at the Holiday Inn. The announcement is being made early to enable interested parties to plan ahead. Don's address is P.O. Box 563, Boulder, CO 80306. ☐

*103 Division Ave., Millington, NJ 07946

Toward Common EME Sequencing and Reporting Systems

Those who are moonbounce operators are only too well aware that sequencing and reporting systems vary from band to band. For many years, the standard on 70 cm has been 2½-minute sequencing, whereas on 2 meters the switch between transmit and receive at 2-minute intervals has been the norm for as long as anyone can remember. In a similar fashion, the reporting systems are slightly different from one another.

While both bands employ the so-called "TMO5" system, there is a slight difference between them in the way the "M" is interpreted. Both use "T" to denote the detection of some signals, but not enough to derive enough intelligence to be certain of the call of the other station. This report is seldom sent, but can be useful in letting the other operator know that he or she is being heard, if weakly. On both bands, the letter "O" means that complete calls are being heard, but that signals are too weak to warrant giving a standard "RST" report. A complete exchange, therefore, is possible with "O" reports. On 70 cm, "M" is taken to mean that enough can be copied to identify a complete call and hence a QSO is possible with "M"s. On the other hand, on 2 meters, "M" signifies that only one or two letters have been detected, and hence a contact cannot be considered to have taken place if an "M" report is sent in either direction. On both bands, when signals are above the "O" level, the standard RST report is given.

As equipment has improved over the years, RSTs are becoming more common and even SSB QSOs with 5 × 4 and 5 × 5 reports are becoming quite frequent. Nevertheless, the dichotomy in the use of the TMO5 system continues to represent confusion, especially for new people getting on EME. Since they often start with smaller stations, and hence are more likely to encounter TMO reports, the difference in reporting systems represents one additional (and unneeded) hurdle to becoming proficient moonbounce operators. Naturally, the confusion associated with both the sequencing and reporting differences particularly manifests itself

for those who attempt EME on more than one band.

Attempts have been made in the past to standardize both the sequencing and reporting standards, but agreement was not reached between the adherents of both. Each camp thought the others should change. Now, a new initiative is being launched, this time from Europe. Rolf Niefind, DK2ZF, editor of the VHF column in the German magazine *CQ DL*, is mounting a campaign through IARU Region 1 (Europe and Africa) to develop standard systems of EME reporting and sequencing for use on all bands. Following his lead, VUAC Chairman Dick Jansson, WD4FAB, has charged the Committee to come up with suggestions for accomplishing this. Should the 2-meter 2-minute sequence be selected or the 2½ minute one used on the higher bands? What about a common reporting system? One suggestion made would replace both sequences with 1-minute transmit/receive periods. This might appear logical at first glance, since today's better equipment results in higher signal levels and hence less need for long sequences. Certainly, if the station can be worked with 1-minute sequences, the contact would require a shorter time to complete than with the longer sequences. On the other hand, if signals are weak, long sequences are especially needed. If, at the beginning of the schedule, it is found that signals are quite readable, there is no need to stick with the long sequence anyway. After all, this is what we do on meteor scatter (m.s.) if a strong sustained burst is encountered.

Despite its apparent appeal, adopting a 1-minute standard would appear to have some real disadvantages. For one thing, the 2½-second propagation delay from the earth to the moon and back becomes a significant percentage of each sequence. In addition, those who rotate polarization, mostly those with dishes on 70 cm, require more time to accomplish this task than is available in a 1-minute period. On the higher bands, such as 23 cm, where beamwidths may

be quite narrow, the longer time affords a better opportunity to reaim the antenna. In comparing the 2 minutes used on 2 meters and the 2½ minutes employed on 70 cm and above, there does not appear to be an overwhelming argument either way. The 2½-minute standard does provide more time for tasks such as aiming antennas and/or rotating feed systems. It is also perhaps less prone to confusion as to what part of the sequence one is in. One of the two stations always starts transmitting on the integer minute from the start of the sked divisible by 5, and the other at the 2-minute 30-second point. With the 2-minute sequence, both stations always start transmitting on an even minute and thus it is possible to get confused as to which even minute is which. However, 2-meter EME operators might argue that the 2-minute standard has been used for years with good success, and they would be right.

I am sure that those of you who are active moonbounce operators have opinions on the matters discussed. If a viable standard is to be adopted — one that will gain wide acceptance — it must be based on a consensus of the operators involved. Thus, you are asked to voice your comments and suggestions to the VUAC. Remember: That Committee does not concern itself solely with band plans, although that task represents one of its major jobs. Like all League Advisory Committees, its mission is to make recommendations to the ARRL Board of Directors, in this case on a variety of matters concerning operation on the VHF and UHF bands. Thus, EME operating procedures are an appropriate topic for its consideration. For the VUAC to properly represent the views of the active VHFers, however, your ideas and suggestions are needed. Please address your comments on EME procedures or any other subject in the VHF/UHF realm to Mark Wilson, AA2Z, League Headquarters. Mark is the VUAC Headquarters Liaison and, as such, will see to it that the Committee members are furnished with copies of your letters.

ON THE BANDS

6 Meters — Once again, WA5IYX comes up with a very detailed report on E_s doings during December and the first few days of the new year. From his San Antonio QTH, Pat notes some kind of E_s activity during nine days of December as well as on January 2-5. It should be understood that Pat keeps track of the TV channels and the 88- to 108-MHz FM broadcast band as well as 6 meters. On some of these days, although it was obvious that the 6-meter band was open, there were no amateur signals heard. One of the best days was December 14, when sporadic-E signals were received for about seven hours, including over two hours when signals were being heard well into, and occasionally above, the FM broadcast band. On that day, TV, FM and 6 meter signals were heard from Georgia, across the northern tier of states and all the way around to Arizona. The 12th also displayed a long opening, this one lasting for some four hours. On this occasion, however, only one amateur was heard (WA7OHF

Table 1
Sporadic-E Openings Observed by WA5IYX San Antonio, TX

	1982			1983			1984		
	Days Open	No. Open	Min. Open	Days Open	No. Open	Min. Open	Days Open	No. Open	Min. Open
Jan	4	5	245	---	---	---	1	1	20
Feb	2	3	65	---	---	---	2	2	45
Mar	2	3	20	3	5	495	3	6	40
Apr	2	2	25	1	1	33	6	11	420
May	13	25	990	9	15	585	14	29	1035
Jun	22	46	2235	20	50	3430	19	43	2180
Jul	20	44	2555	22	51	3300	13	30	670
Aug	8	10	135	9	12	460	6	16	205
Sep	---	---	---	3	3	25	4	4	30
Oct	---	---	---	2	2	20	2	3	10
Nov	1	1	40	3	3	255	9	12	120
Dec	3	4	250	4	10	150	9	12	615
Totals	77	143	6560	76	152	8755	88	169	5390

Arizona). A few Phoenix- and Tucson-area FM stations were received as well, but most of the rest were from Mexico City, Toluca and Acapulco.

Table 1 is an example of Pat's patient and meticulous data taking. Among other things, it shows that 1984 wasn't as bad a year for E_s as most of us thought. In

terms of both the number of days that openings were noted in San Antonio as well as the number of separate openings observed by WA5IYX, it ranks well ahead of both 1982 and 1983. If one examines the total time that openings took place, however, 1984 falls significantly short of the two preceding years. This is due principal-

*Send reports to Bill Tynan, W3XO, P.O. Box 517, Burtonsville, MD 20866, or call 301-384-6736 to record late-breaking information.

70-CM Standings

For WAS holders, listings are WAS number, call, state, call areas worked and grids worked. For others, call, state, U.S. states worked, number of call areas work and grids worked. Call areas are the 10 U.S. call areas plus KL7 and KH6, each VE and XE call area plus DXCC countries not located within the continental limits of the U.S., Canada or Mexico. Grids are those Maidenhead designators worked since the VUCC Award was instituted January 1, 1983. Those not showing some indication of activity or interest within the past two years have been deleted. They will be reinstated upon providing an indication in writing that they are still interested in being listed. It is not necessary to have worked any new states or grids in order to be reinstated. Compiled January 14, 1985. Deadline for next update is July 10, 1985.

1	W0YZS*	MO	—	—	N2EO	NY	13	5	—	W4ATC/4	VA	25	8	—	WA5DBY	TX	12	4	—	KB9NM	WI	9	3	—
2	K2UYH*†	NJ	56	—	WA2TIF	NY	13	5	—	WA4CQG*	AL	25	5	—	K6LLL	TX	11	6	—	K0TLM*†	MO	47	24	49
3	K5JL*†	OK	—	—	N2BJ	NY	12	4	17	W4ISS	GA	24	8	—	W5DFU	OK	10	4	10	W0RAP*†	IA	43	31	83
4	WB5LUA*	TX	41	—	NB2T	NY	10	5	—	W4GJO	GA	23	—	—	K5DHU	TX	10	3	10	WB0TEM*	IA	42	—	—
5	W5FP*†	NM	28	—	WA2PVV	NY	10	5	—	K4CAW	NC	23	—	—	W5VJB	TX	10	3	—	K0BY*	IA	40	9	—
6	W1JR*†	MA	44	112	W2WW	NY	10	3	14	WB4NXY	KY	22	8	54	W5UWB	TX	10	3	—	W0PW*	CO	28	10	—
					W2MPK	NY	9	6	—	WA4SBC	VA	20	8	—	W5NZU	TX	8	3	—	K0DAS	IA	26	7	—
					WA2ABN	NY	7	5	—	W3IY/4	VA	19	7	—	W5YU	LA	5	2	—	K0ALL*	ND	20	12	—
					W2WW	NY	7	3	—	WA4PCS	KY	18	7	—	W6ABN*	43	34	—	W0OHU	MN	20	6	—	
K1FO	CT	36	33	112	W3QCC	PA	35	26	—	WB4NMA	GA	17	6	—	K6JYO*	8	6	—	W0FY	MO	20	—	—	
AD1C	MA	33	10	—	W3RUE	PA	30	10	26	K4GL	SC	16	7	—	W6BNT*	8	7	—	W0ER	MN	18	6	—	
K1PXE	CT	25	11	—	W3TMZ*	MD	25	9	—	KC4P	AL	16	5	—	W4WDI*†	UT	38	33	—	W0VB	MN	17	6	—
K1LPS*	VT	22	12	—	K3WHC*	PA	25	9	—	K4LHB	VA	13	6	—	W7JF*	MT	15	11	—	K0CQR	NE	11	4	27
W1GXT	MA	13	6	—	W3IP	MD	25	7	—	K4KAE	SC	12	5	—	W7LUX	AZ	5	3	—	WB0DRL	KS	10	4	14
WA1JOF	MA	13	4	—	W3ZZ	MD	21	8	45	WD4CXU	VA	11	4	—	K7ICW	NV	4	2	—	WB0DGF	NE	10	3	25
N1AIS	MA	11	5	—	K3HZO	MD	20	9	14	KB4CRT	FL	7	2	15	W7JCU	NV	3	2	—	W0NOK	MO	9	3	—
W1HDQ	CT	11	4	—	K3IUV	PA	19	5	—	WB4SLM	GA	6	2	13	WA7JUO	NV	3	2	—	WB0ZKG	IA	9	3	—
K2RIW*	NY	28	12	—	W3UJG	MD	16	6	—	K4KJP	FL	6	2	—	N7EIJ	ID	2	1	—	W0RWC	IA	8	3	—
W2VC	NJ	25	11	61	K3HCE	MD	16	5	—	K5FF*	NM	38	29	—	K8WW*	OH	45	34	—	KC0G	NE	7	2	17
K2GK	NY	24	9	43	W3XO	MD	13	6	12	W0RRY/5*	OK	32	35	—	W5UKQ*†	LA	30	11	—	W0SD	SD	7	2	—
W2DWJ	NJ	22	9	—	WA3DMF	MD	10	5	6	W5RCI	MS	25	7	—	W8IDU	MI	30	9	73	—	—	—	—	—
W2PGC	NY	20	10	—	WA4MVI*†	SC	40	19	—	W5HN	TX	23	7	—	W8PAT	OH	23	9	—	KL7WE*†	—	28	25	—
W2CNS	NY	20	9	—	K4QIF*	VA	39	21	—	K5SW	OK	20	7	—	WB2DIN/8	WV	13	6	—	KH6HME	—	2	2	6
WA2FGK	NJ	18	7	—	W5HQU/4*†	FL	34	39	—	WA5HMK	TX	16	6	—	—	—	—	—	VE1RC	—	3	2	—	
K2YCO	NY	17	8	—	W4FJ*	VA	25	8	—	KB5MR	OK	16	4	53	—	—	—	—	VE2DFO	—	12	7	—	
K2OVS	NY	16	6	—	—	—	—	—	—	K5WFE	OK	15	4	35	—	—	—	—	VE3LNJ	—	15	6	43	
W2CRS	NY	16	—	—	—	—	—	—	—	K5JRH	TX	15	4	—	—	—	—	—	VE3AIB	—	11	7	—	
										N4JS/5	MS	13	5	—	—	—	—	—	VE4MA*†	—	39	37	—	
										K5YY	AR	13	4	34	—	—	—	—	VE7BBG*†	—	39	32	—	
															W9MSV	IL	14	5	49	JA9BOH*	—	18	31	—

*Some contacts made via EME
†WAC

ly to the significant drop in E, time for July, which results in a net loss for the year as a whole. Undoubtedly, it was the dearth of openings during July that convinced most of us that we had a subpar season.

A few other E, reports have been received. One of these is from K0TLM Kansas City. Tom notes 6-meter openings into Tennessee, Alabama and Georgia between 0200 and 0240 December 10 and between 1720 and 2000Z December 18 to Florida, New Jersey, New York and Pennsylvania. N5EZX, who got going on the band just three months ago, files a similar report concerning an opening beginning at 2230Z December 14. Bob began by working WA4ZZB in Virginia; one-half hour later WB2RJL/4, followed by a succession of contacts with stations in New Jersey, Maryland, Pennsylvania, Indiana, Ohio, Illinois and North Carolina, and then south Texas and Arizona. In all, 20 QSOs were made.

The January VHF Sweepstakes was enlivened here in the Mid Atlantic states by the appearance, Saturday evening, of VP9GE in FM72. That's one none of us expected to work in this contest.

2 Meters — A lot has been said over the past few years concerning calling frequencies and their use. WB3LJK makes a new and interesting observation on the subject. Mike notes that many regional nets have sprung up in the Mid Atlantic states on frequencies such as 144.225, 144.170, 144.230, 144.150 and 144.120. He wonders why, with all of the space available above 144.250, these groups must select the crowded part of the band for their get-togethers. He says that he does not wish to engage in QSOs on 144.200, but the proximity of all of these nets makes it difficult for someone with a high-power station such as his to know where to QSY away from the calling frequency and not cause QRM to one of them. A further consideration is that the more of the band we use, the less the danger of encroachment by other modes and services. If regional nets would select frequencies above 144.250, it would serve both causes. WB3LJK also makes the point that, when we do QSY, we should make it far enough so as not to cause QRM to the calling frequency or other QSOs. He notes that with strong signals, 10 kHz is seldom far enough, especially with some of the flat-topped signals heard on the band.

Activity in the Midwest is being helped by a new publication called the *Midwest VHF Report*, put out by the Lincoln Communications Society. It replaces the group's *LCS Newsletter*. Editor and publisher is Roger Cox, WB0DGF, who can be reached at 3451 Dudley, Lincoln, NE 68503, or by phone at 402-464-3235 outside of normal working hours. News of propagation conditions on all of the bands as well as station activities are featured. The January issue includes a list of nearby grids in which it is believed that no VHF activity exists. They are DM98, DM99, EM85, EM46, EM56, EN02, EN04, EN05, EN06, EN23, EN26 and EN33. Anyone on from these areas who would like to correct that impression?

As well as spurring resident activity, lists like this can



These three gentlemen were instrumental in evolving and promoting the Maidenhead Locator System, now used by VHFers throughout the world. From left to right are Folke Rasvall, SM5AGM, John Morris, G4ANB, and Rolf Niefind, DK2ZF.

serve as guides for those planning grid expeditions during forthcoming contests. One I have heard about recently is the intention of K1FJM to visit the Dry Tortugas in EL84 during the June VHF QSO Party. Pete says that his decision is a direct result of the switch to grids as multipliers in this contest. He plans to be on 2 and 6 meters and possibly 70 cm from the small island group, which lies 58 miles west of Key West. I will be happy to publish news of any other rare grids as well as plans to put them on, but I must receive information by the 10th of the second month preceding the QST cover date. For example, information for the June issue must be in my hands no later than April 10. I am sure that all will agree that there is little point in publishing information about operations that will be over by the time the column appears.

Another fine publication that serves to build activity and keep people informed is the *2 Meter EME Bulletin*, run by KB7Q. In addition to providing news of 2-meter EME station activity throughout the world, Gene presents much valuable technical information. The issue carrying the cover date of January 4 includes details, furnished by K6QXY, for modifications to the Henry 2002A 2-meter amplifier to increase the unit's output power to near the new legal limit. There are also specific instructions for adding directors to the KLM 16 LBX to achieve a reported additional gain of up to 0.8 dB. Similarly, VE7BQH passes along details for getting more gain out of the Cushcraft DX 120 collinear by the addition of two directors to each boom and then making needed changes to the matching system. The same issue includes a survey card to collect opinions on the subject of EME sequencing and reporting systems, the topic of this column's lead this month. Address for the *2 Meter EME Bulletin* is 417 Staudaher St., Bozeman, MT 59715.

Very little information has been received on long-haul propagation for the period from mid-December to mid-January. In his report, K0TLM does mention that he managed an m.s. contact with WS4F in Georgia during the Geminids Meteor Shower, December 13.

1 1/4 Meters — Although missing (because of business travel) some of the states put on by W0VB, W0SD, WB0TEM and company during 1983, W1JR is still in there climbing the WAS ladder. Joe gave himself a Yuletide present in the form of state number 42 by completing an EME contact with K5JL Oklahoma on Christmas Day. Then, on January 3, he made the grade with WA4CQG Alabama via m.s., to bring his total to 43. He had been trying unsuccessfully to work Dale on this band for several years. This time was the charm with 8 pings and short bursts during the 1-hour 20-minute sked.

N6EKS writes from the Los Angeles area that he is quite active on 220 MHz and expresses his concern over threats to the band. He stresses the high level of activity in his area and offers any help he can muster in defense of our allocation in this part of the spectrum. All are reminded to watch the monthly QST column Happenings and *The ARRL Letter* for late news and recommendations on what we can do to protect our frequencies.

The Higher Bands — Reports of good tropo propagation are rare indeed this time of year. Thus, it is all the more important to drop a line to me or call my answering machine when something good does happen. This will enable me to show that there is activity on the bands. If the event occurs after the 5th of the month, it is best to use the answering machine. The fragmentary reports that I do have for this period includes mention of a 70-cm contact December 9 between N0DAG in the Kansas City area and W4GJO in northern Georgia. This comes via K0TLM's letter mostly concerning other matters.

Not too much is heard about ATV DX these days, but word has reached me of a 439.25-MHz color QSO that took place December 8 between WA4GRK near St. Petersburg, Florida, and three stations in Pensacola: K4KIF, W4EQR and K4IVD. Judging by the photo sent along with the report, the 10 W at WA4GRK produced a very clear picture over the approximately 340-mile path while the opening lasted.

According to the latest *Cheese Bits*, the bulletin of the Mt. Airy VHF Radio Club (the Pack Rats, as they are known far and wide), Bill Olson, W3HQT, has left the Philadelphia area to take up residence in Maine. Bill will be remembered by many for his talks on solid-state equipment for 23 and 13 cm, which he presented in company with WA3JUF at a number of the Club's Mid Atlantic VHF Conferences. Along with his move, Bill has started a new business he calls Down East Microwave. The first products are 45-element loop Yagis for the 23- and 13-cm bands. For details, write to Bill at Box 1655 A, RFD 1, Burnham, ME 04922.

The Right Thing

The great debate about the 2-meter-repeater band plan continues. The battle zone is the 146-148 MHz segment, and the lines are drawn between the proponents of 15-kHz repeater channel spacing and 20-kHz channel spacing. 30-kHz channel spacing is no longer adequate in some of the areas where it still exists. The demand is such that the band must be subdivided to accommodate more repeaters, and the debate centers around whether 15-kHz or 20-kHz channeling should be used for the subdivision. 15-kHz proponents argue that their plan will open more channels for repeaters than the 20-kHz plan, while 20-kHz proponents argue that their plan will avoid adjacent-channel interference which, they claim, is prevalent in areas where 15-kHz channeling already exists. Each side is trying to convince the rest of us that its plan is the right thing. While the debate goes on, the question that goes unanswered (or unasked) is: Do we need more repeaters on 2 meters?

Go Simplex

The original purpose of a repeater was to allow hams to communicate with each other where, under normal circumstances, such communications were impossible because of geographical location, terrain or inadequate radio equipment. Repeater etiquette said that if communications were possible on a simplex channel, use the simplex channel and free the repeater for those who need it. However, remarks like "We could move to a simplex channel, but somebody might be reading the mail here" are not unknown to our repeaters and sum up the state of repeater etiquette today. I have the simplex channels of 146.52, 146.55 and 146.58 MHz programmed into my scanner, and there is not much going on. Is that because communication on a simplex

channel is so difficult that the use of a repeater is necessary?

During the W5LFL flybys in November 1983, the activity on Owen's simplex listening channels was so great that a lot of hams complained about the QRM caused by their fellow hams. If they could hear their fellow hams on simplex during the Shuttle mission, why can't they hear them the rest of the time? Why not use the high-gain beams and high-power amplifiers that were directed at W5LFL on simplex channels to communicate with earthbound hams as well? If more hams used simplex, rather than relying on repeaters, the need for more repeaters — and, therefore, the demand for additional repeater channels — would be alleviated. Or would it?

2 Meters: S.R.O.

The QTH here is in downtown 15-kHz City. From this location, I can hear at least one repeater on each repeater channel in the 2-meter band and often I can hear two repeaters on each channel, and sometimes three. The frequency coordinating body for Connecticut, metropolitan New York City and northern New Jersey claims that each 2-meter repeater channel is coordinated to three repeaters. You would think that the repeater activity would really be hopping! But, scan the band and there is a lot of dead air. There are a half-dozen or so repeaters that are always active, a dozen or so more that are active some of the time, and the rest that are unused most of the time, even during the prime-time commuting hours. If there is a dearth of activity on fifty 2-meter repeaters in the greater metropolitan area, why do they exist? Why not pull the plug, save the electricity, and use the band space to experiment with new modes of communications,

such as packet radio and ACSSB?

Hold on, Horzepa! If these repeaters exist, there must be a legitimate reason. What's legit? Sometimes a couple of hams become dissatisfied with a particular repeater and, instead of trying to change things, they put up their own repeater. The same pool of hams previously served by one repeater are now served by two; as a result, each repeater has much less activity than the original one repeater. Is politics a legitimate reason for the existence of a repeater? A couple of other hams in RTTY mode do some band scanning and pinpoint the less-active repeaters. They approach the groups that run each repeater and ask if they could run a little RTTY on their respective repeaters. Each group turns them down because they "don't want no RTTY on our repeater!" So, they build their own repeater, which they use a couple of nights a week to exchange RTTY traffic. Is the need for this repeater legitimate? Then there is the ham with three grand burning in his pocket. He buys a repeater off the shelf with all the bells and whistles built in, puts it on the air, and no one uses it. But every 10 minutes the repeater transmits his call sign to let everyone know that he is a "repeater god" and that this is his realm. Is ego-tripping legitimate frequency usage?

When the federal government parcels out a natural resource to some self-interest, self-serving entity, there is a hue and cry across the land. Isn't it time for a little hue and cry when ham radio's natural resource, "the bands," are parcelled out indiscriminately to self-interested, self-serving, ham entities? Or do we let the bands become full and then develop new schemes to reclaim some band space for future use? Something is very wrong here. Isn't it time we started to do the right thing?

OHIO REJECTS 20-kHz SPACING

At the January 12 meeting of the Ohio Area Repeater Council, the 54 representatives in attendance unanimously voted to reject consideration of the 20-kHz channel spacing for the 146-148 MHz segment of 2 meters. Implicit in this decision is opposition to the introduction of the 20-kHz plan in the Great Lakes region. Ohio is currently using 15-kHz channel spacing and the primary reason cited for rejection of the 20 kHz plan was the loss of populated frequency pairs that adoption of the plan would entail. In a separate action, the representatives voted to proceed with deinvolution of the tertiary channels in the same segment of 2 meters.

COORDINATORS' NEWSLETTER

The *North American Coordinators' Newsletter* is a result of the efforts of John Hackman, WB4VVA, to provide a means of communications among all frequency coordinators. Various means of accomplishing this are being explored

including computer communications via CompuServe and MCI Mail. Meanwhile, the newsletter will provide frequency coordinators with a forum to exchange ideas about the state of the art of frequency coordination. If you are a frequency coordinator and you are interested in the effort, write to WB4VVA, Box 194, Mount Pleasant, MI 48858. (By the way, John is the frequency coordinator for Michigan representing the Michigan Area Repeater Council.)

NEW YORK AND S. ONTARIO ADDRESS CHANGE

Please note that the address of the frequency-coordinating body for Western New York and Southern Ontario has changed. The new address is Western New York-Southern Ontario Repeater Council, c/o Dr. David B. Toth, VE3GYQ, 499 Bobbybrook Dr., London, ON N5X 1G8, Canada.

REPEATER LOG

According to reports received during the month of December, repeaters were involved in the following public-service events: 1 weather emergency, 1 criminal emergency, 10 medical

emergencies, 21 vehicular emergencies, 2 fire emergencies, 1 search and rescue, 5 public safety events, 19 drills/alerts and 3 power failures.

The following repeaters were involved (followed by the number of events): WA1GDW 13, WB2RUH 1, W2VL 20, N3BFL 6, WB4UDS 4, WD6AWP 9, KH6HHG 1, WD8IEL 5, W8VTD 4.

*75 Kreger Dr., Wolcott, CT 06716
CompuServe ID no. 70645,247

Strays

I would like to get in touch with...

anyone of Hunt descent from Page and Bedford counties, Virginia. Ralph W. Smith, WB6EBA, 4755 Clinton Ave., Klamath Falls, OR 97603.

any amateurs in the trucking industry interested in starting a net. Burt Knight, KB1MK, P.O. Box 715, Concord, NH 03301.

Correspondence

Conducted By Bruce Kampe,* WA1POI

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

THE HANDBOOK

□ For a Christmas present in 1933, my wife gave me a copy of the ARRL *Handbook*. It was the 11th edition and cost \$1. (At that time my call sign was W6JUC.)

We were living in Phoenix. The depression was in full force. My job, washing dishes in a restaurant, paid \$10 for a seven-day work week. We had decided to spend \$1 each on Christmas. I gave my wife four goblets.

The goblets were broken and discarded many years ago. The *Handbook* is on the desk here today, torn, worn and scarred with a soldering-iron burn mark.

For this 1984 Christmas, my wife (of the past 54 years) gave me a copy of the 62nd edition.

These are two of the best Christmas presents I have received in my 77 years. — Donald Hutchins, KB6DQ, Pomona, California

□ I have just finished scanning *The ARRL 1985 Handbook* and am most impressed. It is the finest *Handbook* the League has ever published, and everyone connected with its creation and production deserves a hearty "Well done!" It is a tremendous value, too.

I honestly don't see how anyone can call himself a true member of the Amateur Service if he doesn't have a copy to read and enjoy, and learn from. Congratulations! — Stuart D. Cowan, W2LX, KM2XDU Henniker, New Hampshire

□ Many thanks for the copy of the *Handbook*. You fellows [and women — Ed.] really outdid yourselves on this one. Congratulations on a super edition! — David D. Meacham, W6EMD San Carlos, California

IT'S LATER THAN WE THINK

□ Re "It Seems To Us," Jan. 1985 *QST*, I agree wholeheartedly that we need more new radio amateurs (especially young people). However, if we manage to add 50,000 new amateurs per year but continue to lose amateurs at the rate we did in fiscal 1983 and 1984, we will only see a net gain of approximately 32,000 per year.

If we are to make a goal of 600,000 radio amateurs by 1990, we should put as much emphasis on keeping licensees as we do on gaining newcomers. What we need is a way to make Amateur Radio more exciting, both to prospective amateurs and newly licensed people. — Jan F. A. Veen, WB8VVF, Holland, Michigan

□ As a high school teacher working with young people in today's rapidly changing high-tech society, I was dismayed by your editorial in the January issue. What I see "between the lines"

is that to be a radio amateur today means a commitment to spending a thousand or more dollars to buy the current state-of-the-art appliances and proving your worth as an individual by dutifully studying the Morse code. Most intelligent, young people who are challenged by communications, who are interested in developing new ideas through study and experimentation, look upon us as old fuddy-duddies clinging to our cherished past!

Back in the early years, the standards set for obtaining a license made sense in light of that level of technology. The challenge was met because code was an essential tool to advance a person's knowledge. Right now we are turning away the future Ben Franklins, Tom Edisons, Alexander Bells and other great innovators who, in their day, would have wasted no time in needless pursuits.

Today's youth are just as bright, earnest and eager, but every young man I try to encourage to join our ranks balks at having to waste his precious few spare moments learning outdated technological practices. "Why must I study Morse code? I'll never need or use it! Any simple computer handles the job more efficiently." They point out that they can get a driver's license without having to learn to ride a horse. Even the choice of using a stick shift is up to them. Look at the rapid growth of computer-user groups. No artificial initiation rites there, and no "Chicken-Band" mentality either. Why?

Standards are important, and yes a license is worth earning, but there is a lot to be learned, and learning must have a valid purpose. What are the most important things today's budding amateur must know? Add more theory to the written exams and substitute the code portion with a practical exam on construction and wiring, soldering, RFI prevention, handling digital circuitry, and so on. With the new volunteer examiners to oversee, this idea may not be impractical anymore.

Compare the 1985 *Handbook* with its 1024 pages with the very first edition so many years ago and surely you'll recognize that there is a vast new body of knowledge and plenty of material to test someone's sincerity to be a good "ham."

Before 1990, let's open our eyes and stop living in the past. No other group, society, league or other organization devoted to the growth of modern technology insists on clinging to outmoded practices. Believe it or not, to be a darn good engineer today you had better not waste your time learning to use a slide rule! — Myror Steir, W2EDY, Fair Lawn, New Jersey

□ League members will be relieved to know that they won't have the problems of the "no code concept" or "band crowding" to worry about in the 1990s; they will be fighting for their very existence instead.

The realization that the average age of our group has increased also signals that attrition will now occur more rapidly and we shall soon discover a large "void" in our total licenses.

The ham fraternity needs "new young blood" to move us into the computer-related communications field more rapidly. Also, we need to consider the following:

1) What attracted individuals to this "spectrum" 10 to 20 years ago (or during the years of substantial growth)?

2) Is the high cost (\$500 to \$1500) of commercially built equipment a deterrent? What are some alternatives?

3) Where are the "DX-40 type kits" to get started that a young person might afford?

4) Can we expand a separate "no-code" sub-band for newcomers?

5) What about all those young people who own a VIC 20, or "64," etc., with already marketed programs which will send and receive code from 5 to 99 WPM?

6) Should we advertise in several computer-related magazines with: "If you own a computer join the Amateur Radio fraternity and tune in on the world." We can offer free literature on how to become a ham. We can expound on job careers related to our hobby and how Amateur Radio will benefit one's knowledge and experience in the field of communications. Everything I read today in the radio magazines is directed to the more experienced and already licensed radio amateur. The major theme is "upgrade," and while we are upgrading ourselves we have lost sight of the shrinking licensees.

While radio clubs and high schools are seeking newcomers, the "avalanche" just is not there. Some may say, "Why should we have to 'sell' our hobby to get newcomers?" The alternative, of course, is the status quo, and you can be sure those frequencies we now occupy will be re-assigned to more progressive commercial interests. — John J. Mitchell, W1GSM, South Bend, Indiana

□ Almost all of the articles I have seen lately have high hopes of recovering the respect which the amateur community has lost. Hopes are only good if we as a community of hams are going to dedicate ourselves to restoring that respect.

We cannot gain the respect of nonamateurs by sitting in our shacks tapping Morse code, ragchewing or doing any other nonvisible and unproductive radio activity. Don't get me wrong, I too enjoy code and ragchewing. But how many people have you brought into ham radio? How many activities have you supported which benefit your community? How many high school clubs have you helped to encourage students to grow in the field of electronics? If you can't do all of the above, pick one. I have personally been doing some of the above myself. I try my best.

I encourage all hams to get at least one friend active by the end of 1985. I encourage those of you who feel compelled to get involved with a school radio club to do it.

There are over 400,000 hams in the U.S. If just half would become "active" in a way of service, imagine the good which would reach out to many. — Michael A. Fiore, WB8VNH, Cincinnati, Ohio

*Information Services Assistant

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

WIAC, Ralph E. Colvin, Poultney, VT
K1BD, Theodore C. Banta, Greenwich, CT
W1BIF, Vernon L. Lovejoy, Mount Desert, ME
KA1BNN, William J. Shannon, Westfield, MA
KB1CY, Chester J. Matczak, Sr., Tariffville, CT
KA1HQM, Jane C. Clark, West Redding, CT
WA1JDX, James P. Foley, Waterbury, CT
W1KYR, Elmer C. Johnson, Middleton, MA
W1MFJ, George P. Nichols, Auburn, ME
W1NFE, Kenneth G. McCasland, Foxboro, MA
W1QJB, Millard P. "Chris" Christle, Pepperell, MA
WA1YYW, Richard J. Melbourne, East Longmeadow, MA
W2BE, Joseph T. Maloney, Centereach, NY
W2BVM, Herman F. Riesenkonig, Scarsdale, NY
K2CS, William C. Boerner, Cobleskill, NY
WA2CTH, William H. Morgan, Jr., Elizabethtown, NY
W2GAX, Bayman McWhan, Morris Plains, NJ
W2HB, Earl W. Whyman, Snyder, NY
WB2HQD, Albert T. Wurth, Southold, NY
W2IPA, Frederick H. Scheuter, Staten Island, NY
WA2LGO, Romolo Toigo, Chatham, NY
W2MJD, Arthur B. Moore, North Arlington, NJ
W2TTO, Jerold Fink, Rochester, NY
W2UGB, Martin L. Snyder, Amherst, NY
W2VZC, Clarence A. Templeton, Oriskany Falls, NY
WA2YZX, Frank R. Spinka, Centereach, NY
W2ZB, John G. Arsics, North Plainfield, NJ
W3GEX, Joseph F. Eckert, Jr., Quakertown, PA
WB3JPA, William R. Curtis, Frederick, MD
W3QVI, C. Wilfred Kern, Bushkill, PA
WA3RMI, William V. Downs, Hagerstown, MD
K3WJU, Bernard L. Williams, Waymart, PA
WA4BFJ, Robert L. Stone, Greensboro, NC
K4CXX, Raymond S. Foss, Sr., Oklawaha, FL
W4DAW, Thomas I. Dean, Charleston, SC
W4DOL, Edmund M. Karcher, Sr., Orange Beach, AL
K4EKU, Morris G. Bass, North Miami Beach, FL
K4GGG, Robert E. Clifford, Falls Church, VA
K4JHG, Nelson A. Miles, Leesboro, FL

AJ4L, Ben Farkas, Winter Park, FL
W4LIE, Earl F. Hash, Louisville, KY
WA4LPG, Blanche Renaud, Birmingham, AL
KA4MES, Wilmer "Stan" Hill, Tampa, FL
W4MJZ, Frank H. Palmer, Cocoa Beach, FL
K4MWT, Ellis K. Batcheler, Charlotte, NC
W4NCY, Jack Claxton, Brentwood, TN
K4QP, John P. "JP" Sweeney, Summerdale, AL
WA4SQS, Van A. Sears, Columbia, SC
K4SRI, Charles B. Schnerr, Holly Hill, FL
W4TIE, Horace "Ace" H. Ratcliff, Boca Raton, FL
W4UJI, Albert T. Miller, Venice, FL
KA4VGI, John W. Vogel, Hudgins, VA
K4WZ, Charles C. Whysall, Venice, FL
N5BOK, Joe H. Noles, Houston, TX
K5BVP, William D. Sperry, Albuquerque, NM
N5FBY, Katherine K. Bennett, Friendswood, TX
W5FOY, Lewis R. Bowen, Sr., Tyler, TX
W5HBD, Epps Griffin, Longview, TX
W5KFI, Earl E. Dawson, San Benito, TX
W5LGL, Harry E. Garoutte, Denison, TX
WA5LUN, John O. Bronson, Corinth, MS
W5PFI, Wallace R. Payne, Farmington, NM
W5QMX, Clyde C. Anthony, Las Cruces, NM
W5SDH, George W. Horton, Gulfport, MS
*W5URD, James W. Doggett, Jr., Tyler, TX
WB6DXL, William E. Ellison, Valinda, CA
WA6JSO, Hugh "Lew" Lewellen, Richmond, CA
K6MJB, Richard C. Smith, Mi Wuk Village, CA
W6MZV, Richard J. Best, San Rafael, CA
W6UCW, Jack M. Emmett, Pacoima, CA
WB6VDI, Anton A. Driml, Fort Dick, CA
KA6YXF, Edward D. Mashburn, Visalia, CA
N7AIV, Roy C. Kline, Grants Pass, OR
W7EQQ, Stuart A. Thornton, Tacoma, WA
W7LHL, Vinson W. Casey, Billings, MT
W7HTQ, Deemi K. Benway, Tucson, AZ
W7IMF, Norbert I. Bouchard, Castle Rock, WA
W7JWH, Russel C. Alexander, Sequim, WA
K7NTR, Howard E. Hybskman, Quartzsite, AZ
W7ZJO, Ralph L. Taylor, Vancouver, WA
W8AR, Herbert F. Tank, Kerrville, TX
W8DCI, Boyd M. Oplinger, Wadsworth, OH

W8GP, Charles T. Wycoff, Lewiston, MI
K8ILO, Richard P. Bensinger, Fowlerville, MI
W8QWN, Hans H. Haugard, Fowlerville, MI
KV8W, Richard E. Lance, Sr., Cincinnati, OH
WA8ZCR, John A. Schild, Mio, MI
W8ZTB, William H. Kiker, Traverse City, MI
WB9AHB, Norris Nelson, Muncie, IN
W9AN, Robert B. Mossman, South Bend, IN
WD9BKS, John C. Wright, Schofield, WI
N9BYG, Ernest L. Burdick, Watseka, IL
K9FKG, Stephen C. White, Jr., Rockford, IL
W9000, Donald L. Hayner, Milwaukee, WI
W9OUN, Owen W. Brown, Marion, IN
W8BTF, Edwin W. Bereman, Wichita, KS
KA8CGB, Paul Steifer, Kansas City, KS
WB8GNO, Martin D. Fitzgerald, Littleton, CO
W8JMI, Clara F. Fehr, Willmar, MN
WB8MWY, Roy F. Dent, Jr., Colorado Springs, CO
W8TLE, Alward S. Jensen, Sr., St. Paul, MN
*KH6AZ, Niilo E. Koski, San Diego, CA
VE1APK, Robert R. Winchester, Bear River, NS
VE2ASG, Marcel Lemay, St. Liboire, PQ
VE3BVG, Pamela Gorman, Toronto, ON
VE3RL, Howard E. Fralick, Belleville, ON
VE4AAX, John J. Inglis, Winnipeg, MB
VE7DAR, Ernest W. Edwards, Parksville, BC
ZL3MN, J. T. McMullan, Christchurch, New Zealand

*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

March 1935

To assist his record-breaking v.h.f. pioneering, the ingenious Ross Hull has built a signal recorder on photographic principles — reflected light from a receiver output meter needle is put through a lens and focused on sensitive paper wrapped around an aluminum saucerpan for a drum — driven by the works of an alarm clock.

After amateurs nearly concluded that frequencies above 60 Mc. were destined to be useless for any practical distances, a Hartford-Boston link has been established on 2½ meters. This issue's cover shows the 8-antenna, 8-reflector curtain used at W1AL.

Bob Wilson, W1FJ, was radio operator on a light plane expedition east from Connecticut to Manila, working hams along the way in addition to commercial schedules.

William C. Grunow (remember Grigsby-Grunow b.c. sets?) has offered cash and all-wave receivers as prizes in competition for advances made and articles written for QST dealing with gear above 110 Mc.

Many of us telegraphers would be on voice were it not so doggone costly. George Grammer delves deeply into the facts of grid-bias modulation, and then presents a simple 57-2A5 unit to use with our present c.w. rigs and get on the 'phone bands economically.

Messrs. Wirkler and Collins, W8CXX, go even further in grid-bias techniques for voice by comparing it with other systems; they find it not far behind classes B and C in overall appraisal.

More 'phone interest in this issue: W8FJ shows an unorthodox hookup of a 210 tube in a sort of class AB service, giving more audio watts than conventional circuits.

And again — W6KGG finds that neutralizing condensers in a class B modulator reduce phase shift distortion and also improve high-frequency responses — and thus intelligibility.

Finally, W1BMT and W1BES use the new 6B5 "audio" tubes to drive a pair of '03As in a high-efficiency, high-gain class B modulator circuit.

Highlights of experimentation by W2AND, OA1B and W2AOE form a symposium of ideas for getting more efficiency from receiver preselectors.

SCM W8HD describes the unusual structure of his West Virginia traffic net — everyone on a single frequency, 3700 kc.! Other nets are showing interest in switching to the same procedure. Keying the crystal even makes break-in possible.

A college professor made Amateur Radio the subject of his doctoral thesis. One highlight: "At the close of the day, filled with the monotonous routine of the machine age, he can find adventure, vicarious travel, prestige and friendship by throwing in the switch and pounding his signals into the air."

Electronic keys are by now old hat, but W4FGM adds a new angle in his version with the use of magnetic core memories for storage and switching.

RCA's new 7360 tube was designed for beam deflection in TV receivers, but K2FF points out its useful characteristics for modulation, frequency conversion and detection in sideband exciters.

Hotshot contest op KH6LJ is also skilled in parasitic beam technology, and he shares with us his scholarly lecture on the subject, with particular reference to the Gamma match.

Heard a whistler lately? Electromagnetic energy — say, from lightning discharges — is the principal source of very-low-frequency radio waves bordering the audible range. A resistance-coupled audio amplifier, such as that offered by W1FGQ, will enable you to listen to this unusual phenomenon.

We all know by now that our basic amateur bands have been preserved at the just-concluded world radio conference. Now, W1BUD and W1LVQ outline the complex details of preparation for participation in and detailed results of the Geneva meeting — complete with dozens of allocations table footnotes.

We have 50 kc. more now for voice operation on 20 meters, resulting from FCC action on a League request.

W1HKK outlines the activities of Project OZMA, the attempt to capture any man-made signals that may come from outer space. The hydrogen-line frequency of 1420 Mc. is the main search spot.

Here's the popular BC-454 surplus receiver again, this time with a Q multiplier added by W1ICP to improve selectivity, particularly for the Novice types.

The usual light-bulb load for testing transmitter output has faults on v.h.f. — stray resonances and varying impedances. W1HDQ shows us some compact dummy loads made with everyday resistors.

The new Secretary-General of the International Telecommunications Union is Gerald Gross; a feather in Amateur Radio's cap, since Jerry has been hamming for years as W3GG. — W1RW

25 Years Ago

March 1960

Ideal for AREC/75-C, communications for a sports car rally or just hamming, W1HDQ's self-contained portable weighs only five pounds complete with headset and antenna, yet puts out a healthy signal on 50 Mc.

Our individual interests in ham radio result in varied gear requirements. W3AXF says the only way to fill your exact receiving needs is to build your own; he offers his own unusual design as an example.



President: Richard L. Baldwin, W1RU
Vice President: Carl L. Smith, W0BWJ
Secretary: David Sumner, K1ZZ
Assistant to the Secretary: Naoki Akiyama, JH1VRQ/N1CIX

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Secretary, IARU Region 3 Association
P.O. 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.

The Amateur Radio Service

The following, excerpted from a special edition of the *IARU Region 2 RTTY Bulletin*, bears repeating to the perhaps wider audience of this column.

"The Amateur Radio Service is a service in the true sense of the word. We are constantly serving the community by providing communications during emergencies and natural disasters. We experiment and have developed many of the systems now being used for communications. We take time to talk to people all over the world and

therefore promote and create mutual friendship. Throughout all of our activities, we do not let religious or political incidents interfere with our objectives. In exchange for our efforts the worldwide community, through the ITU, has given us allocations in the frequency spectrum. The good use of these allocations ensures future use of the frequency spectrum to the extent that Amateur Radio will be able to continue a healthy rate of growth.

"The International Amateur Radio Union, as a worldwide organization, strives to promote and

defend the Amateur and Amateur Satellite Services. Our task is made possible by the support we receive from our member societies, yet our most important tool in meeting our objectives is the individual amateur. If he correctly uses the allocations, if he serves his community, if we continue to be self-monitoring, and if the individual amateur progresses consistently with changing technology, then we are assured of continued opportunities in the field of communications." — *HK3DEU*

A COMMON LICENSE

One of the dreams, one of the goals, of the IARU is the attainment of a common license throughout the world. Like the international driving license, it would permit an Amateur Radio operator licensed in almost any country to operate an amateur station in almost any other country. Some progress is being made, we are glad to report. After many years of persistence in Europe, some concrete proposals are being put forth by the CEPT, an organization of the posts & telecommunications ministers in Europe. Likewise, the Andean pact nations, under the leadership of Colombia and Peru, have approved the concept in principle. It is likely that if we can make a breakthrough in one or two areas, the whole world will follow.

JAINET A SILENT KEY

We are grieved to report the December 21 death of Shigetake Morimoto, JAINET, at the age of 77. "Take," a valuable member of the IARU WARC-79 team, was much liked and respected by all of us who had the privilege of working with him during that conference. He became interested in Amateur Radio while a high-school student, in the twenties. First licensed as JIKO and later as JIFT, he took part in the founding of JARL in 1926. After WW II, he was licensed as JA1NET. In his business life, he was a PTT official for some 28 years, and was then associated with commercial TV broadcasting. He was an active participant in the work of ITU's CCR, and attended a number of ITU conferences. On the Amateur Radio side, in recent years he had made substantial contributions to amateur satellite communications in Japan, serving as president of JAMSAT and as chairman of the JARL Satellite Committee. Amateur Radio has lost a good friend and valuable contributor.

THAILAND

RAST, the IARU society in Thailand, anticipates a change of status in Amateur Radio in that country during the coming months. At the 20th anniversary celebrations of RAST held last

November, senior society officials had an opportunity to talk with the Minister of Communications. During these discussions, the Minister promised to assist RAST in the licensing of Amateur Radio operators in Thailand once again.


CHINESE TAIPEI

BV2A/BV2B advises that 25 potential amateurs are currently under training in Taiwan. It is hoped that there will be 12 new stations on the air sometime during 1985.

IARU POTPOURRI

□ One of the earliest certificates awarded for DX operation was the WAC certificate, issued by IARU. Thousands of WAC certificates have been issued, and the WAC award continues to be an important first step for new amateurs or those just getting their first taste of the lure of DX. WAC has been worked all on a single band, all on RTTY, all QRP, etc. But here's another way of making WAC — in person at an IARU Conference. In the accompanying photo those pictured were gathered for the Region 1 IARU Conference in Cefalu, Sicily, Italy, in the spring of 1984. Left to right are Alberto Shaio, HK3DEU, Region 2 Secretary; Masayoshi Fujioka, JM1UXU, Region 3 Secretary; Muh. Bello Tunau, 5N9MBT; Saviour Galea, VK2AKP; Larry Price, W4RA, ARRL President; and Alf Almedal, LA5QK, NRRL HF Manager. The photo comes to us courtesy of Kris Benediktsson, TF3KB, president of the Icelandic Radio Association.



□ A special-call station, ED7ITU, was set up by IARU society Union de Radioaficionados Espanoles (URE) for use during the VIII Plenary Assembly of the International Telegraph and Telephone Consultative Committee (CCITT) of the International Telecommunication Union, held October 8-19, 1984 at Malaga-Torremolinos, Spain. Members of the local section of the URE manned the station during the entire two-week period of the Plenary Assembly. (Remember what I said about IARU/Amateur Radio exposure at international telecommunications meetings?) Prominent among the operators were Tony, EA7BUD; Frank, EA7FP; and Jose, EA7AIN. If you worked them, QSL to ED7ITU, c/o Delgacion Local de la URE, P.O. Box 262, Malaga, Spain. Thanks to W4KM for the info on ED7ITU. 

Strays

QST congratulates...

□ the following radio amateur on 60 years as a member of ARRL:

Frederick H. Brill, W1GC, of West Haven, Connecticut

WEATHER-SATELLITE CONFERENCE

□ Amateurs involved in SKYWARN and other weather-watch operations may be interested in attending a weather-satellite conference April 15-19 at the Holiday Inn near Baltimore-Washington International Airport. Among the possible topics to be discussed at the second International Satellite Direct Broadcast Services Users' Conference will be the role of amateurs in times of local and regional weather disasters. For more information, contact Robert Popham, NOAA Co-chairman, ISDBSUC, NOAA/NESDIS, Washington, DC 20233, tel. 202-763-7820.

*President, IARU

Hamfest Calendar

Administered By Marjorie C. Tenney,* WB1FSN

[Attention 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. Hamfest information is accurate as of our deadline; contact sponsor for possible late changes.]

Connecticut (West Hartford) — March 17: The 3rd Annual Ham Radio/Electronic Flea Market sponsored by the Insurance City Repeater Club will be held from 9 A.M. to 4 P.M. at the American School for the Deaf, 139 North Main St. Admission at the door is \$1; tables are \$8. Talk-in on 28/88. For further information, contact Charles I. Motes, Jr., K1DFS, Treasurer, 22 Woodside La., Plainville, CT 06062, tel. 203-747-6377.

Florida (Orlando) — March 8-10: The Orlando Hamcat and Computer Show, sponsored by the Orlando ARC, Inc., will be held at the Centro-Plex, 500 Livingston St., Orlando. Hours are 5-9 P.M. Friday, 9 A.M.-5 P.M. Saturday. Advance admission is \$5; at the door \$7. ARRL forum, RTTY, DX, traffic handler's program, SSTV, antennas and activities for women. FCC exams on Saturday only. Talk-in on 146.76/147.045. For information and reservations, contact A. J. Huber, KC4CT, P.O. Box 15142, Orlando, FL 32858, tel. 305-422-1332.

Florida (Fort Walton Beach) — March 16-17: The Playground ARC hamfest will be held at the Fort Walton Beach Fairgrounds. Admission is \$3. For further information, contact Clarence N. Quintan, W4I RC, 120 Patton Dr., NE, Fort Walton Beach, FL 32548, tel. 904-862-4789.

Georgia (Dalton) — March 9: The Dalton ARC will hold their 3rd annual hamfest at North GA Fairgrounds. Plans have been made to conduct license exams during the hamfest hours. Contact Tom Smith, K14IG, tel. 404-259-5200 (after 6 P.M.) for details.

Georgia (Columbus) — March 30: The Columbus ARC hamfest will be held at the Columbus Municipal Auditorium 9 A.M.-5 P.M. (EST) Saturday and 9 A.M.-3:30 P.M. Sunday. Ticket donations: 13 for \$10; 6 for \$5; 1 for \$1. ARES forum, MARS, open-air flea market, free coffee and chocolate, free parking for self-contained RVs (no hookups). Indoor tables are \$5.50 per day. Talk-in on 01/61. License exams Saturday morning. Further information from George M. Reitz, N4AG0, RR 2, Box 22D, Seale, AL 36875, tel. 205-855-2204.

Illinois (Sterling) — March 10: The Sterling-Rockfalls Amateur Radio Society's 25th Silver Anniversary Hamfest will be held at the Sterling High School Fieldhouse, 1608 4th Ave. There will be commercial distributors, dealers and a large flea market. Lots of free parking, and space to accommodate self-contained campers overnight. Doors will open at 7:30 A.M., and a concession stand will be available. Tickets: in advance \$2; at the door \$3. Tables requiring electricity and all commercial tables, \$5. All others \$3. For advanced tickets, tables or information, contact Sue Peters, KA9GNR, P.O. Box 521, Sterling, IL 61081, or call 815-625-9262. Talk-in on 25/85.

Illinois (Amboy) — March 31: The 19th Annual Rock River ARC Hamfest will be held at the Lee County 4-H Center, one mile east of junctions 52 and 30. Camping space available at nominal charge. Tables available (8-ft) at \$5; inside space available for flea market \$3. Advance ticket donation \$2; at the gate \$3. Lunch will be served. Talk-in on 37/97 and 444.700/449.700. Doors open at 8 A.M. for the general public. For information or advance tickets, tables and spaces, write to or call Shirley Webb, KA9HGZ, 618 Orchard St., Dixon, IL 61020, tel. 815-284-3811. Advance tickets available until March 15, 1985.

Illinois (Grayslake) — March 31: LAMARSFEST 1985, sponsored by Libertyville and Mundelein ARS, will be held at the Lake County Fairgrounds. Doors open at 8 A.M.; setup at 6 A.M. Advance admission \$2; at the door \$3. Large indoor electronic and radio swapfest. Commercial exhibits, code-speed testing, free

parking, public cafeteria. Talk-in on 146.94 and 63/03. For further information, write to LAMARS, Box 751, Libertyville, IL 60048, tel. 312-255-8717.

Indiana (Indianapolis) — March 10: The Indiana Hamfest, formerly the Martinsville Hamfest and now sponsored by the Morgan County Repeater Assn. Club, will be held indoors at the Indiana State Fairgrounds Pavilion Bldg., Indianapolis. Admission: \$5 at the door. Premium table, \$40; flea market table, \$8; flea market space without table, \$3. All tables must be reserved in advance. Setup for reserved tables will be available 3 P.M.-9 P.M. Saturday, March 9. Space setup will be 6 A.M.-8 A.M. Sunday. No cars inside after 8 A.M. Sunday. Free paved parking. Talk-in on 145.25. For table reservations or information, send s.a.s.e. before March 1 to Aileen Scales, KC9YA, 3142 Market Pl., Bloomington, IN 47401, tel. 812-339-4446.

Indiana (Winchester) — March 24: The Randolph ARA 6th hamfest is from 8 A.M. to 5 P.M. in the Winchester National Guard Armory. Dealers, flea market, food and drink, and programs all inside. Ticket donation \$3; under 12 years free. Table space (by reservation only): \$5 with table; \$2.50 without. Setup at 6 A.M.-8 P.M. Saturday and 6 A.M.-8 A.M. Sunday. Programs, license testing (volunteer examiner), flea market, breakfast/dinner catering. Talk-in on 90/30 and 223.30/224.90. For information and reservations, contact Jake Life, W9VJX, P.O. Box 203, Winchester, IN 47394, tel. 317-584-9361 or Herbert James, WB9JZZ, Co. Rd. 650N, Box 90, Ridgeville, IN 47380, tel. 317-584-4995.

Maryland (Timonium) — March 31: The Baltimore ARC, Inc. (BARC) will present the 1985 Greater Baltimore Hamboree and Computerfest at the Maryland State Fairgrounds Exhibition Complex. The indoor flea market and large dealers display area will be in two modern exhibit halls. Amateur Radio, personal computer, and small business-computer dealers will be featured. Guest speakers throughout the day. Large, hard-surface outdoor tailgate area. Food service, free parking. The fairgrounds are located east of I-83 exit 17, three miles north of I-695, just north of Baltimore. Gates open at 8 A.M. Admission is \$4; children under 12 free. Overnight accommodations available in immediate area. For additional information and table reservations, contact GB H & C; P.O. Box 95, Timonium, MD 21093-0095, tel. 301-561-1282. For a recorded announcement, dial 301-HAMTALK.

Massachusetts (Chicopee) — March 3: The Mount Tom Amateur Repeater Association (MTARA) Inc. will host its first annual indoor flea market for Amateur Radio and computer-related items at the Knights of Columbus Hall, Elder Council 69, Granby Rd., Chicopee. Easy access from I-91, the Mass. Pike or 391. Talk-in on 52 or 34/94. General admission is \$1; tables are \$8 at the door, \$7 by preregistration. Power available for vendors. Food and drink. Setup at 8-9 A.M., flea market from 9 A.M.-4 P.M. Contact Mickey Yale, N1CDR, 6 Laurel Terr., Westfield, MA 01085, tel. 413-562-1027.

Massachusetts (Lynn) — March 24: 19/79 ARA, of Chelsea, will hold its annual flea market from 11 A.M. to 3 P.M. local time. It will be held at Lyon Hall in the Ireson Bldg., 493 Western Ave. (Rte. 107). Sellers will be allowed in at 10 A.M. to set up. Admission for the general public is \$1; sellers free. Tables are \$6 in advance, \$8 at the door, if available. For table reservations, send checks to 19/79 ARA, P.O. Box 171, Chelsea, MA 02150.

Massachusetts (Wellesley Hills) — March 30: The Wellesley ARS annual spring auction will be held at the Wellesley Hills First Congregational Church, 207 Washington St., Wellesley Hills, at the intersection of Rtes. 16 and 9. Check-in will start at 10 A.M., and the auction will start at 11 A.M. Commission is 15%, with \$1 minimum and \$30 maximum. Food and drink available. No admission charge and plenty of free parking. Talk-in on 63/03. For more information, contact Neils Anderson, K1UR, tel. 617-872-5259.

Michigan (Grosse Pointe) — March 24: The Southeastern Michigan ARA (SEMARA) annual Swap and Shop will be held at the Grosse Pointe North High School, 707 Vernier Rd., from 8 A.M. to 3 P.M. Donation at the door \$3. Talk-in on 147, 150 and 52. Reserve \$8 tables with George Berg, KB8SS, tel. 313-446-1804, or write to P.O. Box 646, St. Clair Shores, MI 48080.

New Hampshire (Hudson) — March 16: The Interstate Repeater Society will hold their annual flea market at the Lions Club, Lions Ave., Hudson. For table reservations please write to Interstate Repeater Society, P.O. Box 693, Derry, NH 03038, or call Dick WB8YGR, at 603-889-3479. Talk-in on 25/85 and 52.

New Jersey (Morris Plains) — March 8: The Split Rock ARA presents its Annual Ham Auction at the VFW Post 3401, Tabor Rd. (Rte. 53). Doors open at 7 P.M., and the auction starts at 8 P.M. Lots of free parking. For additional information, write to P.O. Box 3, Whippany, NJ 07981. Talk-in on 385/985.

New Jersey (Trenton) — March 17: The Delaware Valley Radio Assn. will hold its 13th annual flea market of Amateur Radio and computer equipment from 8 A.M. to 4 P.M. at the New Jersey National Guard 112th Field Artillery Armory, Eggerts Crossing Rd., Lawrence Township. Advance registration \$2.50; \$3 at the door. Indoor and outdoor flea market area, commercial dealers, refreshments. Sellers are asked to provide their own tables. Talk-in on 52 and 07/67. For advanced tickets and space reservations, write to KB2ZY, Box 441B, RD 1, Stockton, NJ 08559 (s.a.s.e. please).

New Jersey (Egg Harbor City) — March 30: Shore Points ARC, Inc. invites everyone to Springfest '85, to be held from 9 A.M. to 2 P.M. at the Atlantic County 4-H Center, Egg Harbor City, about 15 miles west of Atlantic City. Buyers and sellers can make their deals inside 8000 square feet of heated, indoor selling space; covered tailgating will also be available, weather permitting. Limited ac in indoor space. Sellers \$5 per space (bring own table); buyers \$2.50 advance, \$3 day of hamfest. Info: SPARC, Box 142, Absecon, NJ 08201.

New Jersey (Upper Saddle River) — March 30: A ham radio flea market sponsored by the Chestnut Ridge RC will be held in the Education Bldg., Saddle River Reformed Church, East Saddle River Rd. and Weiss Rd. Tables: \$10 for the first, \$5 each additional table. Tailgating: \$5. Food and soda. No admission fee. Contact Jack Meagher, W2EHD, tel. 201-768-8360, or Roger Soderman, KW2U, tel. 201-666-2430.

North Dakota (Fargo) — March 30: "Hobbie Hi Tech 85," a Ham Radio/Computer Show and Swap Meet will be held at the Army National Guard Armory at Hector Field. This event is sponsored by the Red River Valley and NDSU ARCs. Swap tables are available by reservation: \$20 for commercial, \$5 noncommercial and \$3 for 1/2 noncommercial. Any left-over tables will be sold at the door. Hours are 8 A.M. to 5 P.M. For those with advance applications, all classes and elements of Amateur Radio exams will be given at this same location and time. Talk-in on 16/76. For more information, please contact Tim Gooding, WD8GUR, Event Chairman, 1006 Shyenne St., West Fargo, ND 58078 or call 701-282-6630.

Ohio (Maumee) — March 17: The Toledo Mobile Radio Assn., Inc. proudly presents its 30th Annual Ham/ComputerFest and Auction at the Lucas County Recreation Center, Key St. Hours will be 8 A.M. to 5 P.M., with the auction starting at 10 A.M. Plenty of free parking. Tickets are \$2.50 in advance. \$3 at the door. Tables will be available, and displays are limited to electronic, amateur and computer equipment. License examinations will be given to those with advance appointments only. Women's activities will be held in the 4-H room, starting at 11 A.M. Talk-in on 52, 87/27 and 447.850/442.850. Further information from Joseph Nyitray, W8LNV, 3950 Drummond Rd., Toledo, OH 43613, tel. 419-472-7935.

Ohio (Madison) — March 31: The Lake County ARA will present their Seventh Annual Lake County Hamfest & Computerfest at Madison High School. Doors open for exhibitors at 5:30 A.M., for the public at 8 A.M., at this large indoor location. We'll close at 3 P.M. Admission is \$3 advance, \$3.50 at the door. Table and display space is \$5 for 6-foot table, \$6.50 for 8-foot table. Plenty of parking, and all display space is indoors, just 40 miles east of Cleveland. Talk-in on 81/21. Information and reservations by sending an s.a.s.e. to Ken Blazor, N8E1H, Lake County Hamfest Committee, 713 W. Jackson, Painesville, OH 44077, tel. 216-953-9784. Exams, Novice through Extra. Check for registration cut-off date.

Oregon (Milton-Freewater) — March 24: The Walla Walla Valley Radio Amateur Club will hold their annual swapfest indoors at the Milton-Freewater, Oregon

*ARRL Hamfest

*Convention/Travel Coordinator, ARRL

Community Bldg. Snack bar at the site. For more information, write to W7DP, P.O. Box 321, Walla Walla, WA 99362.

†Pennsylvania (McKeesport) — March 10: The Two Rivers ARC announces its 12th annual swap'n'shop, from 8 A.M. to 4 P.M., at Green Valley VFC Hall, just off U.S. Rte. 30, North Versailles. Commercial vendors welcome. Talk-in on 22/82. For further information, contact Michael A. Kowalcheck, WA3IZH, P.O. Box 184, Greenock, PA 15047.

Pennsylvania (Johnstown) — March 17: The eighth annual hamfest of the Conemaugh Valley ARC will be held at the East Taylor Fire Hall, Rte. 271, five miles south of Rte. 22 (4 miles north of Johnstown). Hours are 8 A.M. until 4 P.M. Food and refreshments available. Check-in on 34/94.

Texas (Midland) — March 17: The Midland ARC will

hold its annual St. Patrick's Swapfest 10 A.M. - 5 P.M. Saturday, 8 A.M. - 2:30 P.M. Sunday at the Midland County Exhibit Bldg., located east of Midland, on the north side of Hwy. 80. Preregistration is \$5; \$6 at the door. Tables are \$6 each. Refreshments and food available. Volunteer Examiner tests for all license classes given. For further information and reservations, please contact Midland ARC, P.O. Box 4401, Midland, TX 79704.

Wisconsin (Milwaukee) — March 2: The Milwaukee School of Engineering ARC, W9HHX, is sponsoring its second annual swapfest in Downtown Milwaukee. All indoors at the MSOE cafeteria, 1121 N. Milwaukee St. General admission at 8 A.M.; setup at 7:30 A.M.; food and refreshments at 9 A.M. Admission \$2; tables \$3. Talk-in on 19/79. For tickets or info, send business-size s.a.s.e. to MSOE ARC W9HHX, 1025 N. Milwaukee St., Rm. C-6, Milwaukee, WI 53201, or call

Pete or Paul at 414-347-1099.

Wisconsin (Jefferson) — March 17: The Tri-County ARC will hold its annual hamfest from 8 A.M. to 3 P.M. at the Jefferson County Fairgrounds, Jefferson. Tickets are \$2.50 in advance, \$3 at the door. Tables are \$3 in advance and \$4 at the door. Free parking, plenty of food. Doors open at 7 A.M. for sellers only. Talk-in on 52, 22/82 and 144.89/145.49. For more information, advance tickets and tables, send an s.a.s.e. to Bob Barker, K9RIJ, 724 Burdick, Milton, WI 53563.

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.

Coming Conventions

ROANOKE DIVISION CONVENTION

March 16-17, Charlotte, North Carolina

Twelve-thousand Radio Amateurs are expected to arrive in Charlotte for the ARRL Roanoke Division Convention-Charlotte Hamfest and Computerfair, sponsored by the Mecklenburg Amateur Radio Society. The beautiful Charlotte Convention Center will offer a temperature-controlled environment for 160 booths for major manufacturers and dealers displaying the latest miracles in Amateur Radio — computer equipment — while 700 flea market tables will offer choice selections of hard-to-find items and irresistible bargains for all.

Many special guests will be on hand, with programs running continuously both days. Included will be a free DX program featuring the recent Taiwan DXpedition, BV0W, with Don Murray, W4WJ, and video tapes of VU7WCY, Indian Laccadives Islands; the latest update on FCC activities from J. J. Freeman, W4JJ, engineer-in-charge, Norfolk District; A special seminar on Emergency Operations and SKYWARN; the fascinating new mode, packet radio, with Jonathan Bloom, KE3Z, ARRL Hq.; update and status on DXAC and DXCC from Don Search, W3AZD, and John Kanode, N4MM; getting the most out of your tower and antenna structure by Al Caplan; Gay Millus, W4UG, Director, Roanoke Division, conducting programs for all the ARRL Convention Activities.

Volunteer Examinations will be held on Sunday, March 17, by the Charlotte VEC. Send a completed Form 610, a photocopy of your present license and a check payable to "Charlotte VEC" for \$4 to Charlotte VEC, 227 Bennett La., Charlotte, NC 28213, before March 9.

Headquarters hotel is the Adam's Mark, 555 S. McDowell St., Charlotte, NC 28204. Special rates are available: \$50 single, double, triple, quad, function no. CHC7644LA.

Preregistration for both days of the convention is \$6 (cutoff March 9); \$8 at the door; flea market reservations \$10 per table both days, chair \$1 each. Send preregistration requests to Mecklenburg Amateur Radio Society, 2425 Park Rd., Charlotte, NC 28203. Make checks payable to Charlotte Hamfest.

COLORADO STATE CONVENTION

March 17, Aurora

The 1985 ARRL Colorado State Convention/4th Annual ARA Hamfest will be hosted by the Aurora Repeater Association March 17, from 8 A.M. to 4 P.M., at the Colorado National Guard Armory, 55 S. Potomac St., Aurora. Activities include an ARRL forum with Rocky Mountain Division Director Lys Carey, K0PCM; VE test session; meetings for ARES, NTS and CCARC. Indoor swap. Food and drink.

Admission is \$1; under 12 years of age admitted free. Swap tables are \$5 each. Talk-in on 75/15 and 443.85/448.85. For further information, contact Bill Sheffield, K0QJ, 1444 Roslyn St., Denver, CO 80220, tel. 303-355-2488 or 355-6400.

NEBRASKA STATE CONVENTION

March 30-31, 1985, Kearney

The Midway ARC of Kearney will celebrate its 8th annual ARRL Nebraska State Spring Convention. As

†March 9-10
Louisiana State, Lafayette
†March 16-17
Roanoke Division, Charlotte, NC
March 17
Colorado State, Aurora
March 30-31
Nebraska State, Kearney
April 13
Michigan State, Muskegon
April 13-14
Arkansas State, North Little Rock
†April 13-14
Missouri State, Kansas City
April 20-21
Mississippi State, Jackson

*At press time, Amateur Radio exams are scheduled to be given at these conventions. For other exam opportunities see Hamfest Calendar.

May 4-5
South Carolina State, Greenville
May 18-19
Alabama State, Birmingham
†May 18-19
Atlantic Division/New York State, Rochester

ARRL NATIONAL CONVENTIONS

October 4-6, 1985

Louisville, Kentucky

September 5-7, 1986

San Diego, California

July 10-12, 1987

Atlanta, Georgia

How to Register for Upcoming Exams

March 16-17, Roanoke Division Convention (Charlotte North Carolina): Volunteer examinations will be held on Sunday, March 17. Send a completed Form 610, a photocopy of your present license and a check for \$4 (payable to Charlotte VEC) to Charlotte VEC, 227 Bennett La., Charlotte, NC 28213. Applications must arrive by March 9.

May 18-19, Atlantic Division/New York State Convention (Rochester): Preregistration required. Send request for testing and a business-size s.a.s.e. to A. G. deBlick, KW2X, 59 Bay Knoll Rd., Rochester NY 14622. Preregistration must arrive by April 20. Your appointment and copy of new FCC Form 610 will be returned promptly. Bring check payable to "METROPLEX/VEC" to test session. You must bring a copy (if you have one) of your current Amateur license and any code credit certificate or temporary operating certificate. You must also have two forms of positive identification.

April 13-14, Missouri State Convention (Kansas City): Volunteer examinations will be given 5 and 7 P.M. Friday and 8 A.M. Saturday and Sunday. List first and second choice (limit of 40 each session). Send Form 610, copy of license, check for \$1 payable to PHD/VEC (not with hamfest registration) to PHDVEC, P.O. Box 11, Liberty, MO 64068-0011, by April 8. S.a.s.e. a must for confirmation, please. Walk-ins if space available. Original license plus one other ID required for ID. Hamfest registration not required to take exams or attend forums.

usual, we will take over the Holiday Inn for the weekend.

The Friday night preactivity will be the North American Teleconference Radio Network, originating live from the Holiday. According to net manager Timothy Loewenstein, WA0VW, the two-hour program featuring Jim Larsen, K7GE, of Larsen Antennas, will begin at 8:00 P.M. (local time).

License exams, sponsored by the Lincoln ARC, will be on Saturday morning.

Convention symposium speakers are John Champa, K8OCL, on AMSAT; Ralph Wallio, W0RPK, on packet radio. Joe Eisenberg, WA0WRI, on frequency

coordination and RFI; and Steve Place, WB1EYI of ARRL. Paul Grauer, W0FIR, Midwest Director, and Dick Dyas, W0JCP, Vice-Director, will conduct the ARRL forum. Ladies' activities coordinators Janene Feikert and Delaine Loewenstein, WB0MMI, have events planned.

And then there's the banquet: terrific cuisine, Four Keys music, ventriloquism, Belvin B. Bump's humor, and more. Kearney definitely has a convention for the whole family.

For registration information, write to Midway Amateur Radio Club, NE State Convention, P.O. Box 1231, Kearney, NE 68847-1231.

A Tribute to the HAYLARCs

The HAYLARCs are the Huntsville Alabama Young Ladies' Amateur Radio Club. They have been serving their community and Amateur Radio since their inception, in 1977. The word that best describes the HAYLARCs is willing. Willing also means voluntary, earnest, enthusiastic, bent upon and well-disposed.

It all began with a coffee break. Nancy Christian, N4CEU, decided one morning in 1977 that it was about time all the YL hams in the Huntsville area should get together. With the help of neighbors, SCM notes on newly licensed women and the rosters of other ham associations, a list of approximately 40 YLs was compiled and invitations mailed. More than 25 YLs attended that first coffee party — some on coffee breaks from offices where they worked.

The idea of forming a club took hold and grew into a lively discussion of the purposes of such a group. It was agreed that their most useful approach would be as a service organization dedicated to upgrading member licenses, educating the community about all aspects of Amateur Radio and serving the community in times of need.

In no time the club was formed, complete with constitution, officers, dues, name and emblem. Plans were made to become listed with the Chamber of Commerce and to become ARRL-affiliated.

Educating the Community

The club members agreed that the best way they could begin to educate the community on Amateur Radio was in the schools, and it was off to school for many of them. They designed a program to teach children from grade three through high school about all aspects of Amateur Radio. A presentation of this program was given at a regular meeting of the Huntsville ARC for comments and suggestions, and it rapidly won a vote of confidence. HARC felt that these YLs would succeed in filling a void that the older club had been unable to fill.

An overwhelming response by the community in favor of this program ensured its popularity throughout the ensuing school years. In addition to the program, area schools and libraries were supplied with ARRL films and publications.

It soon became apparent that while membership dues were adequate to cover mundane club expenses, they were not sufficient to support the educational program and the library giveaways. Fund-raising became a necessity and was accomplished by publishing a North Alabama Ham Radio Directory, to be sold at hamfests. Collecting and selling newspapers was also added to the club's fund-raising activities.

Community Service

The club's first communications-service project was entered into with no hesitation. They were asked to provide communications for the



HAYLARC member Jo McDonald, KY4V, lets fifth grade students at Colonial Hills Elementary School in Huntsville, Alabama, listen in on a 2-meter QSO as part of her demonstration of Amateur Radio.

first-annual, all-volunteer Christmas Parade, in 1977. This they did with great success, and have continued this service for seven years.

In 1983, JoAnn Tunstill, WB4QOS, president of HAYLARC, received an exciting request from Alabama A & M University. The University wanted to produce a program about Amateur Radio, to be broadcast on Alabama Educational Television, and was enlisting the help of HAYLARC members. A University representative met with HAYLARC members to discuss program material possibilities. It was agreed that the school program material used by the club was geared to a very young audience, and since the television program *Montage* attracted adults, it was more feasible to lend the University the films *Moving Up to Amateur Radio* and *The Wide World of Amateur Radio* for their review. The resulting program was shown on the Public Broadcasting System in two half-hour segments throughout Alabama, western Georgia, southern Tennessee, eastern Mississippi and the north Florida panhandle in September 1983. Dr. Hayward Handy, WO4V, director of the School of Telecommunications at the University, provided the copyright release so that ARRL might use the program. A copy is on file at League Headquarters.

Upgrading Members' Licenses

The original membership of HAYLARC included just one General class licensee; the balance of the members held Novice and Technician licenses. The club's third purpose has been upheld well. Toward the latter part of 1984, club membership boasted two Novices, eight Technicians, three General, five Advanced and five Extra Class licensees, with several members planning to upgrade.

Where to Begin?

"Where shall I begin, please your Majesty?"

"Begin at the beginning," the King said gravely, "and go on till you come to the end: then stop." (Lewis Carroll's famous quotation from *Alice in Wonderland*)

Many YLs have expressed a desire to make a contribution as worthwhile as the HAYLARC's educational school program. Invariably, such discussions end with fears of inadequacy. Comments such as, "What if the children ask a question I can't answer?" are not uncommon.

JoAnn Tunstill, WB4QOS, kindly complied with a request for a step-by-step approach to such a project. The steps set forth by JoAnn should allay all fears.

First step: Obtain permission from the school administration to present such a program and to use the interoffice mail to contact teachers. The letter to teachers used by HAYLARC was written to create interest in Amateur Radio, and a copy can be supplied upon request.

Second step: Decide which grades you want to present your program to. HAYLARC's experience has found that the most genuine interest stems from grades three through eight.

Third step: When presenting a program, have charts of QSL cards and radio frequencies, a code oscillator, a 2-meter rig and the ARRL films mentioned above. Start with a brief explanation of what Amateur Radio is, then show one of the films. Following the film, explain the charts and demonstrate all other items. The 2-meter demonstration generally creates the greatest excitement. There is always a station on frequency willing to help with this demonstration.

Then follows the question-and-answer period. To quote JoAnn: "You don't need an Extra Class license to answer their questions." Having a teacher in your group can be very helpful, as they are familiar with the attention span of the different age groups. It's also wise to have the teacher remain in the room during the presentation.

Replaying a tape of a QSO can add excitement to a presentation. Or, try demonstrating a hand-held radio. JoAnn has done this in a classroom by using the autopatch and letting a student talk with someone at home, creating amazing interest.

Operation Update

HAYLARC members voted at last October's meeting to put the school program on hold. A committee has been formed to update the program to include the videotape *Amateur Radio's Newest Frontier*, narrated by Roy Neal, K6DUE, as a nucleus. Melanie Winter, N4HIX, and Jan Sturbois, WB4RIV, head this committee. With most schools now having VHS recorders and TV monitors, they feel that this is an opportunity to upgrade their program to first class. With the club's willingness to serve proven, there's no question that their new program will be in full swing for the 1985-1986 school year. It's a pleasure to pay tribute to the activities of the Huntsville YLs. □

*Country Club Dr., Monson, MA 01057

Affiliated Clubs in Action

Conducted by
Leo D. Kluger,* WB2TRN

CLUB CHALLENGE FOR THE '80s

Amateur Radio is facing an important crossroads — do we opt for the status quo and take our future for granted, or do we redouble our efforts and work toward dramatic but high-quality growth? With competition for the Service's most valuable resource — spectrum — growing more intense every year, we'd better choose the second path! If our legacy is to be a healthy, robust Service, we cannot sit back complacently and conduct business as usual.

We must effectively represent our needs, just as the Electronic Industries Association, Federal Aviation Administration, Land Mobile Service and other groups actively further their interests. All of these influential groups want our frequencies, and an effective presence in front of Congress and the FCC is the only thing that will allow us to prevail against their efforts.

How can we ensure success? The ARRL is the national voice of Amateur Radio in the U.S. The ARRL actively fights for Amateur Radio — defending our frequencies, introducing legislation for federal preemption of too-restrictive local zoning laws and commenting on every single FCC Ruling or Proposed Ruling concerning Amateur Radio.

Perry Williams, WIUED, is a registered lobbyist working for the ARRL. To steal a phrase, "when Perry speaks, Washington listens." But the ARRL presently consists of only about one-third of the licensed Amateur Radio operators in the U.S. How much more effective could we be if Perry could speak with 400,000 amateurs behind him, instead of 130,000?

The Answer: Recruiting New ARRL Members

Amateur Radio needs help, and it is *you*, members of ARRL affiliated clubs, who can provide it. This year begins an active campaign to recruit new ARRL

members through affiliated clubs. Whenever an amateur becomes a new ARRL member through a club, the club is entitled to a \$5 commission from the member's first year's dues. A new member is considered to be anyone whose last membership expired before 1980.

Four Digits Are the Key

Here are the details: A mailing has been sent to the ARRL contact person in each active affiliated club. A unique four-digit ID number is on the cover letter. When a new regular, youth or senior ARRL member writes your club's four-digit code on his or her membership application, your club will be credited with that membership.¹ Headquarters will regularly reimburse your club \$5 for each of these new memberships. It's up to the new member to write down the club's number; *if no number is on an application, no credit will be given to any club.*

Your club will benefit directly from this competition.² Besides the commission money, we're sponsoring an inter-club competition. The 1900 ARRL affiliated clubs are divided into three groups: those clubs with 25 or fewer members, clubs with 26 to 75 members, and clubs with more than 75 members. As more members join the ARRL through your club, your club will become eligible for a series of awards, including certificates, flags, gavels and plaques. See the mailing for more details.

In addition to the awards, the clubs in each of the three major categories will compete against each other: At the end of the year, the club in each category with the greatest number of new ARRL members will receive special recognition. The clubs' names will also be engraved on the "ARRL Challenge Cup." This trophy will be displayed in the ARRL Hq. building and a plaque commemorating the achievement will be sent to each of the three winning clubs. The results of the competition, including group photographs of each winning club, will be presented in *QST*.

The more people who become ARRL members

through your club, the more your club will benefit. Even if your club has only 10 or 12 members, you can recruit nonclub amateurs to become ARRL members *through* your club — and, consequently, your club becomes eligible for greater incentives. Just instruct the prospective League members to write down your club's four-digit code on their membership application. Your club will receive the credit, and the \$5. See the mailing for further details.

Ideas for Your Club

What better way is there to build your club membership than this? You can't lose! The most effective means of promoting any membership — in your club or in the ARRL — is through personal contact. A club outreach committee can visit amateurs in your community and persuade them to join the ARRL and your club. The ARRL *Geographical Directory* will give you the call signs of the hams in your area, and you can cross-check with any other call directory to find out names and complete addresses. A few brochures explaining ARRL membership benefits are included in the recent club mailing. You can use these in your outreach work. If you need more, let us know here at Hq. and we'll ship 'em out.

Think how many of your club's members are not yet ARRL members. Multiply that number by \$5. That's how much money your club's treasury could receive. All you have to do is introduce them to the ARRL, your national organization representing your Amateur Radio interests.

Notes

¹Family, life and blind memberships are not included in any of the promotion commissions or competition.

²Presently, when an ARRL member renews his or her membership through an affiliated club, the club is entitled to a \$2 commission from the member's ARRL dues. This affiliated-club benefit remains unchanged.

*Club Program Manager, ARRL

Amateur Satellite Program News

Conducted By
Bernie Glassmeyer,*
W9KDR

AMSAT BOARD STAKES OUT MAJOR GOALS; NAMES OFFICERS

Meeting in Los Angeles for the first time, AMSAT's Board of Directors articulated goals and installed officers. The November 16 meeting at the Amfac Hotel, the scene the prior Saturday of the Satellite Symposium and Annual Membership Meeting, had many significant agenda items. The following is the briefest of summaries. Full details will be published when the minutes of the meeting are made available by AMSAT Hq.

Four organizational goals were endorsed by the Board. These were:

1) Recognizing the relative abundance of low-earth-orbit launch opportunities and their particular relevance to store-and-forward communications techniques on an as-available basis, AMSAT will strive to make effective use of low-cost spacecraft technology to exploit such opportunities.

2) Recognizing the potential value and utility of continuous satellite communications to provide effective public services, AMSAT will strive to develop space systems to fulfill this need.

3) Recognizing the growing value of space science and space research activities to our organization, AMSAT will strive to participate and cooperate with other organizations in pursuing appropriate science and research activities.

4) Recognizing the value of communications services provided by the Phase 3 satellite program, AMSAT will continue to support the program.

Officers elected include John Browning, W6SP,

Chairman of the Board; Vern "Rip" Riportella, WA2LQQ, President; John Champa, K8OCL, Executive Vice President and Acting Vice President for Operations; Jan King, Vice President for Engineering. Art Feller, KB4ZJ, was elected Treasurer, and Martha Saragovitz was reelected Corporate Secretary. Additional officers include the following appointments: Bill

Brown, K9LF, Vice President, Special Projects; Bill Tynan, W3XO, Vice President for Manned Spacecraft Operations.

In other actions, the Board: resolved to commend W3IWI on his devotion and creativity as President; decided to meet again not later than March 1985; decided to fund Phase 3C at \$50,000 per year for each

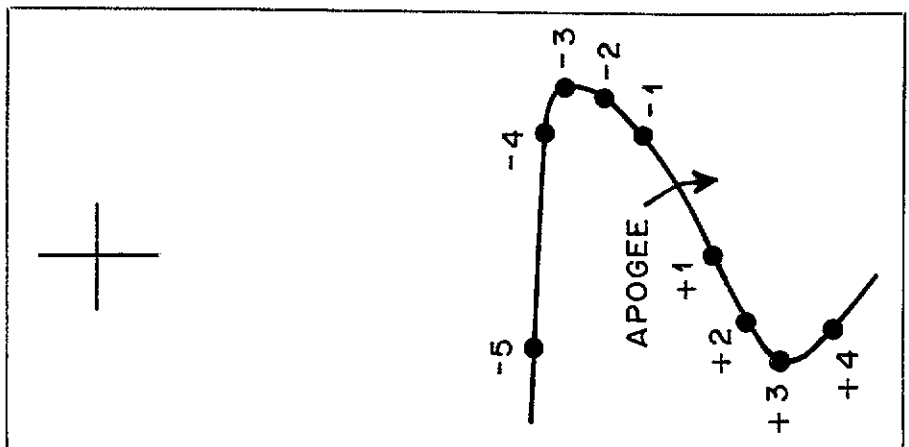


Fig. 1 — AMSAT-OSCAR 10 ground-track cursor for OSCARLOCATOR. Reference date is Feb. 15, 1985.

*Satellite Program Manager, ARRL

of two years, with 32% of the budget for projects; commended WD4FAB for recruiting and finding talented volunteers; support the creation of an International Amateur Satellite Service Coordinating Committee, as discussed at the Cheltenham, England, meeting in July; decided that Phase 4 needs more study and groundwork before major commitments could be made toward it; heard of possible Phase 3C integration options; learned that an Ariane 4 launch in mid-1986 was looking favorable for Phase 3C; that Phase 3C could contain Mode B and L transponders, a Mode L digital transponder and an S-band beacon (2.3 GHz.); learned that a PACSAT satellite was at least 1.5 years away and possibly could be launched from a Shuttle from Vandenberg AFB given that the V'Berg launches have a higher orbital inclination and would be thus more useful to amateurs; heard of improvements in the Area Coordinator team, communications within Operations and the possibility of an Operations Management newsletter; learned of the Teleport STA granted to 21 stations; resolved to commend the ARRL on its superb effort and leadership in connection with the WARC-79 frequency allocations, and to endorse the efforts of the ARRL to preserve the 220-MHz band and to have the 1270-MHz space allocation implemented; decided to poll the membership on the sale of mailing lists to outside agencies for the purpose of raising revenues; resolved to support an ARRL DXCC-

satellite award providing the award was nonendorsable and that the concept was endorsed as well by AMSAT-DL.

Keplerian Elements

Satellite: AMSAT-OSCAR 10.
 Catalog number: 14129.
 EPOCH time: 85010.63929339.
 Thu., Jan. 10, 15:20:34.948 1985 UTC.
 Element set: 155.
 Inclination: 25.9805 deg.
 RA of node: 158.8441 deg.
 Eccentricity: 0.6009837.
 Arg. of perigee: 338.5687 deg.
 Mean anomaly: 4.2684 deg.
 Mean motion: 2.05855838 rev/day.
 Decay rate: -5.5e-07 rev/day.
 Epoch rev: 1188.
 Semimajor axis: 26,105.528 km.
 Anom. period: 699.518660 min.
 Apogee: 35,416.928 km.
 Perigee: 4038.934 km.
 Ref. perigee: 2566.6335370.
 Thu., Jan. 10, 15:12:17.311 1985 UTC.
 Beacon: 145.8100 MHz.

Monthly Listings

- ASR (Amateur Satellite Report) is available for \$22 (\$30 overseas) for 26 issues (1 year) from Amateur Satellite Report, 221 Long Swamp Rd., Wolcott, CT 06716.
- AMSAT Membership is available for \$24 per year (\$26 outside North America). Life Membership is \$600. Write to or call AMSAT Hq., P.O. Box 27, Washington, DC 20044, tel. 301-589-6062. VISA/MC cards accepted.
- ARRL members only send a 4 × 9-in. s.a.s.e. with your call sign to ARRL for a complete, monthly orbit schedule for all operating Amateur Radio satellites. Please mark the s.a.s.e. with the month needed, to help us ensure that the envelopes are filled properly. A year's supply of s.a.s.e.'s may be sent in at one time, but be sure to affix 2 units of postage to each s.a.s.e.
- The OSCARLOCATOR package second revision is now available for \$8.50 U.S., \$9.50 elsewhere. This package and *The Satellite Experimenter's Handbook* contain all the information you need to get started using the Amateur Radio satellites.
- A free package of information about AMSAT and the Amateur Satellite Program is available from ARRL Hq. This package is intended for those with no knowledge of the program. (附註:)

In Training

Conducted By
 John Foss,* W7KQW

INSTRUCTORS — THE IDEAL TEAM

You, an Amateur Radio instructor, are faced with one of the most significant challenges and responsibilities for the Amateur Radio Service in 1985. For Amateur Radio to remain a viable and vital force, it will have to expand in numbers dramatically over the next few years (see *It Seems to Us*, Jan. 1985 *QST*, p. 9). Though this is certainly no revelation to you, as someone committed to quality growth of our ranks, are you in a position to make it happen?

How do we achieve our objective of a healthy, robust Service? We work aggressively to bring bright, young people into Amateur Radio — a task at which you, an instructor, have proven your capability in the past. But the growth trend of yesterday is no longer sufficient. We'll have to redouble our efforts each year, starting now. Similarly, we've worked hard to keep new and existing amateurs active and involved in Amateur Radio — we gain nothing if for every newcomer we welcome in the front door we lose a veteran out the back. Finally, as League members, we know the importance of maintaining a strong, effective organization to represent us. Thus, we instill a spirit of participation in and support of the ARRL in our newcomers and actively recruit nonmembers to join us in protecting our futures as radio amateurs.

As instructors, you're committed to helping others earn their licenses. Without sacrificing quality in your teaching, you now have a wealth of new "tools of the trade" to remove the obstacles that have short-circuited potential students' interest in the past. We have a few suggestions on how to capture and sustain people's interest, and to make their quest ultimately successful.

Target: Technician

What does a bright, young candidate find exciting nowadays? Are the privileges earned with a Novice license still sufficient incentive? If you'll look at recent history, the Amateur Radio growth trend suggests that Novice privileges haven't sufficiently satisfied the needs or captured the imaginations of large numbers of potential hams in your community. Where the promise of HF CW fails, however, the lure of more exotic modes may succeed. What if completing your course brought with it a ticket to satellite communications, microcomputer linking, talking to astronauts in orbit, and ultra-convenient, local voice communication? Would more people be more likely to sign up? What we're leading up to, of course, is targeting the Technician license as the pot at the end of a newcomer's rain-

bow — the objective of your entry-level courses.

The tools are there for you to use. *Tune in the World with Ham Radio* has been a very effective package in introducing thousands to Amateur Radio — both in exam preparation and in getting them started on the right foot. Today, with the entire Element 2, multiple-choice question pool contained in the text, and with ARRL's brand-new *Novice Instructor Guide*, the Element 2 written exam and Element 1A (5 WPM) code exam are easier to teach than ever. With ARRL's brand new stand-alone *Technician/General License Manual for the Radio Amateur* (containing all 500 of the Element 3, multiple-choice question pool and thorough, well-organized supporting text) and its completely revised companion, *Technician/General Instructor Guide*, you have the tools to bring your students from civilian status to Technician class licensees in short order.

Volunteer Examining has removed the final obstacle. By planning ahead and contacting a Volunteer Examiner Coordinator early (the ARRL/VEC is eager to work with your class or club), you could even have the FCC exam given at your final class meeting. That's convenience! You don't know any Volunteer Examiners in your community? Don't let that stop you — the ARRL/VEC can handle that problem, too. Just keep in mind that you must contact the VEC well in advance (75 days minimum for your first session), and that your session must be open to others in the community who want to upgrade; it cannot be planned exclusively for your class.

Strength in Numbers

For your Training/Recruiting effort to be successful, you, your club and local fellow hams will have to stage one of your most effective, pull-out-all-the-stops publicity campaigns ever. With a little ingenuity you can reach the people most likely to be interested in earning their licenses. Computer clubs, computer bulletin boards, school science clubs, science fair participants, school bulletin boards, local papers, cable TV community channels, Scout Troops, churches, grocery store and radio store bulletin boards, civic and fraternal organizations — all are fertile ground. It will take a little work, but the stakes are high and the goals worthwhile. (See *Affiliated Clubs in Action* in this issue for an exciting new club recruitment program and competition.)

Follow-through

Your job is not over at the end of the class. Those students who pass should be invited to help with next season's classes. Those who fail should be encouraged to try again. Stick with them and make them feel wanted!

It's just as important to keep new hams in the Service and active as it is to get them licensed in the first place. How can you do this? Send each class member a personal invitation to join your club several weeks in advance of a meeting. If the new amateurs passed the Technician class exam, chances are you can find them on local repeaters. Invite them over to see your station and to get ideas for their own. Take the time to visit them and see how they are doing. Ham radio is a whole lot more fun when you have someone to share your triumphs and problems with.

Clubs thrive on the fresh ideas and enthusiasm of new members. Make your new licensees feel welcome from the outset. Visitors should be welcomed personally within 30 seconds of their walking in the door; get to know them and let them get to know several of you personally before the night's out. Appoint a mix of newcomers and veterans to every task group, and encourage new members to get involved in the various interest groups within the club. Make them feel that they belong! Let them participate in club activities. Give your new members responsibilities, shared with the old hands if necessary, and involve them in all phases of club activity.

What can new amateurs help with? As recent graduates they are in a good position to help with the next round of license classes. They will remember problems they encountered and will be able to share their solutions. Just as important is to organize additional study groups for your new Technicians so they can help each other raise their code speeds.

Early in their Amateur Radio careers introduce new amateurs to the ARRL and invite them to join. Explain how ARRL not only publishes *QST* and books to support them in all phases of Amateur Radio, but also represents the interests of the Amateur Radio Service as a whole. Tell them about continued ARRL involvement in Washington and at the local level to protect the interests of all amateurs. And let them know about the inexpensive group insurance on equipment, the Outgoing QSL Bureau, contests, awards and the opportunities for them to get involved in the organizational side of Amateur Radio as League Volunteers.

Conclusion

The challenge is . . . challenging! But, as an instructor, you've faced it before. You, with your club's support, are among the best qualified to meet the challenge. With the new, demystified exams created from public question pools, a Volunteer Examiner Program that brings exams to your class, and brand new license manuals and instructor guides that are right on target, your training team has all it needs for an exciting year of success. — Steve Place, WB1EYI (附註:)

*Training Manager, ARRL

Results, Eighth ARRL International EME Competition

By Edith Holsopple,* N1CZC

We've come a long way since the first two-way amateur EME link between the Eimac Radio Club, W6HB, and the Rhododendron Swamp VHF Society, W1BU, on 1296 MHz in July 1960. As K1WHS noted on a log sheet margin, "Who ever heard of a dupe sheet for EME contacts? Times do change!"

Yes, the times are changing, and we are changing with them. We received 150 entries for this, the eighth running of the ARRL International EME Competition. Conditions were favorable as a whole, but below normal in some areas because of aurora and bad weather. The daylight hours were marred a bit both weekends by one-way propagation on 432 MHz because of Faraday rotation. U.S. stations were coming in loud and clear in Europe, but statesiders had trouble copying the European stations. The 144 MHz band dried up about one hour after the European window closed on both weekends. Sept. 22-23 and Oct. 20-21 were at perigee, which put the test perilously close to the new moon and resulted in increased solar noise.

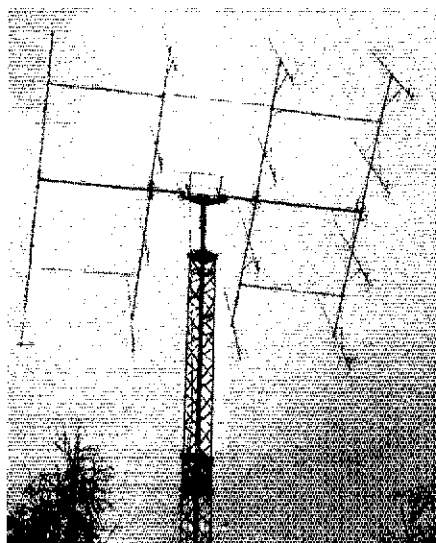
In September, the periods of daylight operating were extended, which, unfortunately, meant increased ionospheric absorption of signals and severe Faraday rotation problems for some. Conditions were better on Saturday than on Sunday, when there was aurora visible. Part of Saturday, solar noise killed all but the strongest stations. On Sunday the sun and moon reached azimuth at one period, with an elevation difference of only 15 degrees.

The October weekend was not the best because of aurora, especially on Sunday. Gale-force winds were prevalent in Europe, making operating difficult, but at times conditions were extremely good. Activity on both weekends was phenomenal. The average QSO total for single-operator stations was 34.

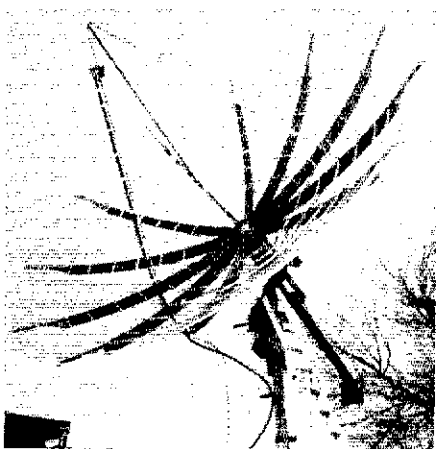
Scores rose significantly this year. HB9SV, active on 144 and 432 MHz, topped his '83 score by 100 kilopoints to lead the single-operator, multiband category. He was followed by WB0TEM, who operated 220 MHz in addition to 144 and 432. N4GJV was at it again with his homebuilt 1-kW transmitters, receivers, quads and quagis on 144 and 432 MHz.

K1WHS decided to operate a single band this year and managed to beat out the highly populated 2-meter crowd with the help of his MGF-1200 GaAsFET preamp mounted at the antenna and fed into an MMT 144-28 converter, and a much-modified 75A4 (vintage 1953!) with a 300-Hz crystal filter in the IF. DL8DAT was close on his heels, working 167 stations from his Fed. Rep. of Germany QTH.

No single-band entries were received on 220.



The no. 2 station on 144 MHz, DL8DAT, worked 167 stations with his 16 x 24-element parabreams.



This 6-meter dish was used by G3LTF, the number 4 single-operator station on 432 MHz.

Several multiop stations and multiband operators made contacts there.

The top-scoring two on 432 MHz are a repeat of last year. DL9KR and N9AB retained their leadership positions, while JA6CZD moved up to third, replacing W0RRY, who didn't operate this year.

With the activity on 1296, thumb twiddling wasn't an option. EME pioneer VE7BBG

worked 18 stations to take top honors on that band.

The number of multiop entries doubled from 14 in '83 to 28 in '84. K5GW/WB5LUA broke the one-million-point barrier for the first time in EME history, more than doubling the score of last year's top entrant, K2UYH.

This year, we are including the antenna type with the score listings. This will help you compare your station with others. We appreciate your comments, suggestions and photos.

The 1985 EME Competition dates are Nov. 2-3 and Nov. 23-24. We are looking forward to seeing you then. Our warm thanks to W1JR and WA1JXN for help in choosing the dates.

SOAPBOX

I'm a beginner and was very surprised at such high activity. In the last night of the contest, I was so tired I fell asleep in the middle of a CQ call (DL8DAT). The activity was very good this time, but I had no luck. I had a problem with the power dividers and relay, but good luck also in working two new states, bringing my total up to 48 (SM2GGF). I have never heard so many stations at one time on any EME weekend. It is unfortunate that everyone wanted to operate on the same frequency at the same time when we have all the band space. It makes things rather difficult, but exciting (ZL3AAD). Our downtown Tijuana QTH is almost too noisy, even for the big guys. I hope we can find another location for the equipment and show up to the level that the gear is really capable of (WB6NMT). I had fun and look forward to trying again. I hope by next year, VE3OCX will be on to give at least one good signal from VE3 on 144 MHz (VE3FN). The first day of the second weekend, WA7CJO and I worked for 24 hours straight getting things ready. Unfortunately, we fell over dead tired after making three contacts (WA7LYD). The first part of the contest had good activity and good weather. The second part was just the opposite. High winds damaged my antenna and made operation very difficult (SM7BAE). This contest was perhaps the most exciting one I have entered in 15 years of VHFing! Signals were weak, QRM from below the band was intense, but perseverance paid off. Look out next year (VE3DSS). This was the best contest we had yet. I want to thank KL7WE and KL7MJ for the best contact ever. That was the big number 50 for WAS (KB8RQ). It was a pity that the propagation on 432 MHz toward the U.S. was very bad during both weekends (HB9SV). US stations were very loud, but few could detect my signals. Although perigee is supposed to help us smaller stations, the theoretical 2-dB advantage was wiped out by unkind Faraday rotation. So please, when choosing the contest weekends for next year, consider a wider range of factors instead of listening only to the cries of "Give me perigee or give me death" (G3SEK). Thanks for the contest. I worked 11 new stations and was happy to work ZL3AAD (DJ6MB). W5FF drove 1900 miles to set up a portable station at WA4LYS. We worked every 220 station that called, including VE3EMS for his number 50 for WAS (WA4LYS and W5FF). I was lucky that the 90-mi/h gales the week before didn't damage my antennas. They only caused the azimuth rotator to slip out of alignment. Despite these problems, I was delighted to work the seven stations on random (GM4JJJ). Murphy sure visited my place this year! On the first weekend, my antenna was covered with ice and wet snow so that I couldn't hear anything. By the time it melted, the moon had set in Europe, an aurora had moved in, and my converter

*Communications Assistant, ARRL

1985 ARRL International DX Contest Awards Program

Below are listed all of the plaques that will be awarded in the 1985 ARRL International DX Contest. The sponsors as of February 7 are shown next to the corresponding category. If you are interested in sponsoring one of these awards, contact the Contest Branch at ARRL Hq. for details.

The list of sponsored plaques may change before you read this because of QST lead time, so please call or write for a list of what is available before sending payment. We salute those clubs and individuals who have helped to make the DX Contest awards program such a success!



5T5CJ (left) receives his plaque and congratulations from IARC President F8RU for making the top African single-operator CW score in the 1981 ARRL International DX Contest.



WVE Phone

Single Operator

All Bands	Frankford Radio Club
1.8 MHz	Butch Greve, W9EWC Memorial
3.5 MHz	Lance Johnson Engineering, K0CS
7 MHz	David L. Thompson, K4JRB
14 MHz	Trio-Kenwood Communications
21 MHz	Trio-Kenwood Communications
28 MHz	Trio-Kenwood Communications
QRP	KZ2E & KA2TPA, Rick & Marlis Norton

Multioperator

Single Transmitter	John Allyn, W7XR
Two Transmitter	Trio-Kenwood Communications
Unlimited	Western New York DX Assn., W2RR

WVE CW

Single Operator

All Bands	Frankford Radio Club
1.8 MHz	W1TX Memorial — Conn. Wireless Assn.
3.5 MHz	Northern Illinois DX Assn.
7 MHz	Northern Arizona DX Assn.
14 MHz	Neenah-Menasha ARC
21 MHz	Carl Luetzelschwab, K9LA
28 MHz	Mike Badolato Jr., W5MYA
QRP	Hollywood ARC, Inc.

Multioperator

Single Transmitter	Edith Holsopple, N1CZC & Mike Kaczynski, W1OD
Two Transmitter	Trio-Kenwood Communications
Unlimited	Colorado Contest Conspiracy

DX Phone

Single Operator

World	North Jersey DX Association
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Africa
Asia
Europe
North America
Oceania

South America
1.8 MHz
3.5 MHz
7 MHz
14 MHz
21 MHz
28 MHz
QRP

Multioperator, Single Transmitter

World	Gloucester County Amateur Radio Club
Africa	David Vogel, NL7P
Asia	Trio-Kenwood Communications
Europe	Metro DX Club
North America	Nick G. Lash, K9KLR & Dennis J. Berkeley, KD9BG
Oceania	Trio-Kenwood Communications
South America	Trio-Kenwood Communications

Multioperator, Two Transmitter

World	Trio-Kenwood Communications
Asia	Trio-Kenwood Communications
Europe	Tom & Joy Middleton, WB4CKY
North America	John Brosnahan, W0UN

Multioperator, Unlimited

World	Trio-Kenwood Communications
North America	The Willamette Valley DX Club, Inc.

DX CW

Single Operator

World	North Jersey DX Assn.
Africa	Trio-Kenwood Communications
Asia	Alamo DX Amigos
Europe	Clarke V. Greene, K1JX
North America	Potomac Valley Radio Club
Oceania	Tom Morton, KT8V
South America	Herbert Clark Hoover III, W6ZH Memorial Award
1.8 MHz	Jim Dionne, K1MEM and Bill Poellnitz, K1MM
3.5 MHz	Mad River Radio Club
7 MHz	Trio-Kenwood Communications
14 MHz	Bencher, Inc.
21 MHz	Southern New England DX Assn.
28 MHz	Trio-Kenwood Communications
QRP	KZ2E & KA2TPA, Rick & Marlis Norton

John M. Shinal, K4BYK
Acadiana DX Association
Murphy's Marauders Contest Club
Chad Harris, VP2ML
Doc Sayre, N7AVK and DX Int'l Society
Carl L. Smith, W0BWJ
W8FP, Fred Race, CPO USN
Trio-Kenwood Communications
Central Arizona DX Assn.
Don C. Wallace, W6AM
Trio-Kenwood Communications
Mike Badolato, Jr., W5MYA
Gerald Griffin, M.D., W8MEP

Multioperator, Single Transmitter

World	John Brosnahan, W0UN & George Schultz, W0UA
Asia	Trio-Kenwood Communications
Europe	Trio-Kenwood Communications
North America	Trio-Kenwood Communications
Oceania	Trio-Kenwood Communications
South America	Trio-Kenwood Communications

Multioperator, Two Transmitter

World	Tom Frenaye, K1KI
Asia	Trio-Kenwood Communications
North America	W4KFC Memorial — N4MM

Multioperator, Unlimited

World	H. Stephen Miller, N6SM
Asia	Trio-Kenwood Communications
Europe	Schenectady Amateur Radio Association
North America	The Willamette Valley DX Club, Inc.

Special

Single Operator

WVE Combined Score	National Contest Journal
Japan Combined Score	Northern California Contest Club
Arizona (CW)	Central Arizona DX Assn.
Arizona (phone)	Central Arizona DX Assn.
Fifth Call Area	Red Stick DX Assn.
Low Power (phone)	Rochester DX Assn.
Japan (phone)	Western Washington DX Club, Inc.
USSR — All Band (CW)	K1KI, W1DA, W1KM, W3XU
USSR — All Band (phone)	NC5K, K7NW, K8BJ, W0ZZV, SV0AA
	K1KI, W1RR, WA2VUY, K3UA, NE4R, N5NM, NC5K, KM7E, W0ZV

Multioperator

Caribbean Multi-Single (CW)	The YASMF Foundation
Caribbean Multi-Single (Phone)	Mike Badolato Jr., W5MYA
Multi-Multi World (combined score)	W2PV Memorial: Schenectady ARA

WVE Club

Unlimited (50+ entries)	ARRL
Medium (fewer than 50 entries)	ARRL
Local (3-10 entries; live within 20 miles)	ARRL
Most Improved Club	Steve Place, WB1EYI

The Symbolic Public Service Baton Has Been Passed

As your new coordinator of this column, I feel a great sense of responsibility and pride. The past holders of this baton have built a grand tradition of dedication, professionalism and integrity. I intend not only to follow, but to build upon that tradition.

I'm sure that those of you who are involved with public service communications at the appointee level have noticed a change here at Hq. A new department, Field Services (FSD), has been organized. Rick Palm, KICE, is the able manager of FSD. Rick brings with him the experience he gained as Acting Manager of the Membership Services Department along with his dedication and drive.

Many of you may have heard of our departmental reorganizations here in Newington. For those of you who are unsure of where to send your correspondence, a quick tour of FSD might prove helpful.

Within FSD are five Branches, each with specific responsibilities. They are:

The *Affiliated Club Branch*. Support and development in the League's affiliated club arena are two very important responsibilities ARRL has incurred in recent years. As manager of this branch, Leo Kluger, WB2TRN, is the new conductor of the Affiliated Clubs in Action column. His branch will screen and process your club's affiliation or Special Service Club application as well. If you have questions regarding ARRL clubs, Leo is "your man at Hq."

The *FSD Information Branch*. You've probably already heard about our newsletter to appointees. The *ARRL Field Forum* is our first step toward providing all ARRL Field Organization appointees with timely and useful information. Your newsletter manager is Steve Ewald, WA4CMS. Steve is the perfect person for the job, especially since he bears a striking resemblance to Clark Kent.

The *Convention Support Branch*. Marge

Tenney, WB1FSN, one of the matriarchs here at Hq. (she's been a member of the staff for over 25 years!) is manager of this branch. Convention and Hamfest committees that have gained approval from their ARRL Director can expect helpful hints, advice and assistance from Marge.

The *Field Organization Branch*. For many of you old-timers, Arline Bender, WA1VMC, is a familiar name and call. For many years, Arline has supported the needs of appointees by sending out supplies, handling expense and reimbursement accounts, and conducting Section Manager elections. As manager of this branch, Arline will continue to assist appointees whenever needed.

The *Public Service Branch*. The public service responsibilities of the former Communications Department have been delegated to this branch. As manager, I am your contact at Hq. in the areas of ARES, NTS, TCC, BPL, PSHR, the *ARRL Net Directory*, Repeater Log reports, Independent Net reports and amateur public service communications in general. I have also been appointed as the new staff liaison with our area net staffs and served agencies.

Now, let's get down to brass tacks. Those of you submitting monthly reports to Hq. for publication in this column should know that we must receive your reports no later than the 12th of the following month. For example, your April reports should be received at Hq. no later than the 12th of May. Reports received after the 12th will be entered in this column as time permits.

Now that I've asked you appointees to reschedule your deadline, you're probably wondering why this change must be made.

During my tenure with the Communications Department, four people were involved from time to time with public service. Generally, three people carried the workload. Under the leadership of Bob Halprin, K1XA, I edited the Public Service diaries and Emergency Service Reports, while Jim Clary, WB9IHH, masterfully com-

plied the NTS statistics. Bob wrote and professionally edited the lead stories.

Your new Public Service Branch consists of two people. Along with our daily duties and the responsibility for this column, we have been tasked with writing two manuals on public service communications this year.

Our increased workload is a challenge to us as well as you. If we work as a team and get the job done right and on time, we'll see a better Public Service column in the future. After all, this column is meant to be a reflection of your accomplishments in the field of public service.

But, how can you make this column better? If your ARES/NTS group serves the public, let me know. Members of ARES should complete a Public Service Activity Report (FSD-157) and send it to me. Read the reports in this column to get "pointers" on how to write the summary. If you're out of these forms, write to Arline Bender for more.

Generally, the National Traffic System performs in an excellent manner every day of the year without recognition. Has your local, section, region or area net risen "above and beyond the call of duty" recently? Have you TCC people made newsworthy accomplishments? I haven't seen many articles concerning these areas. Ladies and gentlemen, this is your column.

What if you have an idea that may be of interest to the readers of this column? Write a cover letter explaining your idea in general terms, attach your proposed article (written in a style similar to previous articles in this column), then mail the package to me. Simple, isn't it?

Now you know how to increase the chances of your article getting into this column. If this is a "first," it's been long overdue. Since this is your column, it's only fair that you know how to get the recognition you deserve.

Your comments concerning this column are not only appreciated, they're welcomed.

COMMUNICATIONS SERVICE OF THE MONTH

For the sixth consecutive year, the San Antonio Repeater Organization (SARO) has provided communications for the Las Colonias de San Antonio Marathon. The 1984 Marathon was run on Sunday, November 4, from 7 A.M. to noon. The SARO repeater, K5SUZ/R, was used again this year; it has been used for five out of the six years.

Informal communications activities began at approximately 6 A.M., with numerous messages being passed between WB5ZJC at Marathon headquarters, located at the finish line, and WB5QBV and WD5BKO, at the runners' check-in point and start line.

The communications net was formally activated at 6:45 A.M. with WB5ZJC as net control operator using the club call sign, W4SUNH. The race began a few seconds after 7 A.M., with approximately 11,000 runners.

This year, for the first time, communications were maintained with the pace car throughout the race, since WD5FMU secured permission from the San Antonio Police Department to ride in the lead patrol car.

WD5BKO left the starting line and drove the course a few minutes ahead of the lead runners to make sure that the scheduled water and aid stations were manned by both marathon personnel and SARO communicators. In past marathons, there had been some confusion among volunteer workers as to the exact locations of these stations. The ability of SARO to provide communications coordinating personnel and assignments greatly improved the situation.

Message traffic was mostly the routine reporting of minor medical problems, requests for ice and other aid station supplies, and assisting the medical personnel in keeping track of runners who had reported blisters,

cramps and nausea but elected to continue running. One runner, however, required assistance by the Emergency Medical Services.

As the runners cleared the water and aid stations, SARO personnel were allowed to secure their stations. Several SARO members volunteered to assist runners who had dropped out of the race to the finish line. This action brought about an unfortunate misunderstanding between a SARO member and a police officer. The Marathon Communications Coordinator now recommends that SARO members no longer volunteer their services in that manner because of potential liabilities. [I concur — Ed.]

The marathon officially closed at noon when the remaining water and aid stations were secured. Although there were still several runners on the course who had elected to continue without marathon support, communications were secured at approximately 12:30 P.M. Participating amateurs were WB5QBV, WB5FWI, K5TYV, KB5NZ, K5DSF, KA5OHJ, W5TOS, W5TCC, KA5DPL, WD5FMU, K5SUZ, WB5ZJC, KA5HCR, WD5BKO, WA5RNV. — Jim Carpenter,

*Public Service Manager, ARRL

IN SERVICE...

□ Newington, Connecticut — September 23. Amateurs provided communications for the 55th Anniversary Parade of the Newington Volunteer Fire Department. Eleven amateurs participated. (KA1BRD, DEC Connecticut District 6)

□ Lynchburg, Virginia — September 29. The annual Virginia Ten-Miler was run for the 10th time with the assistance of the Lynchburg ARC. Approximately 55 amateurs provided communications for the race staff and 4000 runners. (WA4RTS, DEC Central Virginia)

□ Orlando, Florida — September 30. Amateur Radio operators provided communications during the Leukemia Society of America's annual swimming fundraiser. Nine amateurs participated, with KA4RTE's performance considered outstanding. (N4IPV, AEC Orange County)

□ Madera, California — October 3. An emergency drill was planned around a simulated cropduster plane crash on an elementary school playground during recess. Along with many casualties, many students were "contaminated" by cropdusting chemicals. All medical traffic from the disaster scene to local hospitals was handled by W6BWM, WB6FAP, N6JKO and N7ESR — members of the Madera County ARES. (W6BWM, EC Madera County)

□ Huber Heights, Ohio — October 6-7. Every fall, an operating farm administered by the Dayton/Montgomery County Park district invites the public to share in an "Autumn on the Farm." Over 11,000 people attended the event. Members of the Huber Heights ARC provided communications during this two-day extravaganza. (W8XB)

□ Northern Virginia — October 12-13. Members of the Public Service Committee of the NVMFA assisted the Patowomeck District, Boy Scouts of America during their 1984 fall camporee. The amateurs were positioned along a 50-mile hike route ready to provide coordination, unit status and medical-emergency communications when required. Eight amateurs participated during the 20-hour trek. (K4FHK)

□ East Meadow, New York — October 21. A 10-km recreational run proved to be anything but fun for members of the LIMARC who provided logistics and medical communications. Two cardiac emergencies and 10 injuries to runners kept the amateurs busy. (WB2LAP, ASM/ACC New York City/Long Island)

□ Virginia — October 27. A 50-mile race through the mountains of Virginia tested the endurance of the runners and the members of the Lynchburg ARC. With the assistance of the Rockbridge ARC, communications were more than adequate. The run exposed the "weak links" in planned communications by both clubs. Over 20 amateurs participated in this educational exercise. (WA4RTS, DEC Central Virginia)

□ Central Ohio — October. The Central Ohio ARES participated in six public service events, utilizing over 130 amateurs during the month. The events ran the gamut from college football games to a road rally. (W8BKO, DEC COARES)

□ Madison, Indiana — November 10. A local bank, sponsoring a 10-km run to benefit the American Cancer Society, requested Amateur Radio operators to provide communications. An EMT, WB9PFZ, was stationed in a stand-by ambulance, while N9ASR roved the course in a golf cart. Three amateurs were stationed along the course and another was stationed by a telephone, ready to call the authorities should the need arise. (WB9PFZ, EC Trimble County, KY)

□ Modesto, California — November 11. The Turlock ARC provided communications during a 10-km run at Modesto Junior College. The amateurs reported the conditions of the runners and were ready to report any emergency that might develop. The operation was smooth with the exception of a "follow up" car that became stuck on the muddy course. The car and its occupants were rescued by W6GIW. Ten amateurs participated. (KD6QA, President, Turlock ARC)

□ Bucks County, Pennsylvania — November 20. The Philadelphia Electric Company's Limerick nuclear power plant in Montgomery County conducted an emergency drill and simulated evacuation of residents into Bucks County. With the exception of localized communications being furnished by a REACT group, coordinating communications during the drill were provided exclusively by Bucks County ARES. Twelve amateurs participated. (KA3DZY, EC Bucks County)

□ Liberty Township, Ohio — November 30. The emergency began when the driver of a truck carrying toxic chemicals realized that a faulty shut-off valve had allowed the chemicals to pour onto the highway. Local residents were evacuated as authorities were called in to contain the spill. Trumbull County ARES provided



A dedicated effort by the Santa Barbara ARC and the Santa Barbara South County ARES resulted in this recently acquired mobile communications van. (photo submitted by WB6UNH)



The City of Coral Springs, Florida recently recognized its Amateur Radio operators and their ties to the FCC by presenting custom-styled caps to its Police Emergency Communications Group and their guest, Jeanne Turonis, Miami FCC Public Service Specialist. (photo submitted by KB4XE)

communications for several of the agencies involved. A significant change in wind direction prevented a greater emergency, according to reports. Thirteen amateurs participated. (W88BWY, EC Trumbull County)

□ Santa Clara, California — November 30. A simulated earthquake activated the Silicon Valley Emergency Communications System. Sixty amateurs responded during the drill, which lasted over two hours. (KA6TGE, EC Santa Clara)

□ Westerville, Ohio — December 2. Sixteen members of the Central Ohio ARES provided communications for the annual Westerville Jaycee's Christmas Parade. (W8BKO, DEC COARES)

□ Santa Clara and San Mateo Counties, California — December 8. During an emergency medical drill, situation reports and victim condition lists were transmitted from the disaster site to four hospitals and two Emergency Operations Centers via packet radio. The agencies served were impressed by the ability of amateurs to provide "hard copy" information within a short time. (WB5VUL, EC Palo Alto Area Red Cross)

During the same drill, the Palo Alto ARES provided back-up tactical communications at the scene. Amateurs were also dispatched to two local hospitals. "Pre-planning" was minimized as the location of the simulated disaster was changed at the last minute. Fifteen amateurs participated in this area of the semi-annual drill. (WA6NIL, EC Palo Alto)

□ Franklin County, Ohio — December 15. The Central Ohio ARES was requested to assist with the resupply, as required, of charity newspaper vendors located on street corners throughout Franklin County. Selected members of COARES picked up a supply of the charity papers early in the day and set up a net control station at the newspaper headquarters. When the vendor's supplies ran low, headquarters was called for a new supply. The COARES net control dispatched the COARES volunteer nearest the vendor to provide a quick resupply. Twelve amateurs participated. (W8BKO, DEC COARES)

□ Carr County, North Dakota/Clay County, Minnesota — December 16. Members of the local SKYWARN/ARES net were called out by the local Red Cross to assist with search-and-rescue operations during the area's first major blizzard. Four wheel drive vehicles were dispatched from the Red Cross Chapter, with amateurs providing communications. Weather related

information was relayed to the Fargo National Weather Service Office as well. Seventeen amateurs utilized two VHF repeaters during the operation. (WB8BIN, DEC Minnesota)

□ Fullerton, California — December 20. Amateurs were requested to provide communications for the local Red Cross when a steel drum containing toxic chemicals fell from its transport truck onto the highway and ruptured. Six amateurs assisted until the area was declared secure five hours later. (W6RE, EC Tuxin)

□ Tulsa, Oklahoma — January 3. Members of the Tulsa Repeater Organization aided in the search for a missing person who had wandered from a nursing home the evening before. Four amateurs participated. (K5ENA, DEC Oklahoma)

ARRL Section Emergency Coordinator Reports

For December, 33 SEC reports were received, denoting a total ARES membership of 17,105. Sections reporting were: ALB, AR, AZ, CO, ENY, EPA, HI, ID, LA, ME, MI, MN, MO, NE, NFL, NH, NLI, OH, OK, OR, ORG, SC, SCV, SDG, SFL, SNJ, SJV, SV, UT, VA, WI, WMA and WNY.

NATIONAL TRAFFIC SYSTEM

December Reports

	1	2	3	4	5	6	7
Cycle Two							
Area Nets							
EAN	31	2485	80.2	1.31	99.5		
CAN	31	4281	138	2.24	100		
PAN	62	2402	38.7	.925	98.4		
Region Nets							
1RN	62	1288	20.0	1.040	96	90.3	
2RN	60	997	16.6	.501	87.4	83.8	
3RN	31	687	22.2	.700	97	96.7	
4RN	62	1595	25.7	.680	81.8	96.7	
RN5	62	1635	26.4	.697	97		
RN6	61	1084	17.4	.434	100	100	
RN7							100
8RN	62	1140	18.4	.564	97.8	93.5	
9RN	62	1348	21.7	.832	94.0		
TEN	62	4765	76.8	2.192	91.2		
ECN							70.9
TWN	54	910	16.9	.538	93.0	100.0	
TCC							
TCC Eastern	124	1263					
TCC Central	83	1019					
TCC Pacific	108	1308					
Cycle Three							
Area Net							
EAN	31	1419	45.8	1.37	73.7		
Region Nets							
1RN							98.7
2RN							74.1
3RN							70.9
4RN							93.5
8RN							80.8
ECN							25.8
Cycle Four							
Area Nets							
EAN	31	2880	92.9	1.74	88.7		
CAN	33	2116	64.1	1.45			
				1	99.5		
PAN	31	2035	65.6	1.36	97.9		
Region Nets							
1RN							
2RN	87	870	10.0	.52	88.3		
3RN	62	682	11.0	.63	97.3		
4RN							
RN5	62	1406	22.7	.899	92.1	100.0	
RN6	62	985	15.9	.626	100		
RN7	62	834	13.4	.715	88.2		
8RN							
9RN	62	971	15.7	.590	92.0	98.4	
TEN	62	639	10.3	.428	76.4	100.0	
ECN							
TWN	62	677	10.9	.440	85.0	100.0	
TCC							
TCC Eastern							
TCC Central							
TCC Pacific							
Sections ²	5425	48,600	7.5				
Summary	7774	88,691	11.4				
Record	7987	108,074	28.5				

*PAN operates both cycles one and two.
¹TCC functions not counted as net sessions.
²Section and local nets reporting (220): AENY AENZ AEND AENK ATNM AENB AENX AENR (AL), ATEN SWN ACN (AZ), BN (BC), DEPN SEN DTN (DE), EMRI

EMRIPN EMISS EM2MN HHTN CPTN NEEPN (EMA),
 MYS/E NYSM HBN NYPN CDN EPN SDN (ENY),
 GSN GSBM GGN GYN (GA), PTN (HI), ISN ILN ITN (IL),
 IRN QIN ITN ICN (IN), KSBM QKSSS KPN CSTN
 KMWN QKS KWN (KS), KNTN KYPN NKPN NKARC
 CARN KTN KYN (KY), RACES MEPN (MD), AEN CMEN
 MPNS SGN PTN (ME), MSN/2 PAW MSPNIE
 MNAMWXNT MSN/1 MSRN MSSN MSPN/N (MN),
 LOFM LAARN MEOW MN PHD HBN SARL IFN
 ZAEN MTTN MOSSB CMEN MOFON PTN LOZCW
 JCCCN RRABN (MO), IMN CCAREN IMNS (MT),
 M2MEN PCTN CN CSN RAFA PETN CFARS NCEN
 CNCTN THEN CNMCM (NC), GN NFPN CRFN SVTN
 LSTTN GN CFRN NFPN SVTN GCVTN QFNS (NFL),
 GSFN MSOVTP GSPN NHN (NH), NCVHFTN BAVTN
 SCVHFTN NLIC/W (NL), TOETN OBTTN NJPN (NNJ),
 WNARES (NV), NWOSN ONON OPEN STN QCWA63
 OTWN OLZ EATIN MCEN (OK), KTN OSND OSN2 TIN
 OSNI OPN OLN (ON), WCN PDXARES OSN OARES
 THN OHNN LBLARES SOFM PTTN BSN (OR), RTTY/B
 SCEN/V EMRIPN EMRI EMRIS (RI), CSN CN
 GPD2MN SCSSBN SCNTN LC2MN BR2MN (SC),
 NCTN (SD), SPAC CFN ENMC DEN GN QFNS TPTN
 PBTN PPTN SPARC FPON SEFTN FMSN SWFTN
 PRVAN FMTN (SFL), SJVN/220 MSWWARC JSARS
 SWARN SJBN NJSN MGN (SNJ), TNPN TBRN TNQWN
 TNVHFN (TN), DCESN BUN UCN (UT), VSBN SVEN VN
 SSN VSN VTN VLN STARES (VA), VTN (VT), PSTS
 NWSSBN WARTS WSN EWTN NTN (WA), WMFN
 WMN WMTN (WMA), CNYTN NYS/4 NYS/5 NYSPTEN
 WDN/E WDN/L NYS/1 NYNPN OCTEN/E WDN/M
 MIKEFARAD ESS OCTEN/L (WVY)

1 - NET 4 - AVERAGE 7 - % REP.
 2 - SESSIONS 5 - RATE TO AREA NET
 3 - TRAFFIC 6 - % REP.

Transcontinental Corps

1	2	3	4	5
Cycle Two				
TCC Eastern	138	90.0	2580	1263
TCC Central	93	89.2	2038	1019
TCC Pacific	124	71.0	—	1308
Summary	355	83.4	4618	3590

Cycle Four

TCC Eastern				
TCC Central				
TCC Pacific				
Summary				

1 - AREA 4 - TRAFFIC
 2 - FUNCTIONS 5 - OUT-OF-NET TRAFFIC
 3 - % SUCCESSFUL

NCC Roster

N5BB, W5CIC, W5GHP, K5GM, K5OAF, N5TC, K5TL, KV5X, KW9J, WB9NVN, WB9UYU, KB9X, W0HI, KS0U.

TCC Talk

A busy month, indeed. Cycle 3 was activated to handle expected overflow from the Dallas-Ft. Worth local net on the two Saturdays before Christmas and gave us a chance to see how conditions are at that time of day. Extra schedules for the Christmas overflow went smoothly. My thanks to W7LYA (new TCC Dir Pan), KW1U (ex-KA1GBS) and W2CS for assistance in establishing these schedules. Help was provided for fill-in special sessions by K8EVH and AE5L. W9CXY has apparently had either health or rig problems and has not been active; his place on the roster has been temporarily filled by WB9NVN. Thanks, Bill, N5BB's sked with ND5T is now regularly held on RTTY; we look forward to greater use of RTTY in the future. (K5GM, TCC Dir Can Cycles 3, 4)

Public Service Honor Roll December 1984

This listing is available to amateurs whose public service performance during the month indicated qualifies for 80 or more total points in the following nine categories (as reported to their SM). Please note maximum points for each category: (1) Checking into CW nets, 1 point each, max. 30; (2) Checking into phone/RTTY nets, 1 point each, max. 30; (3) NCS CW nets, 3 points each, max. 12; (4) NCS phone/RTTY nets, 3 points each, max. 12; (5) Performing assigned NTS liaison, 3 points each, max. 12; (6) Delivering a formal message to a third party, 1 point each, no max.; (7) Handling an emergency message, 5 points each, no max.; (8) Serving as Emergency Coordinator or net manager for the entire month, 5 points, max. 5; (9) Participating in a public service event, 5 points, no max. This listing is available to Novices and Technicians who achieve a total of 40 or more points. Stations listed in the Public Service Honor Roll for 12 consecutive months, or 18 months out of a 24-month period, will be awarded a

special PSHR certificate from ARRL Hq.

342	WB8JGW	90	WA3UNX
K7VW	WB3GZU	W1UD	N0CLS
248	K2YQK	WD80UO	WD0GUF
VE3KK	KJ2T	KA4AMC	WD5EEH
225	113	ND9N	KZ9V
WB7FE	WA4PFK	89	71
219	KA1KML	K3JL	K8JDI
KA00EY	N0EVC	K2VX	WA7GGQ
210	112	KA9FFO	WD4HBP
KC9CJ	WA4EIC	K33AV	WA8DHB
204	111	AG9G	WA7BTD
K5CXP	W2MTA	N6CVF	NK7K
194	WB5SRX	KA8BWM	KR4V
KA8CPS	110	KP4DJ	N1BGW
177	WX4H	KA1EPO	70
WB7WOW	109	88	K4ZN
168	KA1T	W2GJ	69
KA0ARP	WA6ZUD	KA4MTX	W7GHT
166	W9JUU	W9FZW	K8BQK
KA4RSC	108	87	WA4MNR
164	KA4SAA	K5LUPN	W9JUU
VE7BNI	107	K5OAF	WA0HJZ
155	AA4AT	K4ZN	KB7FE
N4GHI	W2PKY	KA2BHR	W1EOF
163	K4IWW	N7BGW	ND5T
KC4VK	WB1HIH	68	N4GHI
150	106	86	W7VSE
W4PIN	WA4CCK	WB4WYG	W3VR
146	K2MFF	N10R	AA4AT
WX4Y	KV5X	KA4YEA	KA8CPS
145	K4JST	W2VY	N5AMK
KB0Z	105	67	WA4JTE
141	VE3KCZ	KA2DQA	N4EXQ
W0IKT	104	A100	N4EXQ
139	K7GXZ	KA4BBA	VE7BNI
WB2OWO	KT5Y	W0DAIT	549
AA4GF	WB4HRR	66	30
138	AA4GF	WB4VMX	30
WA4QXT	134	W4FMZ	4
KD7ME	WB4HRR	KR7L	4
137	KA4GUS	KB4OG	67
W7LRB	K4ZK	KS7KA1	342
KA5CL	103	WD8MIO	384
136	WB4WII	W7AMM	23
W1EOF	*A6QLA	WB2OWO	384
135	102	WB3GZU	323
KB0MB	KA4BCM	N2S2	30
134	WD9IID	KA1EKQ	354
K4SCL	VE3BDM	K5EVI	366
133	K08VF	KW9D	292
KB2HM	WB1GLH	K4UFI	9
NG4J	101	K4JST	346
132	WD4KBW	K5EVI	6
W9YCV	KA5AZK	85	351
WB8RFB	N5AMK	KB9ND	308
KD8KY	101	NT4S	1
129	WB8RFB	KU2N	4
WF4X	WA4NK	K8EF	383
N4PL	100	W3EGK	1
KB4WT	AF3S	N1PG	3
128	K2GGE	WDBKFN	1
N1CPX	KA6BNW	KDBKY	276
WB1GXZ	N5BT	WD4KBW	4
127	99	KC9CJ	37
KC3Y	AF3S	W3OKN	1
KA1EXJ	N5DFO	W4NFK	24
125	KA4AMC	W5KLV	1
WD9FRI	WA8MFT	KU6D	15
WB2MCO	WA4PFK	AK1E	0
KW9J	WA9WYS	WA0YOI	0
WB2IDS	W1RWG	W5CTZ	0
124	98	KA0ARP	1
KA2F	WB4YQP	KT6A	6
122	WB2ZCM	K8BQVH	0
AG2R	KF4U	WB7NHR	105
KK3F	WB2VUK	KB2HM	11
AL7W	KFBJ	NB5T	16
W7VSE	AK1E	WA4CCK	0
121	97	N5DFO	3
WA2FJJ	NS5J	WA4PFK	33
120	WD4ALY	K5OAF	16
WB2EAG	KY4U	W3ATQ	4
N8FCQ	119	WA9WYS	22
WB4WYG	K4ZK	K4EUK	127
KA8GJV	118	AA4GF	16
119	96	KB4WT	0
K4ZK	WD9DNQ	K7HLR	11
118	N8AEH	KC3DW	1
KA2SPH	K3NNI	NE8X	223
WB8MIO	N1PG	W0FRC	42
WB6TIF	KA2UBX	N2XJ	6
N41YU	95	W8QHB	0
KW1U	WD8KQC	KJ9J	8
117	WA1YNZ	WA2FJJ	10
KJ3E	118	K0RXX	0
N4HMD	94	KA0EY	43
W4ANK	WA2ERT3	KY4U	19
115	WA1FCD	NW4O	19
WB0TED	93	K1CB	2
N2XJ	92	KA8ICB	1
K55V	91	KA7NMA	6
114	90	W4HON	1
W3YVQ	89	WD8RHU	1
WA1DXT	88	KI4LO	1
	87	KA4BBA	1
	86	KA8ICV	1
	85	57	1
	84	KA7RFD/T	1
	83	54	1
	82	N1BYS/T	1
	81	53	1
	80	N8FNP/T	1
	79	52	1
	78	WB1CBP/T	1
	77	48	1
	76	KA1HPO/T	1
	75	45	1
	74	44	1
	73	43	1
	72	42	1
	71	41	1
	70	40	1
	69	N4JOA/T	1
	68	KA9RI/T	1

Brass Pounders League December 1984

BPL Medallions (see April 1979 QST, p. 77) have been awarded to the following amateurs since last month's listing: WB5CIC, W4FY, KC4VK, KB7FE, KD8KY, KK1A/6, W1FYR, WA1YZN.

The BPL is open to all amateurs in the United States, Canada and U.S. possessions who report to their SM a message total of 500 or a sum of origins and delivery points of 100 or more on any calendar month. All messages must be handled on amateur frequencies within 48 hours of receipt in standard ARRL form.

1	2	3	4	5	6
KB0MB	3591	335	3582	57	7835
W3CVL	810	1291	1703	169	3973
VE3KK	844	405	1082	189	2520
N0BQP	33	1345	188	744	2308
KA9CPA	98	1172	205	818	2293
W9JUU	18	1048	1045	8	2119
WA0HJZ	0	1271	31	791	2093
KB7FE	271	913	709	136	2033
W1EOF	3	831	798	40	1472
ND5T	13	649	621	27	1310
N4GHI	58	596	586	66	1306
W7VSE	2	608	546	16	1170
W3VR	384	257	478	23	1142
AA4AT	42	510	507	6	1055
KA8CPS	17	452	427	139	1045
N5AMK	2	552	458	5	1017
WA4JTE	0	493	488	0	981
N4EXQ	12	447	396	68	923
VE7BNI	36	366	365	105	872
KA4AMC	549	87	205	27	868
K4ZK	30	396	412	18	856
W2MTA	4	442	381	5	832
KW9J	—	—	—	—	817
WB2IDS	67	342	326	71	808
KA1T	3	384	380	37	804
WD8MIO	23	384	323	39	769
W7AMM	30	354	366	18	768
WB2OWO	60	292	372	38	762
WB3GZU	9	346	358	13	726
KA4UFI	356	6	356	0	718
K4JST	0	351	332	8	691
K2MFF	30	308	331	10	689
W3EGK	1	339	338	8	686
N1PG	4	383	272	14	673
WDBKFN	1	347	315	9	672
KDBKY	276	204	160	31	671
WD4KBW	4	322	329	12	667
KC9CJ	37	267	252	104	660
W3OKN	1	297	352	5	655
W4NFK	24	290	304	21	639
W5KLV	1	318	288	23	630
KU6D	15	301	314	0	630
AK1E	0	327	298	2	627
WA0YOI	—	—	—	—	623
W5CTZ	0	301	318	4	623
KA0ARP	1	290	252	67	610
KT6A	6	314	267	19	606
K8BQVH	0	289	310	4	603
WB7NHR	105	187	307	5	601
KB2HM	11	218	267	32	591
NB5T	16	281	269	23	589
WA4CCK	0	308	272	5	586
N5DFO	3	320	217	44	584
WA4PFK	33	283	249	17	582
K5OAF	16	287	276	1	580
W3ATQ	4	283	278	8	573
WA9WYS	22	239	304	3	568
K4EUK	127	150	260	22	559
AA4GF	16	262	242	32	552
KB4WT	0	283	242	23	548
K7HLR	11	290	244	3	548
KC3DW	1	257	275	3	538
NE8X	223	206	41	68	536
W0FRC	42	223	255	10	530
N2XJ	6	201	294	13	515
W8QHB	0	245	267	0	512
KJ9J	8	305	176	22	511
WA2FJJ	10	245	227	25	507
K0RXX	0	237	276	0	505
KA0EY	43	209	87	30	469
WB5EPA	19	179	108	90	396

1 - CALL 4 - SENT
 2 - ORIG. 5 - DLVD.
 3 - RCVD. 6 - TOTAL

Independent Nets (December 1984)

1	2	3	4
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Contest Corral

A Roundup of Upcoming Operating Events



Conducted By Edith Holsopple,* N1CZC

MARCH

2-3

ARRL International DX Contest, phone, Jan. *QST*, page 73.

D.V.L. Contest, sponsored by the U.B.A. Section of Liege. CW contest will be from 0700-1100Z March 2, on 20 and 80 meters. (Phone contest on 20 and 80 meters will be from 0700-1100Z on March 3. VHF-FM/phone contest will be from 0700-1100Z March 10). Contests are separate. Exchange signal report and QSO number. (ON stations give province and members denote membership.) Use a separate log for each band. Count 1 point for QSOs with ON and DX stations, 3 points for QSOs with ON stations from Liege and 5 points for working the clubstation, ONSVL. Multipliers are the 9 provinces of Belgium, FBA (Belgium forces in Germany-DA2) and the Section of Liege for a maximum of 11 multipliers per band. Final score equals the sum total of all bands times the sum of the multipliers on all bands. Awards. Send logs by April 30 to Henri Stockmans, ON7HS, LGE Award Manager, 216, Vielle Voie de Tongres, B-4000 Liege, Belgium.

6

West Coast Qualifying Run, 10-35 WPM, at 0500Z March 7 (9 P.M. PST March 6). 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 to ARRL for grading. Please enclose your full name, call (if any) and complete mailing address. A large s.a.s.e. will help expedite your award or endorsement.

9-10

QCWA QSO Party, phone.

DIG QSO Party, phone, Feb. *QST*, page 80.

West Coast 160 Bulletin CW Contest, Feb. *QST*, page 80.

10

D.V.L. VHF Contest, see March 2-3 listing.

Wisconsin QSO Party, Feb. *QST*, page 80.

11

WIAW Qualifying Run, 10-35 WPM at 0300Z March 12 (10 P.M. EST March 11). Transmitted simultaneously on 1.818 3.58 7.08 14.07 21.08 28.08 50.08 147.555 MHz. See March 6 listing for more details.

16-17

YL-ISSB-Commo-System QSO Party, CW, Feb. *QST*, page 80.

Bermuda Contest, sponsored by the Radio Society of Bermuda, from 0001Z March 16 until 2400Z March 17. Operate 36 hours maximum. Off times must be clearly indicated and must be at least 3 hours each. Single operator only. All stations must operate from their own private residence or property. 80-10 meters, phone and CW. No cross-band or cross-mode QSOs. Exchange signal report and QTH (W stations send state; VE stations send province; U.K. stations send county; West German stations send DOK number; Bermuda stations send parish). W/VE stations work W. German, U.K. and Bermuda stations only. Work stations once per band, regardless of mode. A phone contact and a CW contact with the same station on the same band counts for score if the contacts are made at least 30 minutes apart. A multiplier counts only once per band regardless of mode. Count 5 points per QSO and multiply by the number of VP9 stations worked per band. Logs must be received by May 31. In-

clude a dupe sheet if more than 200 contacts were made. Mail to RSB Contest Committee, Box HM275, Hamilton, Bermuda.

Kentucky QSO Party, sponsored by the Western Kentucky DX Assn., from 2100Z March 16 to 0700Z March 17 and 1400-2200Z March 17. Work stations once per band and mode. Work portables and mobiles again as they change county. Stations must remain on a band for 10 minutes after making a QSO. Exchange signal report and QTH (county for KY stations; state, province or country for others). Suggested frequencies: CW — 1.815 MHz and approx. 60 kHz from the lower band edges; phone — 1.840 3.985 7.285 14.285 21.385 28.585 MHz; Novice — 3.725 7.125 21.125 28.125 MHz. Count 2 points per 1.8 MHz QSO, 2 points per CW QSO, and 1 point for each phone QSO (except 1.8 MHz.). KY stations multiply by total states, VE call areas and KY counties worked. Others multiply QSO points by total KY counties (max. 120) worked. Portables and mobiles add 1000 bonus points to the total score for each county operated from outside of home county (min. 10 QSOs from each county). Include a dupe sheet for 50 or more contacts. Awards. Mail logs by May 5 (include large s.a.s.e. for results) to William Shipe, WM4N, Rte. 1, Adairville, KY 42202.

Spring QRP CW Activity Weekend, sponsored by the G-QRP Club. Times (UTC)/frequencies: 0900-1100/14.060 21.060 28.060; 1100-1300/3.560 7.030; 1300-1400/10.106; 1400-1700/14.060 21.060 28.060; 1700-1900/3.560 7.030; 1900-2100/14.060; 2100-2300/3.560 7.030. For further details, contact Christopher J. Page, G4BUE, "Alamosa," The Paddocks, Upper Beeding, Steyning, West Sussex BN4 3JW, England.

International SSTV Contest, sponsored by the Deutscher ARC, from 1200Z March 16 until 1200Z March 17. Frequencies will be the SSTV segments of all bands authorized for SSTV. Single transmitter only. Class 1: HF bands; class 2: VHF and UHF bands; class 3: receiving stations. Only two-way video exchanges count. Exchange call sign, signal report and QSO serial number on video. Calling CQ-SSTV-Contest on phone is permitted. Work each station once per band. Classes 1 and 3 count one point per contact on 80-10 meters. Classes 2 and 3 count five points per contact on all V/UHF bands. Multipliers for classes 1 and 3: count each continent and DXCC and WAE country per band. Multiply QSO points (from all bands operated) by multipliers (from all bands operated) for final score. Multipliers for classes 2 and 3: multiply by 2 for QSOs on 2 meters, by 4 for QSOs on 432 MHz, by 6 for contacts on 1296 MHz, and by 10 for contacts on higher frequencies. Total sum of all band scores is the final score. Submit separate logs for each band. Awards. Mail logs by May 2 to Heinz Moestl, DE8BUS, P.O. Box 1123, D6473 Gdern 1, Federal Republic of Germany.

Iowa QSO Party, sponsored by the Iowa Section, from 1800Z March 16 until 0600Z March 17. Work stations once per band and mode. No repeater QSOs. Exchange signal report and county for Iowa stations; Section or country for others. Suggested frequencies are: CW — 1.810 3.550 7.050 14.060 21.050 28.050 MHz; phone — 3.875 7.225 14.275 21.325 28.600 50.100 144.200 146.520 MHz. Novice — 10 kHz from low ends. Count 1 point for each phone contact; 1.5 points for each CW contact; 3 points for each OSCAR contact. Novices and Techs count 5 points for each QSO. Iowa stations multiply totals by total Sections and total Iowa counties. Others multiply totals by Iowa counties (max. 99) worked. Bonus multiplier for each ARRL Iowa Section Official worked (max. 8). Awards. Send an s.a.s.e. for results. Mail logs by April 1 to K0CY, 3913 29th, Des Moines, IA 50310.

21

WIAW Qualifying Run, 10-35 WPM, at 1400Z

(9 A.M. EST) March 21. See March 6 and 11 listings for more details.

23-24

Tennessee QSO Party, sponsored by the Tennessee Council of ARCs, from 2100Z March 23 until 0500Z March 24 and 1400-2200Z March 24. Work stations once per band and mode. Work portables and mobiles again as they change county. No repeater or list QSOs. CW QSOs in CW subbands only. Stations must remain on a band or mode for 10 minutes after making a QSO. Exchange signal report and QTH (county for TN stations; state, province or country for others). Suggested frequencies: CW — 1.815 and 50 kHz up from lower band edges; phone — 1.860 3.980 7.280 14.280 21.380 28.580; Novice — 3.725 7.125 21.125 28.125. Count 1.5 points per CW QSO and 1 point per phone QSO. TN stations multiply by total states, VE call areas and TN counties (max. 95) worked. Others multiply by total TN counties worked. Portables and mobiles add 500 bonus points to total score of each county operated from excluding home county (min. 10 QSOs from each county). Send an s.a.s.e. before March 23 for a complimentary county map of Tennessee. Mail logs by May 1 (include a large s.a.s.e. for results, return of log and/or certificate earned) to RATS, c/o Jack Byrd, KF4VL, P.O. Box 65, Pleasant View, TN 37146.

23-25

Spring RTTY Contest, sponsored by the British Amateur Radio Teleprinter Group, from 0200Z March 23 until 0200Z March 25. Operate 30 hours maximum. Off times must be no less than three hours each and must be indicated on log. Single-operator, multioperator and SWL categories. Work stations once per band, 80-10 meters. Exchange UTC, signal report and message number starting with 001. Count two points for RTTY QSOs with stations in your country, 10 points for others. Count 200 bonus points for each country worked per band. For final score, add QSO points × (total different DXCC countries + W/VE/VK call areas per band) plus (band countries × 200 × continents). Use a separate log sheet for each band. Mail logs to be received by May 31 to Peter Adams, G6LZB, 464 Whippendell Rd., Watford, Herts WD1 7PT, England.

30-31

Rio CW DX Party, sponsored by Rio Woodpeckers CW Group of Brazil, from 1500Z March 30 until 1500Z March 31. Exchange signal report, name and QTH. Preferred frequencies are 3.510/3.520 7.020/7.030 14.030/14.050 21.030/21.050. Novices — 28.030/28.050. Mail QSLs to bureau or directly to stations worked.

Costa Lugo Contest, sponsored by the Radioclub Costa Lugo, from 1500Z March 30 until 1500Z March 31. Phone, single operator, 80-10 meters. Exchange signal report and age. Count one point for each contact. Work each station once per band. Multipliers are each contact per band with EAIRCW and EDICCL. Awards. Separate logs by band and send with a summary sheet by April 30 to Radioclub Costa Lugo, P.O. Box 69, FOZ Lugo, Spain.

CQ World Wide Prefix Contest, phone, sponsored by *CQ Magazine*, from 0000Z March 30 until 2400Z March 31. (CW contest, May 25-26). Single ops are allowed a maximum 30 hours operating time; off-times must be taken in no more than five periods and must be clearly indicated in the log. Multioperator stations may operate entire 48 hours. Phone only, 160-10 meters (excluding the WARC bands). Categories: single op, all band and single band; QRP (5-W output maximum); multiop (multi-band only) multi and single transmitter. Multi-singles must remain on a band for at least 10 minutes after making a QSO; multi-multis are allowed only

*Communications Assistant, ARRL

one signal per band. All transmitters must be located within a 500-meter diameter circle or limits of property; no remote stations. Work stations once per band for QSO point credit, but prefix credit may be counted only once. Exchange signal report plus serial number starting with 001. Multi-multis use separate numbers on each band. QSO points: Contacts between stations on different continents count three points on 28, 21 and 14 MHz and six points on 7, 3.5 and 1.8 MHz. For North American stations, contacts between stations in different countries on the NA continent count two points on 28, 21 and 14 MHz and four points on 7, 3.5 and 1.8 MHz. For non-NA stations, contacts with stations in other countries but on the same continent count one point on 28, 21 and 14 MHz and two points on 7, 3.5 and 1.8 MHz. QSOs between stations in the same country count zero points but are permitted for prefix multiplier credit. Multipliers are prefixes, to be counted only once. A prefix is the two- or three-letter/number combination that forms the first part of an amateur call sign, as in W1, G4, DF3, 8P6, etc. Stations operating outside the call area indicated by their call signs must sign portable. The portable prefix counts as the multiplier; for example, AA1K/3 in Delaware counts as an AA3 multiplier. Final score is total QSO points \times sum of prefixes worked. Awards and club competition. Mail logs by May 10 (July 10 for CW) to *CQ Magazine*, WPX Contest, 76 North Broadway, Hicksville, NY 11801.

APRIL

2

West Coast Qualifying Run, 10-35 WPM at 0500Z April 3 (9 P.M. PST April 2). See March 6 listing for more details.

6-7

The SP-DX Contest, CW, sponsored by the Polski Związek Krotkofalowcow, from 1500Z April 6 until 2400Z April 7. (No rules have been received this year.) Suggested frequencies are 80-10 meters. Non-Polish stations transmit a 6-digit number consisting of RST 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

April 30 to Polski Związek Krotkofalowcow, SP-DX Contest Committee, P.O. Box 320, 00-950 Warsaw, Poland.

World Wide SSTV Contest, part 1, sponsored by the German AR Teleprinter Group, from 1200Z April 6 until 1200Z April 7. (Part 2 will be held Oct. 13-14.) A six-hour rest period must be taken at any time during the contest period. 3.5, 7, 14, 21 and 28 MHz only. Work stations once per band. Exchange call signs, signal report and serial number. GARTG members also send membership number. Count 1 point per 3.5, 7 or 14-MHz QSO; 2 points per 21-MHz QSO; and 5 points per 28-MHz QSO. Multipliers: countries as defined by the WAE and DXCC lists and W/K, VE/VO, JA, PY, VK call areas. Final score = QSO points \times multipliers worked per band \times continents worked per band. Add 50 bonus points per GARTG member worked. Mail logs to be received within 2 months to Wolfgang Punjer, DL8VX, P.O. Box 90 11 30, D-2100 Hamburg 90, Federal Republic of Germany.

9

WIAW Qualifying Run, 10-35 WPM at 0300Z April 10 (10 P.M. EST April 9). See March 5 listing for more details.

9-10

NA-YL to DX-YL, CW

13-14

DIG QSO Party, CW, refer to March 9-10 listing, this issue.

15

ARRL VHF/UHF Spring Sprints, 144 MHz, from 7 P.M. until 11 P.M. local time. (Note: Other Spring Sprint dates are 220 MHz on Tues., April 23; 432 MHz on Wed., May 1; 1296 MHz on Thurs., May 9; and 50 MHz on Sat., May 18.) Single-operator only. Exchange grid-square locations (see Jan. 1983 *QST*, page 49). Signal reports are optional. Count one point per valid QSO. Multiply QSO points by number of different grid squares worked for final score. Contests are separate; there is no accumulation of scores. FM restrictions: Retransmitting either or both stations, or use of repeater frequencies, is not permitted. Only these recognized simplex frequencies may be used: 144.90 to 145.10; 146.49, .55 and .58; and 147.42, .45, .48, .51, .54 and .57 MHz. This restriction prohibits use of all repeater frequencies, including

146.76 and .94. Contest entrants may not transmit on repeaters or repeater frequencies on 2 meters for the purpose of soliciting contacts. Use of the national calling frequency, 146.52 MHz, is prohibited. Contestants may not transmit on 146.52 MHz for the purpose of making or soliciting contest QSOs. The intent of this rule is to protect the national calling frequency from contest monopolization. For a valid QSO to occur, call signs and grid-square locators must be exchanged and acknowledged. A station may be worked for credit only once per band, regardless of mode. Crossband QSOs do not count. Stations are allowed only one transmitted signal at any given time. A transmitter used to contact one or more stations may not be used subsequently under any other call sign during the contest (except for family stations for which more than one call sign is assigned to one location by FCC/DOC — and then for family members only). Entries for each contest must be postmarked by June 20. Contests are separate. Mail contest entries in separate envelopes. Submit separate log and summary sheets for each contest entered. Logs must indicate time, call sign and complete exchange for each valid QSO. Multipliers must be clearly marked in the log. Include dupe (cross-check) sheets with entries of more than 100 QSOs. Use the official entry forms, available from ARRL Hq. for an s.a.s.e. Each entrant agrees to be bound by the provisions as well as the intent of this announcement, the regulations of his or her licensing authority and the decisions of the ARRL Awards Committee. Disqualifications: For excessive duplicate QSOs, call sign errors or exchange errors. See January 1983 *QST*, page 72 for disqualification details.

16-17

NA-YL to DX-YL, phone

20-21

QRP ARCI Spring Contest, phone
World Fishing Contest — Vigo '85

23

ARRL Spring Sprints, 220 MHz

27-28

Helvetia Contest

28

WIAW Qualifying Run

Special Events

Conducted By Edith Holsopple,* N1CZC

Morton, Illinois: Morton ARC members will be active from 0001Z *March 1* until 2400Z *March 31* to allow hams worldwide to qualify for the Worked All Morton award. Work five Morton-area stations for award. Operation on phone and CW, all bands, about 5 kHz apart up from lower General class band edges and in the Novice bands. Certificate for log information and large s.a.s.e. to Jim Jones, WD9AEU, 701 Columbus Ave., Morton, IL 61550.

Port Talbot, Wales: BSC Port Talbot ARC will operate GB2SDD 0000-2400Z *March 1* to celebrate St. David's Day, the national day of Wales. Operation on 80-10 meters. Special QSL for QSL to Bryn-Ynys, 13 Strawberry Pl., Morriston, Swansea, SA6 7AG Wales.

Washington, Texas: The Brenham ARC will operate WB5STR/5 from 0001Z *March 1* through 2359Z *March 3* from the Brazos State Park in celebration of Texas Independence Day. Phone frequencies will be in the General class portion of 80-10 meters, and 2-meter FM. There will be CW operation in the Novice bands. For a special QSL, send an s.a.s.e. to BARC, P.O. Box 44, Brenham, TX 77833.

St. Catharines, Ontario: The Niagara Peninsula ARC will sponsor VO3OWG (Ontario Winter Games) from *March 4-17*. Please QSL with an

s.a.s.e. via VE3FOI, 12 Frederick St., St. Catharines, ON S2S 2S2.

Fulton, Missouri: Callaway ARL will operate KS0B 1400-2200Z on *March 9* and 1400-1900Z *March 10* from the Winston Churchill Memorial at Westminster College to commemorate the 1946 "Iron Curtain" speech. Frequencies: 7.235 14.235 21.310. Special QSL for s.a.s.e. to CARL, P.O. Box 241, Fulton, MO 65251.

Fairbanks, Alaska: The Arctic ARC is offering special QSL cards during the month of March picturing the Yukon Quest Sled Dog Race, the Winter Ice Festival and the North American Open sled dog race. During the race, from 0000Z *March 15* until 0000Z *March 17*, KL7KC will be operating on all bands. QSL via AARC, P.O. Box 81389, Fairbanks, AK 99708.

Macon, Georgia: The Macon ARC will operate W4BKM in celebration of the Cherry Blossom Festival, *March 18-24*. Operation will be daily in the afternoons and evenings and all weekend in the center portions of the General phone and CW bands on 10-80 meters and the Novice bands. For a certificate and QSL, send an s.a.s.e. to P.O. Box 4862 Macon, GA 31208.

Marysville, California: The Yuba-Sutter ARC will operate WA6AGD to commemorate the 105th annual parade and festival in honor of Bok Kai, the Chinese water god. Operation will be from 1600Z

March 23 to 1400Z *March 24* on the low end of the General phone bands of 80, 40 and 20 meters. For a certificate, send QSL and s.a.s.e. to WA6AGD, c/o Bok Kai, Marysville, CA 95901.

QSLing Special Events Stations: To get your QSL or certificate from any of the special-events stations listed here, follow these simple guidelines. (1) After working the station, carefully fill out a QSL card for the QSO. Show the date and time accurately using UTC. (2) Prepare a stamped, self-addressed envelope. If sending for a certificate, use a 9-x 12-in envelope if you want an unfolded certificate, or a no. 10 envelope if folds are okay. Include enough postage for return of your envelope. (3) Mail both your QSL and your s.a.s.e. to the address listed, or to the address given on the air by the station you QSO. Be patient. Special-events stations will often print their cards and/or certificates after the operation is over so they will know how many to order.

Note: The deadline for receipt of items for this column is the 15th of the second month preceding the publication date. For example, your information would have to reach Hq. by April 15 to make the June issue. For the convenience of those wishing to operate, please be sure that the name of the sponsoring organization, the location, dates, times(Z), frequencies and call sign of the special-event station are included. Requests for donations will not be published. (同群)

*Communications Assistant, ARRL

Section News

The ARRL Field Organization Forum

Coordinated By Steven Ewald, WA4CMS

ALBERTA

ALBERTA: SM, E. Roy Ellis, VE6XC — ASM: VE6AMM, SEC: VE6XC, ST/MN/DEC: VE6ABC. No EC reports received but hoping the new year will be different. Cold wx and poor hf sigs did hinder some hf activities. Hockey game tournaments were delighted to have NARC as their com experts. New rigs from Santa are getting tuned up for that rare DX or whatever. Trust all had a happy holiday. Traffic: VE6BLY 27t, VE6CPE 6s, VE6ABC 40, VE6XC 4.

BRITISH COLUMBIA: SM, H. Ernie Savage, VE7FB — BCEN was squawking with zero communications after 0300Z net time. Tom, VE7BNI, Asst. Net Manager held net open all day to clear traffic. Thanks for being retired so much ARL 61 was cleared. Two meters and repeaters was sure a blessing during Christmas to clear QTC's. BC public service net was also struggling with appalling condition. Burnaby A.R.C. President, VE7FKN, Norm; Vice Pres, VE7ACY, Jim, Secretary, VE7ZCN, Jim Spencer, VE7SH Edna, is recovering nice from her operation. Dogwood Chapter's Christmas Party was a full house and good time by all was had. Gourmet Banquet and Dance Saturday, March 30th, sponsored by all lower mainland ARC. Fantastic food and prizes. Make your reservations early. Traffic: VE7BNI 872, VE7CDF 382, VE7CQJ 155, VE7FB 97, VE7XA 60, VE7EGM 16, VE7EIR 16, VE7EVL 16, VE7FSP 15.

MANITOBA: SM, Peter Guenther, VE4PG — This will be my final report and all reports, News, etc. should be mailed to Jack, VE4AJE, who is taking over as Section Manager as of this new year. I thank all the Managers, Net Control Stations, OBS, EC and all the ones who gave their time to helping make our section one of the better ones. My thanks to all the appointees for putting up with some difficult situations as well as myself. I have enjoyed being your SM during the last 7 years and know the section is in good hands. Traffic increased in December and despite very poor conditions, QNI was good. We wish everyone in Manitoba and others who made our nets function, a very happy New Year. Good luck to all, MMN QNI 641, QTC 88, Sess 31. WFRN QNI 318, QTC 1, Sess 9. MPEPN QNI 802, QTC 38, Sess 31. MTN QNI and QTC will be listed in the January report. Traffic: VE4RO 182, VE4AJE 70, VE4JA 63, VE4LB 35, VE4TE 35, VE4AFQ 32, VE4BT 27, VE4AT 7, VE4AD 18, VE4FK 15, VE4GP 14, VE4CF 9, VE4EAT 7, VE4ADS 6, VE4DT 3, VE4NE 3, VE4XN 3, VE4CR 2, VE4HK 1.

ONTARIO: SM, Larry Thivierge, VE3GT — BM: VE3LST, PGL: VE3AR, SEC: VE3GQ, CEM: VE3BDM, TC: VE3EEO. Congratulations to the RSO's ONTARF Net who recently celebrated their 13th year of operation on 3.755 MHz. The net, started by VE3BC, is currently managed by VE3FQV who has assembled a very capable corps of net control stations and other helpers to ensure that the daily sessions, 0700 to 1800 local, run smoothly. On this occasion there were 1034 checkins for the day. The grand checkin total for 1984 was 194,657. Congratulations also to CARTG who have just celebrated their 18th birthday. As most of you are probably aware as you read this, another very popular net, the CJ Net has relinquished their 3.790 MHz frequency and have moved to 3.745 MHz. (The time still 1830 to 1930 local. The net time for COMSON should now 1500 UTC winter and 1400 UTC summer and not local time as was reported earlier. VE3KK, despite some horrendous band conditions, managed to set a Section all time high traffic total with a message count of 2520 including a record 844 originations. Marshall was responsible for 43% of the Section's December traffic totals. The previous high was 2385, set by VE3CVA. Marshall is hinting he may retire for next Christmas in order to spend some time in California with his son, VE3HB, the Oakville ARC station was active handling senior citizens Christmas greetings messages with VE3JG, VE3FRG, VE3EUN, VE3KA, VE3FGZ taking part. New EC appointments are: VE3BS, Thunder Bay, and VE3KA, Kingston. VE3CSE is now VE3PR. VE3GFN has rekindled his interest in RTTY and has become active again in that mode. New members of the North Shore ARC are VE3LDD and VE3GMM. I have been reelected for another term and will be reviewing all the Section's field appointments prior to April first. Those who have failed to report in the last six months will be cancelled. Traffic: VE3KK 2520, VE3BCZ 467, VE3GT 406, VE3GNW 348, VE3BDM 334, VE3KCZ 276, VE3CYR 263, VE3DPO 175, VE3WM 165, VE3AW 149, VE3HB 119, VE3AN 103, VE3HSF 101, VE3WV 92, VE3BUO 89, VE3GFN 57, VE3EUN 45, VE3DZH 40, VE3BAJ 39, VE3MCO 26, VE3QER 24, VE3KLV 16, VE3EHL 10.

SASKATCHEWAN: SM, W. Munday, VE3MH — SEC: VE3CU, ST/M, VE3IC, TC: VE3FC, CEM: VE3EX, VE3EG, VE3EN, VE3EA, VE3AE, VE3BF. Net report: M.J.R. 102 meter 30 sessions, 210 QTC. RARA-2 meter: 30 sessions, 431 QNI. PWXN: 31 sessions, 449 QNI. Ham classes are progressing favourably with the various clubs in SK. The Regina hamfest committee is working hard and with some interesting speakers lined up, forums and other program events. Everyone attending should have a good time. Renewed interest in the SK Wheat Belt Award has been announced by the Saskatoon club. Congratulations to VESBAF for making BPL in December. Traffic: VE3WM 36, VE3BAF 264, VE3OI 14, VE3KS 14, VE3AGM 12, VE3AEJ 6.

ATLANTIC DIVISION

DELAWARE: SM, John Hartman, WA3ZBI — ST/M: WD3KX, SEC: W3PQ, PIO: N3DIP, PSHR: K3JL, WD3KX. Clubs continue to grow. AWARE has 172 members as of January. SARA has over 60 members. Congratulations to Tony N3EQ, George N3EEO, Leif N3EEM, and Randy KA3NLV for their new calls. A speedy recovery to Tom W2AGR and Bob W3TBE. DTN QNI 395, QTC 57 in 22 sessions. DEPN QNI 86, QTC 20 in 5 sessions. SEN QNI 45, QTC 5 in 4 sessions. Traffic: W3QQ 316, W3PQ 206, WD3KX 100, WB3DUG 80, WA3WY 43, K3JL 32, WA3ZBI 24, N3AXH 22, K3ZXP 11, W3FEG 11, KA3IX 9, KC3JM 6, KC3FW 2.

EASTERN PENNSYLVANIA: SM, Jim Post, KA3A — ASM: WA3PZO, KA3JJ, KC3ML. ACC: KB3NE. PIO: W3AMQ. SEC: WA3PZO. TC: W3FAF. ST/M: KB3UD. DELS: K3QXG

AA3G W3EEK KB3UD N3BFL K3MWA KB3LR N3AIA.

QNI	QTC	Sess
EPA	517	329 59
EPA EPTN	552	483 31
PTTN	322	163 31
ATN	45	11 6
D2ARES	38	5 4
D3ARES	107	20 5
D5ARES	68	5 5
D6ARES	50	23 5
PWA ARES	75	1 5
MARC TN	213	95 13
MARC ARES	195	9 5
PFN	223	11 31

Thanks to the Del Lehigh Club for the nice reception to the EPA staff during our pre-holiday visit also our appreciation to the Lehigh Valley ARC and Evan, WB3HVJ, for becoming our EC in Lehigh County. More EC news: A fine job done by both WA3JRL in securing ECs for Columbia WA3JUG and Northumberland WB3HM. This completes District 8. District 6 is close to completion, now led by K3MWA as DEC; EC positions for Lackawanna KN3V, Luzerne KB3JK and Wyoming WB3WJ have been filled. KA3A and K3MWA traveled to the Susquehanna County ARC in Montrose in mid-January. After a discussion of the emergency network and ARES, they were assured an EC would be appointed for Susquehanna County. We still need ECs in a few counties — Adams, Schuylkill and Dauphin are target counties for February and March. How about a volunteer? WA3CIG, Lou, has semi-retired from his net duties; the entire section has been giving Lou the thanks he richly deserves over the air. It is hard to find the right words to show our appreciation for Lou's many years of stalwart and dedicated service. Congrats to Bob, KC3B, on his passing of the Amateur Auxiliary certification exam. Fire, Ardmore; K3PYO, WA3RIZ, WA3PZO respond with emergency communication and arrange health and welfare for victims. Also, congrats to Mid-Atlantic ARC for their success in Novice and Tech classes. New calls and upgrades: KA3E, N3Z, NKE, NKG, NKH, NKL, NLJ, NMD, NEP, NME, NMF. Anyone interested in the Frequency Coordination problem in EPA, please get your name to KA3A or W3FAF. Preliminary plans are now being made to form a new group for repeater frequency coordination and we need input prior to set-up. Congratulations to D. Scott Miller, recipient of a Certificate of Merit, for his excellent coverage of Amateur Radio Events in York County. Certificate was presented by Gordon Frederick, news editor York Sunday News. Traffic: KB3UD 701, N3CQY 579, KA3DL 382, WA3EHD 352, KA3IME 256, WA3GL 226, N3AJW 205, W3KAG 188, AA3B 185, W3IPX 148, WB8KPE 138, W3AWM 135, W4UD 110, KC3LY 101, N3CD 92, N3AZW 85, W3ADE 53, N2BSK 51, W3VA 49, W3JXK 40, K9TEB 34, W3TWW 33, KC3LM 32, KE3U 27, W3FAF 17, KO3M 16, K3QXC 16, WA3BOM 14, W3CL 11, WA3CKA 8, AA3C 6, W3PZY 5, KA3IY 5, W3HK 4, N3BFL 6, K3EBZ 6.

MARYLAND-DISTRICT OF COLUMBIA: SM, Karl R. Medrow, W3FA — Big month for all traffic handlers with WB3GZU, KC3DW and K3JE making BPL. Congrats! W3FA is looking for a replacement SM at the end of the June term. KA3HUT and WB3FUE are making the Eastern Shore HUM, along with W3HTE, K3ONU (retired) and WA3COT MPEPN regulars. KG3M sends CW bulletins Friday nights 2000 local time 147.03 Rpt. CO reports from K3CHP, KA3R and W3IK all doing a helpful service, thank you! W3ZNV is having fun with RTTY. W3SMN is a ham 52 1/2 years at 78, congrats. His pet peave, all agree, is the guys who tune up on the air! WB3KJT had a great time with 3 grandchildren, next year 5 — hold it! KA3DRG, ACC, is busy with the new job. CBRA has Pres K3UAV, VP/Treas WB3ISF, Secy KB3K all plotting good things. PVRC has Pres N3FC, VP/Activities KD4NI, Secy KC8C and Treas W3FG. Newsletters from FAR, GARG, AARC and CBRA-Tnx. AUTO-CALL will publish exam schedules — let 'em know, please. WB3BFK got a little travel time in before winter hit. Get all sez MSN 3717 daily at 1930 local is what it is! W3LD has no news. W3DQI is getting lots of NCS practice. N3EBQ covers Northeast locally. K3NNI back in full harness after a bypass. KC3Y is becoming a net hopper by necessity. KA3EVM nailed down a regular liaison spot. W3YVQ just missed the BPL list. W3FZV found 160 interesting. K3MR is in Baltimore. WA2ERT3 supports CW, SSB and the Boy Scouts. W3UT has become a regular with the shortened days of winter. The MPEPN lists repeaters its members monitor during regular net sessions. This is a big help when conditions on HF are bad. With the nets: Net/Manager Sessions/Traffic/QNI average. MPEPN/K3JE 30/363/33. Top 10: W3DKX K3JE WA2ERT W3A. K3QDC, K3WJ, W3HFB, K3CY, W3YVQ, and KB3NI. MDD/V3PQ 62/80/95. Eras: W3QO, K3JE and K3CY. MSN/K3CAV 31/64/18. WR PON/W3BDF 21/24/12. MDC PON/W3OY 47/113.8. WC 2 Mtr/K3C3M 3/0/16. Wilcomico ARES/KA3HUT 3/2/10. MDD Nov W3PQ 58/21/19.2. Brass W3FA W3QO and K3CY. WB3GZU is ST/M. KA3ERP is SGL. KA3DBN is PIO. KA3DRG is ACC and KC3KE is OO/RFI Coordinator. Traffic: WB3GZU 726, KC3DW 536, K3JE 519, W3YVQ 410, K3CY 376, KK3F 316, KA3EVM 203, K3NNI 195, W3FA 193, W3CAV 147, W3UT 113, N3EBQ 98, WB3KJT 64, W3DQI 61, K3MR 45, W3LDD 42, WA2ERT3 41, WB3FUE 41, W3ZNV 38, W3FZV 24, WB3BFK 19.

SOUTHERN NEW JERSEY: SM, Richard Baier, WA2HEB — SEC: K2QJL, ST/M: WB2RVE. ACC: K2IXC. TC: W2JX. SGL: W2XQ. PIO: WB2RVE. BM: WB2UWV. OO/RFI: WA2HEB. At this moment, there are a total of 17 League affiliated local clubs in our section. I know there are many more local clubs in our section that aren't affiliated and I'd like to give you some of the advantages of League affiliation in the hope that some of you might bring this subject up at a future meeting. With affiliation you receive periodic newsletters containing important information such as increasing membership and keeping an active membership, a "group" rate on using the outgoing QSL bureau and increasing your club's treasury by having members pay their League dues through the club, thereby keeping a modest commission. The only requirement is

to have 51 percent of the voting membership ARRL members. Why not talk to your club's officers about affiliating? For further info, please contact our ACC, Traffic: WA2HEB 280, N2CER 154, WA2CJUW 122, KC2PB 31, WA4JRP 30, W2UJ 6, (Nov.) WA4JRP 24, (Oct.) W2UJRP 31. **WESTERN NEW YORK:** SM, William W. Thompson, W2MTA — Club officers: ARATA W2VCI, K2LFL, K2JUD, K2QB: BRVARC W2AWB, WA2OEP, N2CKT, HAMO-RAMA '85 WA2ZSJ, N2DZD, KA2FVO, K2GUG, SWARA WA2ZSK, KB2KW, N2BLX, WA2KUT; Salt City DX Association K2ZJ, KA2K; Utica WB2BIN, KK2B, K2XU, NA2Q. INNOVATION: Squaw Island has FB bumper sticker touting the club. Tompkins County ARC conducted exams which produced 15 Novices, 6 Technicians, 1 Advanced and 3 Extra Class licensees — CONGRATULATIONS! RAGS and RAFA continue their licensing program, and LARC and Salt City have teamed up to give exams. Our thanks to all those around the state who are providing these many testing opportunities. Public Service Honor Roll: KA2BHR, KG2D, KA2DQA, WA2FJU, VE2FMQ, W2GJ, WB2DS, WA2KJG, W2MTA, KU2N, WB2OWO, WB2RB, N2D81, K2T, W2JXB, K2YAI, Brass Pounders League, WA2FJ, WB2DS, W2MTA, WB2OWO. Appointments: OES-W2MVH, ORS-AF2A, TEN METER BEACON KA1YE/B now 4 watts 28.285 MHz near Lockport, reports requested. W2MTA copied award in '84 OSCAR 10 AMSAT-Stoner 25th Anniversary Challenge Cup Test. Late December floods in Adirondacks had ARES/RACES/REACT burning the midnight oil in Lewis County-WA2OEP.

Net Name	QNI	QSP	QND
WYSV*10	400	368	31
WDN/1*11	357	152	31
MFN 13	193	130	35
NYPON*17	854	802	31
NYSPEN	652	108	31
ESS 18	434	91	30
OCTENE*	805	148	31
BLUELINE	273	23	29
NYS4*19	488	440	31
OARC 20	55	2	4
BRVSN 21	370	7	31
ONTN*21	345	82	31
OCTEN*1	326	23	31
STAR*21			
Q Net 18	420	7	31
WDN/E*18	599	223	31
WDN/L*21	574	222	31
NYS5*22	351	272	31

*NTS Net. OBS REPORTS: WB2DSR, WA2ZPE, P10/N/EC and HAM RADIO columnist WA2PUU reports having a very active year, including the Empire State Games, and sends her thanks to all who worked so hard to make it a success. Every affiliated club should have a PIA, send your recommendation for appointment to WA2PUU. SEC WB2E reports the continuing expansion of Amateur Radio Emergency Service in the section, with 34 of 40 counties with Emergency Coordinators, and with five District Emergency Coordinators steering the ship in Western, Central, Northern, Southern and Mohawk Districts of WNY. Thanks to WA2AV, KA3BHR, WB2NAO, KB2KW and WB3CUF respectively. Jim and his DEC's are looking for ECs to fill out Franklin, Herkimer, Schoharie, Schuyler, Steuben, and Wyoming counties... WATSAY? Traffic: W2MTA 832, WB2DS 806, WB2OWO 762, WA2FJU 507, VE2FMQ 460, WA2HSB 454, KG2D 229, N2D5 214, WA2KJG 188, K2XT 188, KA2DQA 187, KU2N 175, W2GJ 121, K2YAI 115, KA2DBD 112, KA2UBX 106, KA2BHR 96, W2FR 95, WB2QX 94, WB2RBA 74, AF2K 72, W2UYE 59, KA2PHP 39, KA2SMZ 33, WB2KCT 38, WA2PQ 32, N2BNE 26, W2PFS 25, KA2TFE 25, WB3CUF 23, WA2OEP 20, W2ZJW 18, W2FBK 10, K2GXT 9, KA1YE 9, WB2NAO 4, K2VR 3, KC3SJ 2, (Nov.) WB2KCT 12.

WESTERN PENNSYLVANIA:

Net	QNI	QTC	Sess.	kHz	T/D	Mgr.
WPACW	378	271	31	3585	7:00	WA3UNX
WPAPTN	526	241	31	3983	8:00	W3MML
WPA2MTN	448	132	30	146.28/88	8:00	N3ADM
NWPA2MTN	393	12	28	145.13/-	1400	KC3NY
PFN	223	115	31	3958	5:00	WA3THT

My apologies to WB3IAS who is not a Silent Key; his XYL was the person who was the one, our sympathy is extended to him. I would like to have any notice of a Silent Key made by a card to prevent errors in transmission. New officers for 1985: Foothills ARC, Inc. Pres. WB3AMR, V.P. N3AEP, Sec. KA3EGE, Treas. WB3KEC, Member at large W3TTN, Fort Armstrong Wireless Ass'n Pres. W3ZCS, V.P. KA3KST, Secy W3YVE, Treas. KB3X, Ed. KB3VD, Board W3ZCS, KA3KST, W3YVE, KB3XT, N3DOL, K3JUV & KR3P, Steel City ARC Pres. K3RYA, V.P. KA3JTM, Treas. AK3J, Rep. Secy. KR3L, Corr. Secy. W3UJH, ARRL Liaison AK3J, K3CXX 84, W3RUL 81, K3SM 76, W3KUN 72, KC3QJ 66, KA3WJ 62, W3KXZ 60, K3LT 51, K3NVP 48, KA3ETC 44, K3NPL 42, W3OCY 32, KB3NV 30, W3MML 21, N3KB 14, N3WS 12, K3HR 12, W3SN 8, WB3GUK & KA3EGE 6, (Nov.) KA3ETC 29, KB3DT 13, N3KB 10.

CENTRAL DIVISION

ILLINOIS: SM, David E. Lattan, WD9EBQ — SEC: W9QBH, ST/M: KB9X, OO/RFI: W9TT, BM: K9ZDN, PIO: WD9EED, SGL: W9KPT, ACC: WB9SFT, ASM: K9ORP, Net Freq. Times (Z win) QNI QTC Sess



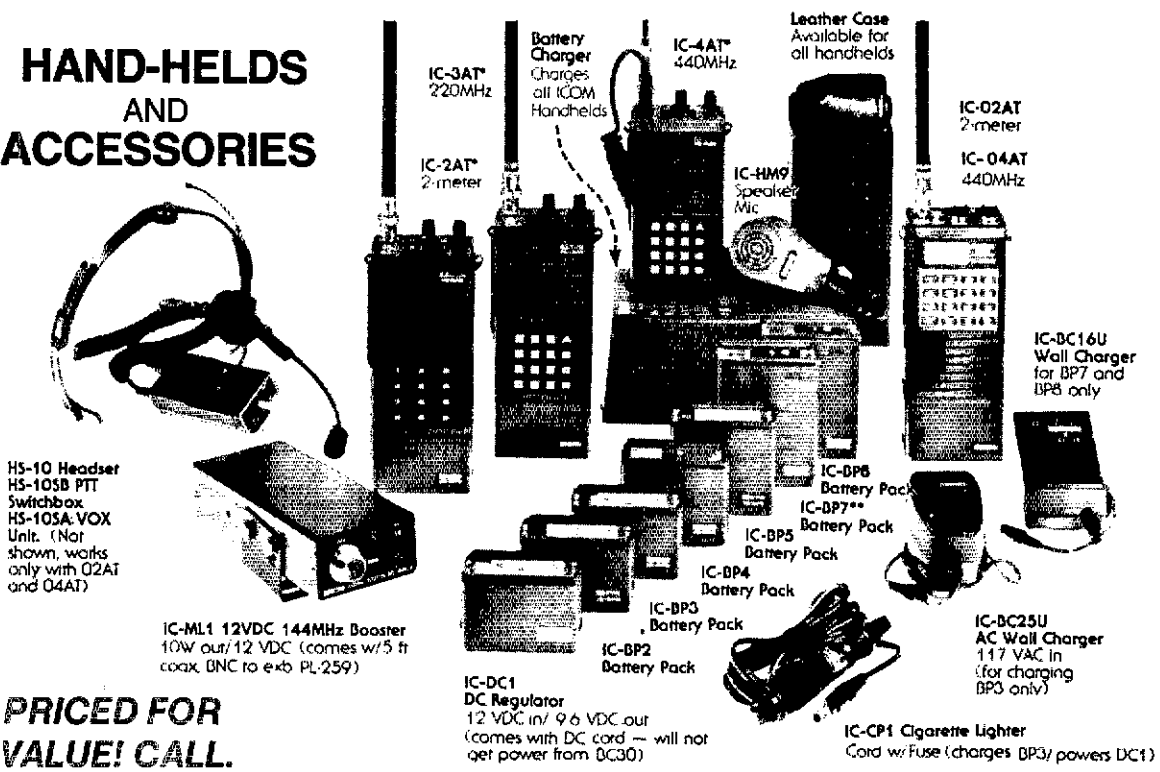
**YOUR
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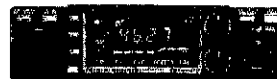


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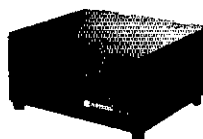
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RS20A	16	20	\$89
RS20M	16	20	\$109
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B215	2M	Yes	2W	150W	22A	\$269
B108	2M	Yes	10W	80W	10A	\$159
B1016	2M	Yes	10W	160W	20A	\$249
B3016	2M	Yes	30W	160W	17A	\$199
C22A	220	Yes	2W	20W	5A	\$89
C106	220	Yes	10W	60W	10A	\$179
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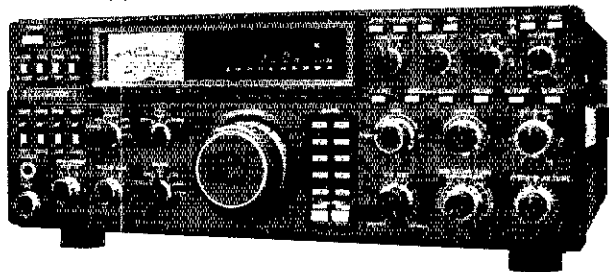
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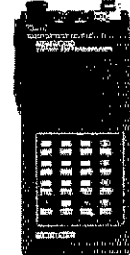


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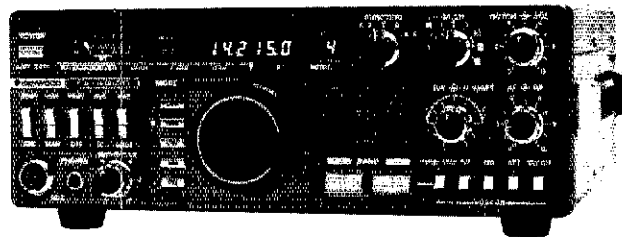
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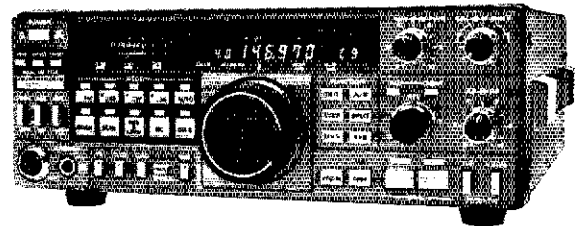
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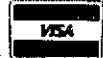
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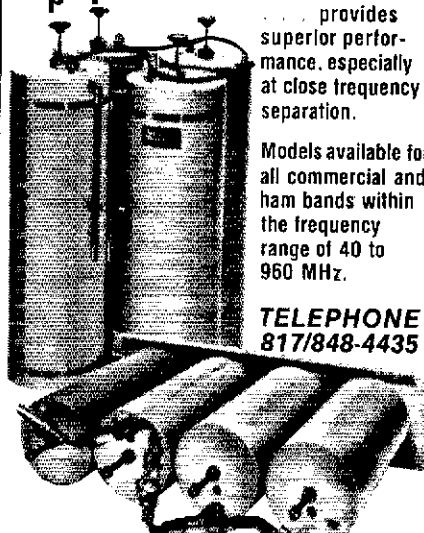
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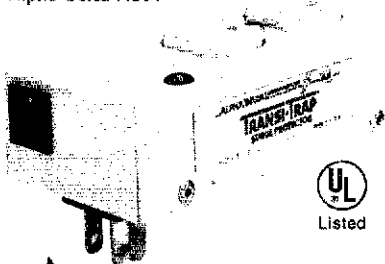
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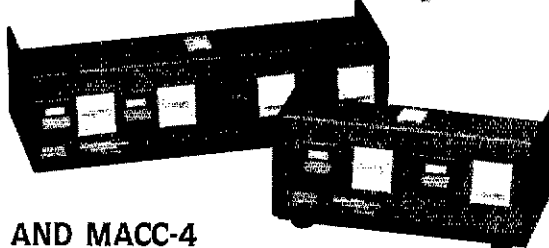
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Illinois was represented 94% by stations N6EAN K9AZS WA9HF K9BVE N9DR KA9FEZ K9GMZ KZ9I W9INZ KW9J KD9K WB9NVN W9NXG KA9PKG WB9RFB N9TN and KB9X. Illinois was represented 95% to D9RN by stations KA9FEZ W9HOT KW9J K9EHP K9AZS WB9NVN WB9ODN W9NXG W9HLX and WB9RFB. 9RN was represented 100% to CAND. Illinois stations were K9AZS K9EHP KA9FEZ KW9J WB9NVN and WD9IFF. Special congratulations to KW9J on her fantastic traffic total this month. Congrats also to the Illinois Phone Net who set a new record for both QNI and QTC. Platt County Radio Amateurs held their annual New Year's Day breakfast and had 54 people in attendance. The Sterling-Rock Fall Hamfest coming up on March 10th will be the club's Silver Anniversary Hamfest. HELP WANTED: The Illinois Section needs your help in finding a Technical Coordinator. Also, due to ever increasing time commitments related to the operation of the North East Illinois Emergency Net (NEIL), K9ZDN wishes to step down as Bulletin Manager. If you are interested in either of these section level appointments or know of someone you think would make a good TC or BM, please contact WD9EBQ. All I can promise from these jobs is some hard work and twice the salary the last you got! Traffic: KW9J 517, KA9FEZ 468, WA9HF X 356, W9NXG 308, K9EHP 991, WB9RFB 170, WB9RFV 170, W9HOT 174, KB9X 133, KB9K 125, WA9SHE 93, N9DR 69, W9JLJ 68, WD9BO 65, K9OEV 61, WD9IBH 56, KA9PKG 34, KA9BBV 27, KZ9I 24, K9HEZ 20, WB9TYD 17, KB9QX 16, W9LNQ 16, K9BED 16, WD9BBI 15, W9KPI 12, W9VEYIM 10, WA9RUM 10, WA9SID 9, N9ELU 8, W9RTD 7, WD9HCW 7, K9WMP 5.

INDIANA: SM: Bruce Woodward, W9UMH — SEC: WB9ZQE. STM: W9JUU. ACC: K9TUS. TC: K9PS. SGL: WA9VQO. OBC: KC9TA. PIC: K9DIY. SFC: N9WB. SHC: WA9FUD. SOOC: K9JG. NMs: ITN KD9DU, QIN K9J9, ICN KW9D, IRN KB9SU. VHF W9PMT, IWN KA9ERC.

Net	Freq.	Time (UCT)	Daily	QNI	QTC	QTR	Sess.
ITN	3910	1330/2130/2300	3485	733	3275	93	
QIN	3656	1430/0000/0300	740	710	2658	83	
ICN	3708	2315	139	73	816	30	
IRN	3629	0030	242	142	1054	31	
IWN	3910	1310	1876	0	408	31	
IWN	VHF	Bloomington	1091	0	317	31	
IWN	VHF	Kokomo	1076	0	227	31	

Hoozier VHF Nets for December. QNI 6588, QTC 234, Bulletins 69, QTR 6938 in 244 sessions for 27 nets. 9RN cycle four QNI 412, QTC 971, QTR 1647. IN 100% Stns: N9AEI W9CSJ W9EI N9HZ K9J9 W9JUU WA9OCF KA9SAD WB9YU K9WUJ. D9RN 1348 messages in 1621 minutes. IN 95% Stns: K9CGS W9JUU N9DWJ W9PRD KA9RNO K9EIV KB9NR KB9XE N9AEI. CAND 4261 messages in 31 sessions. 99RN 100% Stns: N9DWJ W9JUU KB9NR N9AEI KB9S. Appointments: Section Technical Coordinator: K9PFL. Silent Keys: WA9FXE Petersburg IN, WB9R Indianapolis, NC9B will help W9JZV with the Indianapolis Red Cross ARC training program. She's a winner KA9SVG new novice in Clinton County. I wish to thank W9PRD, KB9XE, and KA9RNO who helped again this year with the Christmas Greetings from the Greensburg Nursing homes. W9PRD's efforts were praised on Channel 8 TV Indianapolis. WA9RDF WB9OZZ WB9RCI KM9S WD9DWD N9DON N9DLN N9EKG KA9BTH WD9DVA W9MLN and others of the Mid-State ARC who helped with Christmas Greetings from the Indiana Masonic Home and the Methuen 681 Home in Franklin Indiana. Congratulations to WB9GJ chosen Ham of the Year by the Old Post ARC Vincennes IN. I certainly hope the Frequency Coordinators meeting sponsored by the Central, Great Lakes, and Ontario Canada Division Directors will be a success. It is a much needed first step. Indiana Section Repeater Coordinator is N9WB. Congratulations to the Tri-State ARS for their letter of commendation from Norm Carroll Meteorologist in charge National Weather Service Evansville, Indiana. Congratulations and welcome to the state's newest affiliated club, Mid-State ARC, president KA9COH, Greenwood, Indiana. Traffic: W9JUU 219, K9J9 511, KD9DU 290, WA9RDF 228, WA9SHE 219, N9AEI 215, WB9RT 209, WB9OZZ 183, WA9CJ 173, KB9HH 165, W9EI 159, WD9DWD 158, KA9FFO 125, WA9OKK 116, W9PRD 110, KA9RNO 104, KW9D 96, W9UEM 70, K9DFK 61, WD9ART 59, N9DYC 55, KA9EIV 45, W9UMH 45, K9ET 42, W9PMT 40, K9KTS 37, W9JZV 36, K9TKE 32, K9PS 31, WD9HH 26, WB9WJ 25, N9DHX 25, WB9IHR 24, KA9KRE 23, W9RTH 21, KA9LAU 20, K9FVN 17, KB9FF 16, KW9C 16, AB9A 15, KK9N 15, KB9NR 13, K9CGS 12, KD9ER 12, K9OUP 11, W9OZA 11, W9XD 10, WA9JNC 9, W9CM 8, W9EHY 8, K9DIY 7, W9ZGC 7, K9FV 6, K9SBW 6, W9DKP 5, WB9VP 5, WD9AGK 4, W9URS 4, WB9AJY 2, WB9DP 2, W9KMY 2, KB9DE 1, W9UJ 1.

WISCONSIN: SM, Richard R. Regent, K9GDF — SEC: W9CAK. STM: K9UTQ. ACC: K9BK. BM: KA9CPA. O9RFI: NC9G. PIC: K9ZT. SGL: AG9V. TC: K9GDF. The 1985 Wisconsin QSO Party is March 10th, see QST Contest Corral for details. If you can get on the air, please support Wisconsin Amateur Radio, contact others and give the contest a try. Our O9RFI changed his call from KA9IKR to NC9G, contact Art for information about becoming an Official Observer, an Auxiliary Monitoring station, or forming a Local RF Interference Committee. K9IZV and WA9CXG experiment with packet radio in Milwaukee. Anyone else in Wisconsin using packet radio? KA9GLA has beacon and mailbox RTTY on 145.00 MHz in Milwaukee. WA9A cherishes 1935 QST certificate when his call was W9RMO, bring back memories of the old traffic days (wait, I can't remember that far back). Traffic Training Assistants are available to give updated traffic handling programs at your club, with slides and free handouts; contact SIM K9UTQ for arrangements. West Allis RAC awarded WB9GZP as their 1984 member of year. W9BBC reports Stevens Point new repeater and antenna installation will improve coverage. KE9A returns to Sheboygan from African trip and DX operating. OM K99V, Don, and his XYL KA9RII, Lisa, are both active in traffic. New officers Cshkosh ARC: K9RDI, pres.; W9IWL, v.p.; N9CRD, sec.; WB9VKP, treas. Silent Keys: WA9DA, W9LDM and KB9FR. Wisconsin net can still use more net control stations, alternates and liaisons between nets. If you would like to help and get a beautiful certificate besides, check with the Net Managers listed below. PSHF to KC9CJ WB9CV WD9FRI WD9ID WD9DNC N9BDL AG9G KG9B WB9ESM KZ9V and KA9RII. BPL to KA9CPA KC9CJ and WA9WYS.

BWN 3984 6 A.M. WD9ID 1099-1296-25

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RM 20	20m mobile resonator (std)	14.00
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RM 30	30m mobile resonator (std)	15.25
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	40m mobile resonator (sup)	22.15
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HOT	Trunk mt w/wivel ball	15.80

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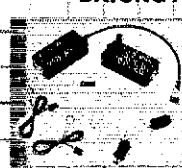
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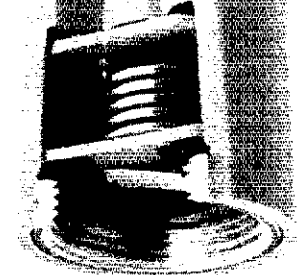
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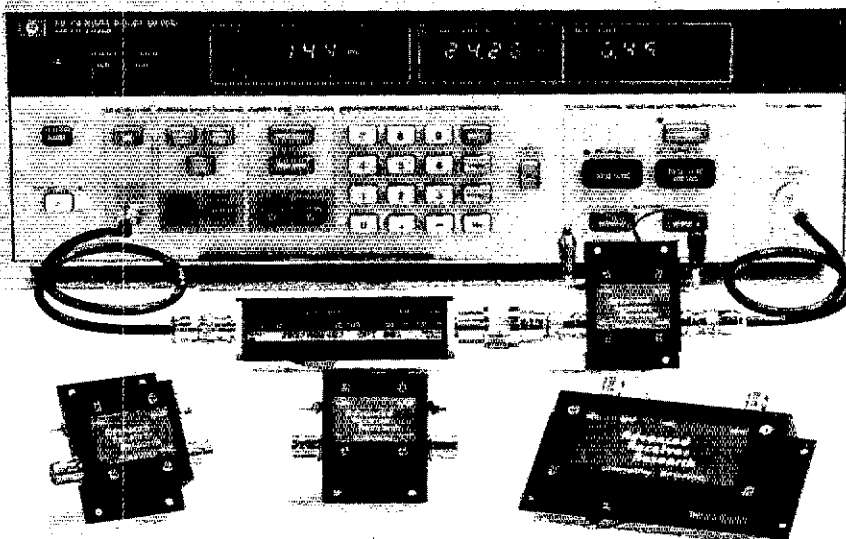
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SP144VDA	144-148	< 1.1	15	0	DGFET	\$67.95
SP144VDG	144-148	< 0.55	24	+12	GaAsFET	\$109.95
SP220VD	220-225	< 1.9	15	0	DGFET	\$59.95
SP220VDA	220-225	< 1.3	15	0	DGFET	\$67.95
SP220VDG	220-225	< 0.55	20	+12	GaAsFET	\$109.95
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 NWTN 34/84 6:30 P.M. W9JSF 425-97-31
 WCWTV 31/91 8:00 P.M. N9DHT 545-103-30
 Traffic: KA9CPA 2293, KC9CJ 660, WA9WYS 568, N9BGE 425, K9GDF 365, W9CBE 348, WD9ID 270, W9YCV 213, W9UCL 178, WD9FRI 184, KA9BHL 153, W9JSF 108, N9BDL 108, N9DHT 103, WB9ICH 97, KA9AKG 97, KG9B 86, WD9ND 84, KA9RH 84, W9LDO 80, KA9OBP 77, AG9G 76, WB9JSW 61, W9LTO 60, N9BCC 59, WB9ESM 56, WD9ND 55, KA9AFB 54, W9JCF 53, W9JHW 47, W9ODV 39, K9FHI 38, WB9NRK 32, W9FDY 31, KN9P 31, K9JPS 31, N9DCX 23, KA9BHK 20, W9UW 17, KB9FM 9, WB9RGE 9, KY9P 8, W9NGP 6, (Nov.) KC9CJ 218, KY9P 18, KV9U 9, (Oct.) KA9CPA 2071, W9CXY 222, W9YCV 206, K9GDF 204, WA9WYS 189, WD9ID 169, KC9CJ 164, W9CBE 141, KA9BHL 126, KA9OBP 113, W9UCL 99, N9BGE 98, WB9ESM 97, N9BDL 97, W9JEM 87, W9LDO 80, WB9ICH 79, K9UTQ 75, WD9ND 73, KA9AFB 71, K9FHI 65, N9DHT 52, WA9YVC 51, AG9G 49, KN9P 47, N9DCX 46, W9JFY 45, KG9B 45, N9EMD 42, KA9AKG 41, WA9ZTY 40, W9JHW 37, N9DCX 34, KB9FM 33, WD9NDQ 29, W9JSF 28, K9JPS 27, W9ODV 21, WB9JSW 17, WB9NRK 16, W9UW 14, KA9BHK 11, WB9RGE 10, KV9U 9, K29V 8, (Sept.) WD9FRI 73, N9DCX 28, KV9U 8, KA9NOT 5.

DAKOTA DIVISION

MINNESOTA: SM, George Frederickson, Jr., KC0T - SEC: KA9ARP. STM: KD0CI. I hope your holiday was as enjoyable as mine was! For our section, it was a banner month activity wise. The Handi Ham gathering at Fairbault was very enjoyable. The silent auction raised over \$2000 for the Courage Handi Ham System. The group also had an opportunity to meet our new SM KC0T. I had the privilege to address the group about nets and traffic handling. K9R also spoke to the gathering about current affairs in the Handi Ham System. KA9KWM informs me that the WB9HUJ rptir will soon be on the air from Blackduck on 147.87/27. It will fill a big coverage void in Northwestern Minnesota. KC0T has announced the appointment of N9BEI as Public Information Officer. Also, W9TIV will be serving as an Amateur Auxiliary Station, acting as liaison between ARRL and FCC. Congrats and good luck to both. Net News: Again this past month our section nets had to deal with terrible band conditions, especially in the evening hours. In spite of it all, we may have shattered all previous traffic totals for one month, with a total count of 11,911 pieces handled by the family hands reporting! For comparison's sake, December 1983 total was 8019. Thanks to all of you who helped in any way. KA9EPY will commence sending CW Bulletins on Friday evenings at 6 PM prior to the start of MSN/1. WB9WJ is still looking for an assistant NM for MSPN/1. WB9WJ informs me he will step down as Mgr of Piconet as soon as a replacement can be found. The liaison station list continues to grow however we need more! Any volunteers? I'm informed that the FCC is somewhat upset that VECs have not been properly reporting their exam activities. If your group is involved in the VEC program, be sure that ALL preparations are in order. Our regrets to the family and friends of W9FX who is a silent key. He was active on the 10/10 Int'l Net. In closing, a personal note: In listening around the band, a complaint I hear often is that some stations fail to ask if a frequency is in use before transmitting. Traffic handlers have been accused of this numerous times. I have directed that more traffic be handled on net frequency due to the crowded conditions. However, when or if you must QSY, make sure you QRZ the frequency before handling your traffic or whatever. At the same time, I hope our section amateurs not involved in our nets will extend to us the same courtesy and respect 3929 kHz or our other net frequencies. Mutual respect and good operating practice must be the rule rather than the exception in amateur radio.

Net	Freq.	Time	QNI	QTC	Sess.
MSN/1	3685	6:30P	300	158	31
MSN/2	3685	10:00P	212	51	31
MSSN	3710	6:00P	172	36	30
MSSN	3685	8:00P	10	1	5*
MSPN/N	3929	12:05P	727	215	31
MSPN/E	3929	5:30P	1167	329	31
MNAMWXNT	3929	6:15P	292	191	19
PICONET	3925	9:00A	3773	376	29*

(*Net report partial) Traffic: KB9M 783, KA9ARR 610, W9EFC 459, KA9EPY 459, N9DNL 330, W9DM 227, W9EHI 226, W9HZU 200, N9CVD 111, KD0CI 97, K9J 93, KZ9H 75, W9KYG 68, W9UCE 62, KC0T, KA9ODQ 55, WD9CGM 51, N9JIP 51, WD9GUF 44, K9R 44, KC9CE 34, WA9ONE 32, KN9U 26, KA9BFP 25, N9BEI 28, N9IX 20, KC9NL 19, KB9CD 17, WD9BGS 15, WB9UKI 9, KB9WV 9, N9EWA 7, WB9JUL 7, KA9AJF 6, K20GI 5.

NORTH DAKOTA: SM, Joe Gregg, KN9A - The RRRA in Fargo is working closely with the Min-Kota chapter of the American Red Cross, especially this winter, providing radio communications from the Red Cross building, the Emergency Operating Center and the various shelters in the Fargo area during severe winter storms. Also, the RRRA is planning a Ham Radio and Electronics Hobby event on March 3. Bring your kids to the hobby net activity was up this month with holiday traffic. DATA net shows 29 sessions, with 340 check-ins, and 47 pieces of traffic handled; Goose River net had 5 sessions, 101 check-ins and 3 pieces of traffic; and the North Forty met 5 times, with 46 check-ins.

SOUTH DAKOTA: SM, Fredric J. Stephan, KC0OO - It is always encouraging to receive reports and news of area and section activities including club and individual operations. December was an especially good month in that regard. Also, constructive comments both pro and con keep rolling in concerning traffic and traffic handling ideas. Not only in relation to the comments made by our area hams that were printed in this monthly space, but comments about additional traffic handling ideas. If you have strong thoughts about anything, be sure to let me know. As far as NTS and DTEN are involved, once all of your ideas and comments are all sent in to the, the STM and SM will pass those suggestions along (without mentioning any names), along with our own suggestions as so-called section leadership types, to the appropriate NTS folks. Net reports this month of December are in from the SDEN, the BCN, the BHN, the Walworth Co. Emergency net, the NJQ net, DTEN, CAND, and even from S9JN. Individual station reports came from N9BD, WB9BOM, WA9URE, W9YMB, W9RWE, KA9IE, W5KLV, KA9KPY, W9HJ, WA9FUZ, N9ABE and W9EDV among others. Net, club and other individual and group news continues to be continued until next month due to lack of space. Best of DX.

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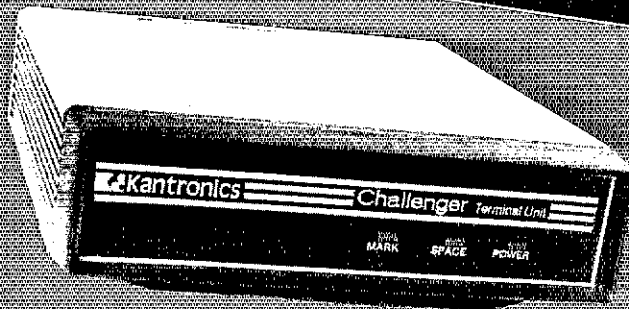
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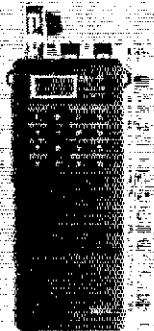
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DELTA DIVISION

ARKANSAS: SM, Joel M. Harrison, WB5IGF — SEC: N5BPU, STM: AE5L, TC: W5FD, ACC: AD5M, PIO: K5DW, SGL: W5LQI, Repeater Coordinator: WB5FDP. Don't miss the Ark Hamfest and ARRL State Convention April 13 & 14. Contact WB5RXU for more details. 1985 ADXA officers: AF5M Pres, W5LQN V.P., KD5ZM Sec/Treas. If you haven't paid your 1985 dues, contact KD5ZM. VEC exams are going very well in Ark. W5HH reports 79% pass rate at the January session in Russellville. Exams for all classes will be given at the hamfest in April, contact W5FD. Congratulations to newly elected Ark QCWA board members N5BK W5MYZ W5YGX W5UAU. Current board members are W4AZJ W5LKU & N5DDI. Tune into 3907 kHz each Sunday at 1 P.M. for the latest chapter 90 QCWA news. Looking forward to seeing each of you at the hamfest.

LOUISIANA: SM, John "Wondy" Wondergem, K5KR — SEC: KA5PFB, ACC: K5DPG, SGL: KD5SL, TC: N5JM, QORF: WB5TPG, Springhill ARC election; Pres, WD5BCY, VP, KA6QIS, Sec./Treas, N5II, Mike, W5ZPA, received the first CEBA-A expedition QSL card sent to the States. It put him on the DXCC Honor Roll in just seven years. How about that for a DXer? Kevin, KA5FB is back permanently at Lake Charles as our SEC. If you can spare a few hours a month by participating in the Amateur Radio Emergency Service write to the Section Emergency Coordinator or check in with N5ADF on the La. Emergency Net at 8 PM Mondays at 3910 kHz. The long 75 meter skip during low sun spots is making the 160 meter band ideal for in-state communications. In the past few months several commercial activities have applied to FCC for primary use in segments of this band. If you are concerned over amateur band encroachment write to the FCC supporting exclusive use for the entire band. Baton Rouge ARC election: Pres, Chris, W5ISS, VP, Milton, KA5JPH, Sec. Barbara, K5MOL, Treas. Mark N5EGA. The Baton Rouge Hamfest will be on May 11 at the usual location. Hope to meet everyone there. Traffic: K5WOD 43, WA5TQA 38, K5ANH 22, WA4MUW 22, (Nov.) W5GHP 334, K5TL 81, K5PFP 53, K5WOD 32, K5ANH 27.

MISSISSIPPI: SM, Paul Kemp, KW5T — STM: KB5W, SEC: N5DDV, VHF COORD: NF5Q. New appointments: ACC, KC5VD, TC: WB5SXK. Still need SGL which will fill all available openings in the basic structure of the MS Section. New Club officers for Laurel ARC: Pres: K5MOH, VP: W5VKR, Sect: KA5TRK. Tnx to the Laurel ARC for their hospitality at their December meeting. MSN new manager N5HGN. Thanks for fine job to outgoing manager KD5TY. Upcoming Hamfest: Jackson on Apr. 20 & 21. There will be Volunteer exams for all classes given. For info on the Hamfest, get in touch with N5PSK. Hope everyone took the opportunity to cast their opinion on the card included in the Jan. QST. CAND (W5KLV) sess 31 QTC 4281, DRN5 (WB5YDD) sess 62 QTC 1635, MTN (K5OAF) sess 31 QNI 139, QTC 47, MSBN (KW5T) sess 31, QNI 2363, QTC 142, GCSBN (W5JHS) sess 31, QNI 1125, QTC 23, MMN (WB5RMW) sess 29, QNI 585, QTC 5, MLEN (N5GDV) sess 5, QNI 68, QTC 0, CAEN (NF5Q) sess 5, QNI 110, QTC 5. Traffic: N5AMK 1017, K5OAF 580, KT5Z 221, W5WZ 84, W5L5G 30, KW5T 21.

TENNESSEE: SM, John C. Brown, NO4Q — ASM & ACC: WA4GLS, QORF: W9FZW, PIO: WK4V, SEC: WA4GZQ, SGL: WA4SZT, STM: NG4J, TC: W4HHK. It is expected that each amateur will have a copy or good reference of FCC Rules, Part 97, in their files. ARRL has just come out with the 3rd edition of their book, "The FCC Rule Book." I have been advised that it is good enough that some of the FCC officials even are taking it along to use in the field. Also the 80th edition of "The Radio Amateur's License Manual" contains not only the questions for all classes but the correct answers. The new hamfest season is here and dates should be sent to the SM for scheduling purposes. There seems to be some confusion as to what are the major holidays when the Tennessee phone net is on the late schedule. The major holidays are New Year, July 4th, Thanksgiving and Christmas. All net schedules maintain normal schedules. The early morning phone net meets Monday thru Friday only, regular morning phone nets at 0800 central clock time on Saturday, Sunday and the major holidays mentioned above. All other nets at the scheduled time, unless the STM and the manager decide otherwise. It seems that many of the member clubs of the Tennessee Council of Amateur Radio Clubs are not sending a representative station to meet with the Sunday Evening session of the net. It should also be mentioned that your club does not have to be a member of the Council but it is highly recommended that your club consider the benefits and objectives. The section activity for this period is as follows: Low frequency sessions-77, QNI-4431, QTC-138; VHF sessions-103, QNI-1903, QTC-527, CW sessions-51, QNI-258, QTC-139; RTTY sessions-28, QNI-253, QTC-18. K9WV was awarded the CW NET Honor Roll certificate this time. Traffic: NG4J 478, W4DDK 280, KA4RSC 220, K4WWQ 203, K4WOP 138, W9FZW 126, W4TYV 75, NN4S 72, KE4LS 83, W3HET 30, W4MRD 30, K4UMW 28, W4PPP 26, W4TYU 24, WA4HKU 15, N4KQX 14, W4E 12, WB4YPO 11, K4JGW 10, WD4GYT 8, W4EVR 7, KB4UQ 6, W4PSN 6, AD4F 2. (Nov.) W3HET 11.

GREAT LAKES DIVISION

KENTUCKY: SM, Ann Jackson, KA4GFU — Rosie Peroful, KA4SAA, has been designated Interim Section Manager due to Ann's resignation just before the end of her term of office. Rosie will serve until an election can be held, probably in June. VECs: notify KA4BCM of all test dates for 1985 for maximum publicity. ECs: send WA44AV your Earthquake Jump Team lists. **DECEMBER NET REPORTS:** MKPN 1457 257, KTN 1427 148, KYN 113 45, KNTN 273 106, KYPON 73 14, CARN 106 14, MTEN 71 44, NKARC 54, PAWN 46 0, TSTMN 637 123, WTEN 42 6, 3ARES 43 6, 7ARES 34 4, 1ARES 49 11. Traffic: WA4JTE 981, KA4BCM 131, WD4BSC 131, KA4SAA 122, WD4YI 101, K4MHL 86, KB4OZ 75, KA4SKV 49, WA4SVF 44, W4WCV 39, WD4YH 35, KA4MTX 29, WD4IXS 27, WA4MXD 27, N4JLT 25, WA4SAC 25, WA4AVV 24, K4HCE 17, WD4PFB 16, KA4GBZ 13, WD4CQF 11, WA4YFQ 7, KA4YIV 4.

MICHIGAN: SM, James R. Seeley, W88MTD — ASM: WA8DHB, SEC: WB8BGY, STM: WD8RHU, ACC: K8SB, PIO: CK8K, SGL: N8CNY, TC: W8YZ, BM: KZ8V.

Net	Freq	Time	QNI	Tic	Sess.	Mgr.
MITN*	3953	1900	626	434	30	WD8EIB
QMN*	3663	1800**	1054	391	89	W8LUE
MACS*	3953	1100*	567	380	31	K8LNE
UPN*	3922	1700	1168	186	36	WA8DHB
160	1950	2000	472	94	31	WB8EMV
WSSBN	3935	1900	926	48	31	WB8EYM
GLETN	3932	2100	99	14	7	WB8AXI
MNN*	3722	1930**	—	—	—	KA8TPX
VHF nets	14	rpts	—	—	—	WB8CUP

*NTS nets. Times local. **OMN late, 2200; MNN late, 2000;

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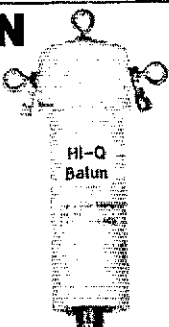
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MACS AU, 1300 AES net, Su, 3932, 1730. ARRVI Info Net/Traffic Workshop, Su, 3953, 1600, 3932 is MI HF emer. I own several very large apologies for my loose and inadequate reporting on the 1984 MI QSO Party (QST Dec. '84). I have no idea what happened except that some extra words creep in and some of the sparse info given was incorrect. LCARC scored 102,301 points, not the 75k that I reported. Impressive, yes; decisive, hardly, not against top scorer (for the third straight year) Eastern Michigan ARC at 515,922 points. WABQAF's 39k was nice, but just fifth, behind top-scoring single-op ADRR at 96,050, followed by KN8P, NBERV and ACBW. NAII was top multi-op with 74,715 points. And, yes, I know that the MI QSO party is sponsored every year by the Oak Park ARC, not by LCARC. (I have even, in better years, given Oak Park credit and plaudits, alas!) All in all, I'd have been better off not mentioning the event this year. Yes, what an awful way to find out that folks really read this column. Thanks to AC8W for sending the full results, and to the many who sent me protests in varying degrees of intensity, but invariably in a gentlemanly way. Three BPL's for Dec., with special congrats to KA8QVH on his first one ever. Please note in the net listings the 1168 QNI for the UPN. This is a new record, topping the old mark of 1152 that has stood since Jan. '78. These are impressive figures all by themselves, but when you consider the size of our U.P., the sparseness of it's population, the relatively few hams up there, the whole thing becomes truly remarkable. On the other end of the scale, condolences are in order for GLETN. Winter conditions compounded by the sunspot nadir have conspired to produce what has to be (I'm admittedly guessing here) an all-time low for this fine old independent net. Traffic: KA8PCS 1045, KA8QVH 693, W8QHE 512, WD8KQC 268, WA8YMH 223, WD8MJB 175, WB8YZ 175, W8CUD 144, K8EOQ 124, WA8DHB 113, K8GXV 107, WD8OJU 100, WD8RHU 89, WB8MTD 68, WB8SYA 61, N8EBG 60, WD8EB 60, N8CNY 57, W8SCV 62, K8OCP 50, K8IPE 48, K8HAP 45, WB8VZ 32, WB8YQ 28, WB8WJV 25, WB8HJ 21, K8JKU 21, WB8Y 18, K8QC 16, KA8PQH 13, WB8HNS 6, W8URM 5, N8EBN 2.

OHIO: SM, Jeffrey A. Maass, K8ND — ASM: KF8J, SEC: KBAN, STM: W8DMZZ, ACC: K8JUS, BM: W8ZM, TC: K8BAM, OO/Rf: AD8I, PIC & SGL: N8CVJ.

Net	QNI	Sess.	Time (Local)	Freq.
ENE	385	316	1845,2200	3.577
BNR	339	253	1800	3.605
BSSN	427	486	1915	3.885
ONN	136	24	1830	3.708
OSN	371	193	1810	3.577
OSSBN	2637	1911	1030, 1615, & 1845	3.9725
OSSN	229	148	0645	3.577
O6MN	201	17	2100	50.16

Two hamfests this month, Toledo/Maumee March 17 and Madison on March 31. At the Dayton Hamvention in April, expect to see a neat flea market. Hara Arena has added blacktopped areas and there will be 1500 spaces available, none to the mud! There will be a meeting at the Dayton Hamvention of groups and individuals sponsoring volunteer exams, in order to discuss coordination of testing dates and common problems and solutions. Contact KG8P for details. The Telephone Radio Amateur Pioneer Society (TRAPS) in the Dayton area used color Amateur TV to allow handicapped children in Xenia to see and talk to Santa at the North Pole. The DARA ATV repeater was used to connect the two sites used. DARA is looking for other innovative uses for their ATV capability. Congratulations! The Canton ARC is forming a committee to assist the new licensees in getting on-the-air, to answer questions, etc. How about your club? The Delaware ARC's new officers for 1985 are: President N8DSJ, VP N8DFZ, and Secretary/Treasurer W8NHHJ. The ARRL packet radio publication "Gateway" reports tremendous activity on both coasts: what is happening in Ohio? Bob, K3RC, keeps a current list of examination dates for the state of Ohio. If you would like the latest list, send Bob an SASE at his Callbook address. W8BKQ reports that the Central Ohio ARES membership gave 9000 man-hours of volunteer public service in 1984! Contact your EC and acknowledge your responsibility in 1985! If you don't know who the EC is, KBAN would be happy to tell you; just drop him a note. Try a traffic net: their times and frequencies are listed above.

Local Nets QNI QTC Sessions

ALERT	58	23	4
BRTN	264	235	30
COTN	349	283	30
DAEN	86	4	14
LCNWO/ARES	333	154	25
MASER	120	13	6
Medina County	354	70	31
NCTW	24	22	6
NEON	141	36	23
RARA	52	15	4
Tristate	272	414	31
TSRAC	992	79	37
VWCEN	50	5	5
WCTN	279	65	31

Traffic: W8BMO 769, W8BKF 872, K8BKY 671, N8BX 536, W8BMMZ 495, W8QZK 370, K8OZ 350, K8JDI 342, W8BGMT 304, W8BKVV 298, W8DRIB 295, W8BMEK 286, W8BHG 273, KA8GJ 268, W8BJJ 263, N8FCQ 261, K8ND 247, K8BQ 204, W8SKP 192, N8AKS 185, KA8CQF 163, N8CV 151, KA8KHS 147, N8EFB 139, W8BSS 134, K8R 128, KA8SSA 126, KA8ICB 125, N8AHE 116, K8R 109, W8BDMF 108, W8BKH 100, W8BFRG 98, K8TVG 95, W8CVM 91, N8DSS 85, W8BHM 83, K8CMR 77, W8BKG 74, W8BHF 72, K8QVY 71, W8BKW 70, N8FNP 69, K8DFV 68, K8EF 60, N8EVC 59, N2NS 47, K8CWH 45, W8RG 44, K8DL, 43, N8P 42, K8AN 41, K8CKY 36, N8JP 35, KA8GGZ 34, N8CQ 33, W8AHD 30, W8BRSM 29, W8DCSP 28, W8DNB 25, N8CJS 24, W8RFS 23, K8EM 21, W8FUP 21, W8BML 21, K8BJ 20, K8LQM 20, W8BNHV 20, W8ZM 19, W8BTR 18, W8BHL 17, W8DFY 14, N8CQM 13, W8IQ 12, N8EJK 10, K8DZ 9, K8LQM 9, N8AJU 8, KA8MF 4, W8BSE 3, K8MFG 3, (NOV.) W8PMU 439, K8J 128, W8BDMF 68, K8BBA 44, K8DL 28.

HUDSON DIVISION
 EASTERN NEW YORK: SM, Paul S. Vydatery, WB2VUK — STM: W8ZMM, SEC: AK2E, AC & SC: N2BFG, BM: W8ZAG, SGL: K8ZHO, TC: KC2ZD, Newsletter, Edit.: W8MAZ, ASM: K2ZM, Net reports: AEN QNI 59, QTC 10, GDN QNI 718, QTC 148; EPN QNI 125, QTC 83; ESS QNI 434, QTC 91; NYPON QNI 854, QTC 802; NYS/M QNI 400 QTC 388; NYS/E QNI 468, QTC 440; NYS/L QNI 351, QTC 272; SDN QNI 297, QTC 206. Club news: ALBANY ARA has elected new officers: Pres-KB2CP, VP-W82BEJ, Sec-KA2SOL, Treas-WA2GY, Dir-W2OJ, W82PUB, Ed Mem-W2XM, W2APGI, Upgrade-KA2VW, New member WA2GKW, CDR elected new officers: Pres-K2LD, VP-K2LV, Sec-W2XJ, Treas-W2JG, Sgl. at W2MS, N2AXS, Novice dir-W2SC, Dir-KAZELI N2AYC WA2MZJ, Orange

City ARC has new officers: Pres-WB2EA, VP-N2BBY, Treas-K2JL, Sec-WA1WTG, Act. Mgr-N2BOK, Will run Special Events Station to commemorate return of Iranian hostages. WARA had KN2X speak on American vs. foreign amateur products. WEGA had W2RP speak on propagation. Congrats to KA2MSL, new EC for Orange Cty. Thanks to all who attended ENY Staff meeting in Kingston and to W2XL for provided location to hold meeting. N2BFG is trying to provide sked of all VE exams - if your group is giving exams, get the info to him. Dec. BPL: W82EAG KC2TF WA2YBM, Dec. PSIR: WB2KCR WB2EAG WB2MCO KC2TF W2PKY WB2ZM WA2JBC KA2MYJ WB2VUK WA8MAM W2BWI K2HM WB2EAG 852, KC2TF WA2ZBO W2MCO 38D, K2ZM 38D, K2ZD 270, W2PKY 213, WB2VUK 211, W2BZKCR 172, WA2YBM 140, WB2ZCM 114, W8BAM 110, K2HNW 92, W2BWB 73, K2ZVI 72, N2AWI 71, KA2MYJ 63, KA2AQZ 62, WA2ZBO 62, N2BFG 41, KA2OPG 32, AK2E 28, W2VCJ 21.

NEW YORK CITY - LONG ISLAND: SM, John H. Smales, K2IZ — SEC: KA2RGL, ACC/ASM: WB2AP, OO/Rf: NB2T, TC: W2JUP, PIO: W2VJY, STM: WA2ARA. The following are traffic nets in and around the section:
 NLI CW* 3630 kHz 1900/2200 N2AKZ mgr
 NCVHF 6.145/745 1930 m-f K2MT
 BAVHF 6.07/87 2000 m-f WB2ENA
 SCVHF 4.77/5.37 2000 m-f W2ZD
 ESS 3590 kHz 1800 m-f W2US
 NYS/M 3877 kHz 1000 WB2EAG
 NYS 3877 kHz 1900/2200 WB2EAG

*Denotes section net, all times are local, please try and help out by checking in whenever possible. WB2AP announces that LIMARC will be conducting license exams the 2nd Sat. of Mar., April, May and June at New York Inst. of Tech., Northern Blvd., Greenvale, from 9 A.M. to 2 P.M., contact Bob, WB2DIN at 221-8116 for further info and details. If your club or group is planning to hold a license exam please let Woody, WB2AP, know so we can pass the info around. Officers for LIMARC are: K2LI Pres., W2ZFBQ VP, W2BKWC Treas., W2AKXE Sec., New Directors are: K2YEV, K2UDI, W2B2WAK. The Westagh ARC Novice class has graduated 3 new Novices, their calls will be published when the info becomes available. WA2UWF has resigned as DEC Eastern Suffolk, I wish to thank Dee for the work and time she devoted to the job and that she will be missed. NB2T is still looking for anyone interested in becoming an OO, if you have already passed the exam from the ARRL, you must send your monthly reports to NB2T. Metroplex makes on-the-air announcements on locations for testing. Thurs. at 2030 local only, freqs. are 145.45, 443.95, the Metroplex computer on 1.45.50 simplex. Officers for Grumman ARC are: WB2VE Pres., KC2DH VP, WB2QDT Sec., W2MFN Treas. Board members W2IVA K2DOD W2ZZE, KA1NH moved to Windsor Ct. now he doesn't have to try and explain why and how he got a 1-land call in 2-land. Best of luck, Harry, Officers for Larkfield ARC are: W2GLE Pres., K2YEV VP, K2DAS Sec., WB2JFG Treas., Trustee's WA2TSN WB2GUB W2AZA K2KE. I would like to ask everyone reading this column to try and get at least one new person into ham radio this year. Our ranks are starting to decline, why not share this interesting hobby of ours with someone new. Traffic: K2YQI 357, K2YQI 216, W2DBQ 98, W2GKZ 64, (Nov.) W2DBO 88, W2GKZ 78.

NORTHERN NEW JERSEY: SM, Robert Neukom, K2ZWI — SEC: WB2UJF, SGL: W2ZD, BM: Vacant, RC: W2CC, SGL: WB2G, PIO: WB2NQC, TC: AB7I, AC/Sec: KK2U KY2S, NMs: W2CX, K8ZHM WB2RMI WB2ANK WB2PKB WB2QMP N2XJ, W2PSU.

Net	Freq.	Time	Sess.	QNI	QSP
NJM	3695	1000 Dy	31	283	213
NJPN	3950	1800 Dy	36	409	194
		0900 Su			
NJSN	3735	1830 Dy	31	300	84
NJNE	3695	1900 Dy	31	292	256
OB TTN	147.12	2000 Dy	31	336	293
TCETN	147.255	1900 Dy	LATE		126
NJNL	3695	2200 Dy		213	226
NJRTTY	147.51	Autostart	31	372	500
	49/49	2230	30	312	253

Carl Feit, N2XJ, Secty of OCWA, advises that an Interclub group has pooled its VEs and formed the NNJ VE Board. Plans call for MONTHLY Ham Exam test sessions. The first two dates are: March 16 and April 13 at the Police Chief's Training Academy, Union College, 1033 Springfield Avenue, Cranford, NJ 07016. Plans generally call for sessions on second Saturdays of each month from 8:30 AM to 10 PM for balance of year. The exam site may vary, the groups/clubs involved are: Morris Radio Club, Irvington (IRAC), CARB, Tri-County (TCRC), New Providence ARC, Split-Rock & Greenbrook, etc. Team contact this year. There N2XJ will see the new VE Team contact this year. There 147 VE members of the Board. Persons interested in further info may contact N2XJ by tone or mail. SASEs will be appreciated: Carl Feit, N2XJ, 8 Charles Pl., Chatham, NJ 07928, (201) 635-7688, W2NKD reports K2DAG working DX with new YET 3-L tribander. Tri-County Radio Assn. will celebrate 50th anniversary in April with a Special Events Station. K2ONE is chairman of Greenbrook Repeater Valentine Dinner-Dance on Feb. 22nd with W2EMM as MC. W2NR & N2ZR working diligently in VEC program. KA2DAU upgraded to Advanced. RAARFQ MOUNTAIN ARC reports that classes for Novices, Techs and Generals wishing to upgrade are being held every Wednesday evening from 7:00 to 9:00 at Our Lady of Perpetual Help Church, Room 107, Franklin Avenue near High Mountain Road, Oakland, NJ. The Ramapo Computer Net meets Thursday evenings at 8:30 PM on the 49 machine. THE PROPAGATOR of the Garden State ARC reports the Treasure Island Special Event station for 1984 was a great success under the guidance of KN2B. The W2GSA gang report they have new jackets. BARA reports the first exam will be held Friday, February 1st at 8 PM at the #1 Firehouse in Fairview with talk-in on the 79 machine. The 2nd exam will be same place on Saturday, March 2nd at 10 AM. All WA2IYL will give a talk at the February meeting working OSCAR. A videotape will be shown of him working OSCAR. Traffic: K2MFF 689, K2BHM 591, N2XJ 515, KA2F 387, AG2R 325, K2PSU 250, K2ZPH 249, K2XV 117, W2RRR 83, W2XD 60, WB2QMP 57, W2VY 54, W2UJ 47, KD2BE 30, W2CZ 23, W2NKD 12.

MIDWEST DIVISION
 IOWA: SM, Bob McCaffrey, K6CY — SEC: WA4VWV, STM: K6BX, ACC: W8BQM, BM: K6HIF, TC: K6DAS, PIO: K6BZF, SGL: AK6Q. Nominations are being accepted for your nominations of the IOWA VE TEAM FOR THE YEAR. Nominate a ham that you think typifies the quality and integrity of the Iowa Ham. Novice classes beginning in Des Moines and Waterloo. New ATV Rptr in Cedar Rapids. Logo contest in Waterloo. Congrats to upgrades KA2QTV KA6POT KA6MKV. The Second Annual State ARRL Con-

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2 - 16 Gauge	2 - 12 Gauge	2 - 12 Gauge	2 - 12 Gauge	2 - 12 Gauge
3 - 12 Gauge	3 - 18 Gauge	3 - 18 Gauge	3 - 18 Gauge	3 - 18 Gauge
4 - 20 Gauge	4 - 20 Gauge	4 - 20 Gauge	4 - 20 Gauge	4 - 20 Gauge
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5 - 22 Gauge Shielded plus Tinned Copper Drain Wire	6 - 22 Gauge Shielded plus Tinned Copper Drain Wire	7 - 22 Gauge Shielded plus Tinned Copper Drain Wire	8 - 22 Gauge Shielded plus Tinned Copper Drain Wire	9 - 22 Gauge Shielded plus Tinned Copper Drain Wire

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	3.68 dB/100 ft. @ 1000 MHz	\$1.25/ft.
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	2.54 dB/100 ft. @ 1000 MHz	\$3.25/ft.

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1/2 inch loss	.38 dB/100 ft. @ 30 MHz	
	(FLC12-50J) 2.78 dB/100 ft. @ 1000 MHz	\$1.59/ft.
7/8 inch loss	.13 dB/100 ft. @ 30 MHz	
	(FLC12-78J) 1.3 dB/100 ft. @ 1000 MHz	\$3.92/ft.

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	8.5 dB/100 @ 1000 MHz	

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RG-62A/U 96% shield mil spec 93 ohm	12¢/ft.
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RG-58U 95% shield	10¢/ft.
RG-59/U 100% foil shield TV type	10¢/ft.
RG-59/U 70% copper shield	09¢/ft.
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Rotor cable 2-18 ga 6-22 ga Poly burial Jkt.	19¢/ft.

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UG-255 (PL-259 to BNC)	\$2.95
Elbow (M359) UHF Elbow	\$1.79
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UG 273 BNC-PL259 Amphenol	\$3.00
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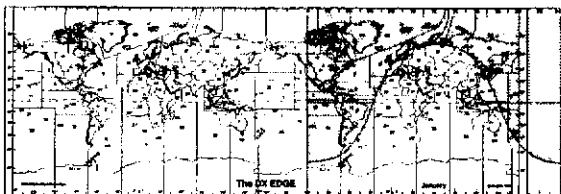
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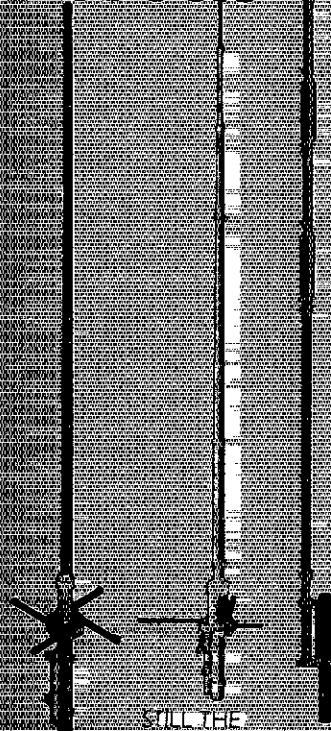
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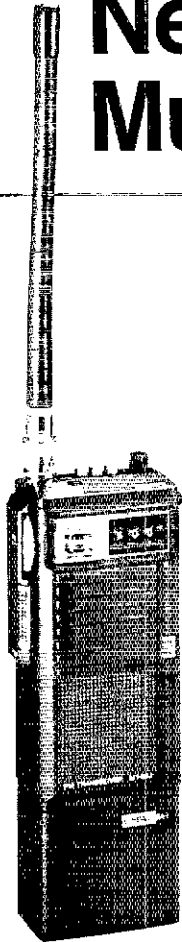
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New 2 Meter FM Multipurpose Transceiver



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MT-20A with LA-20 Linear Amplifier and Nicad Battery
- 20W Mobile
MT-20A with LA-20 Linear Amplifier and Vehicle 13VDC
- 20W Base Station
MT-20A with LA-20 Linear Amplifier and DC Power Supply
- Hi/Low 1.5/150 mW Hand Held MT-20A
(With BA-2 Nicad Rechargeable Battery Unit)
- 1.5W Mobile MT-20A with SD-1 Adapter using car battery

The new MT-20A multipurpose transceiver can be used as a 10W portable unit with carrying case, LA-20 Linear-Amplifier and Rechargeable Battery.

Easy-to-read thumbwheel digital switches and a 5 kHz increment switch provide complete coverage of the 2 meter band in 5 kHz steps.

Output power can be switched from 1.5 W (Hi) to 150 mW (Low), and built-in circuitry provides repeater operation when desired.

High grade MOSFET devices and selected monolithic crystal filters help assure optimum receiver performance.



MULTIPURPOSE TRANSCEIVER

The hand held transceiver can be used as a microphone and control unit for mobile operation;

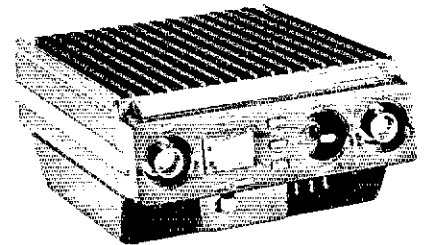
- Remove battery unit.
- Plug into vehicle cigarette lighter through SD-1 adapter.
- Use hand held unit for all transceiver functions... microphone...speaker...thumbwheel frequency selector...built-in S-Meter.

For base operation, use with SD-1 adapter or LA-20 Linear Amplifier. When used with SD-1 adapter the MT-20A transceiver can be operated with any linear amplifier.

MT-20A SPECIFICATIONS

- General**
- Frequency : 144-148 MHz in 5 kHz steps
 - Emission type : (FM)
 - RF output impedance: 50ohm unbalanced (BNC socket)
 - Power source : 8.4V DC (5.5-11V DC)
 - Grounding : Negative
 - Current drain : 150mA Max. on reception
25mA on reception with no input signal
550mA Max. on transmission
- Operating temperature** : -10°C ~ +60°C
- Dimensions/weight** : Main unit (without battery pack)
118mm(H) x 60mm(W) x 38mm(D)/250g
Battery pack (Model BA-2)
40mm(H) x 60mm(W) x 33mm(D)/120g
- Semi-conductors** : Transistors 30
FET 4
IC 6
Diode 28
- Repeater device** : Built-in
: - 600kHz transmit down shift switch
: + 600kHz transmit up shift switch
- Illuminated Dial**

- Receiver Circuitry** : Double-conversion Superheterodyne
- Intermediate frequency** : 1st IF—10.695MHz
2nd IF—455kHz
- Sensitivity** : Better than 1µV for 30dB S/N
- Selectivity** : Greater than ± 7.5kHz/ -6dB
Greater than ± 15kHz/ -60dB
- Image rejection** : Better than -60dB
- Audio output** : 200mW (8 ohms)
- Transmitter RF output power** : High 1.5W Low 150mW
Rugged 2SC1947, used
- Modulation** : Variable reactance frequency modulation
- Frequency deviation** : ± 5kHz
- Spurious emission** : Better than -60dB
- Microphone** : Electret condenser Microphone, built-in (impedance 2K ohm)

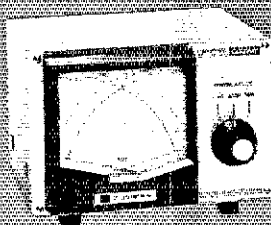


The new LA-20 2 meter linear amplifier provides 20 W (at 13.8 VDC) of stable transmitting power using high performance transistors.

LA-20 SPECIFICATIONS

- General**
- RF output power : 20W (13.8V DC - 1.5W input)
10W (9.6V DC or Nicad - 1.5W input)
Rugged 2SC1946A, used
 - Power source : 13.8V DC—DC power supply
9.6V DC—Nicad battery, Model BA-4/BA-5 (Optional)
 - Dimensions/weight : 53mm(H) x 100mm(W) x 140mm(D)
550g (Without Nicad battery)

SWR & POWER CROSS NEEDLE METERS



Top Quality
CN-720B
Frequency Range: 1.8-150MHz
Power: 3 Ranges (Forward, 20/200/2000 W)
(Reflected, 4/40/400 W)

CN-620B
Frequency Range: 1.8-150 MHz
Power: 3 Ranges (Forward, 20/200/2000 W)
(Reflected, 4/40/400 W)

CN-630
Frequency Range: 140-450 MHz
Power: 2 Ranges (Forward, 20/200 W)
(Reflected, 4/40 W)

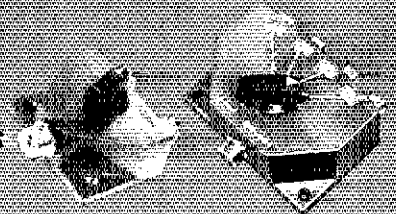
CN-410M	CN-460M	CN-485M
Frequency Range: 3.5-150MHz	140-450 MHz	140-450 MHz
Power Range: Forward 15 W/150 W	15 W/150 W	13 W/75 W
Reflected 5 W/50 W	5 W/50 W	5 W/25 W

All Models Back Lit, with mobile bracket.

CN-520	CN-540	CN-550
Frequency Range: 1.8-80 MHz	50-150 MHz	144-250 MHz
Power Range: 200/2000 W	30/200 W	30/200 W

COAXIAL SWITCHES

PAT. No. 59-000803

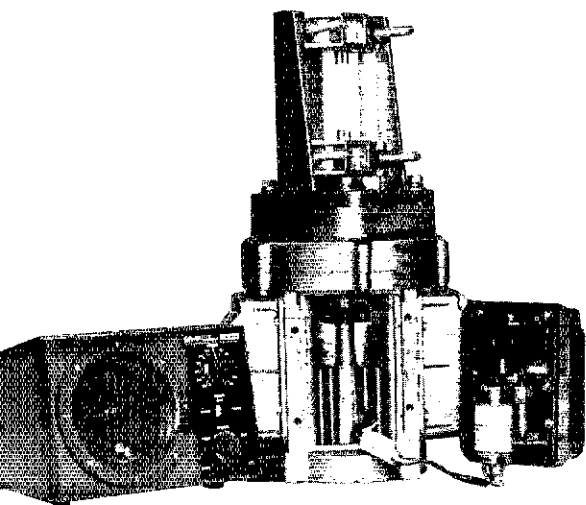


- | | | | | |
|--|--|---|--|---|
| CS-201
2-position
Frequency: 800 MHz
Connectors: SO-238
VSWR: Below 1:1.2
Insertion Loss: Less than 0.2 dB | CS-201G
2-position
Frequency: 1-3 GHz
Connectors: N type | CS-401
4-position
Frequency: 800 MHz
Connectors: SO-238 | CS-401G
4-position
Frequency: 1-3 GHz
Connectors: N type | CS-4
4-position
Frequency: 1-3 GHz
Connectors: BNC type |
|--|--|---|--|---|

POWER SUPPLIES

- | | | | |
|-----------------|---|----------------|--|
| PS-310M | Max 31A/Continuous 24A
3 VDC-14.6 VDC Variable | PS-60MD | Max 66A/44A Contin-
uous Plus sub-DC out-
let 10.6/10A 1 VDC-15
VDC |
| PS-310MD | Max 31A/24A Continuous 13.8 VDC Fixed
Plus sub-DC outlets
Max 5.6A/5A Continuous 3 VDC-14.6 VDC | | |

Advanced Multi Torque Antenna Rotator



The rotator frame can house up to 4 motors to increase torque and load capacity.

Each motor is equipped with a Super Wedge and Clutch brake system (Slip clutch type) that works independently from the main frame gear train and protects the rotator mechanism from excessive torque.

The main frame and reduction gear train have been designed to withstand maximum wind loading.

Maximum brake power is 18,300 lbs/in when 4 motors are installed.

Low voltage (24 VAC) motors... Low cost 6-wire control cable.

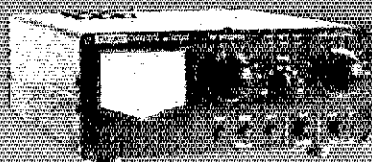
Specifications

■ 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 (700 kg/cm) 5,200 lbs/inch (6,000 kg/cm)	220 lbs/inch (250 kg/cm) 1,700 lbs/inch (2,000 kg/cm)
	2 motor	1,200 lbs/inch (1,400 kg/cm) 9,600 lbs/inch (11,000 kg/cm)	440 lbs/inch (500 kg/cm) 3,500 lbs/inch (4,000 kg/cm)
	3 motor	1,800 lbs/inch (2,100 kg/cm) 13,900 lbs/inch (16,000 kg/cm)	650 lbs/inch (750 kg/cm) 5,200 lbs/inch (6,000 kg/cm)
	4 motor	2,400 lbs/inch (2,800 kg/cm) 18,300 lbs/inch (21,000 kg/cm)	870 lbs/inch (1,000 kg/cm) 7,000 lbs/inch (8,000 kg/cm)
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	
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	180 mm (W) x 125 mm (H) x 175 mm (D)	
Weight	9 lbs (4 kg)	
Operation	Manual	Manual/Pre-set



ANTENNA TUNERS

Frequency Range: 3.5-30 MHz (8 bands)
Power Rating: 1 kW CW (50% duty)
Output Impedance: 10-250/25-100 ohm
(On 3.5 MHz)

CNW-518

3.5-30 MHz (8 bands)
1 kW CW (50% duty)
10-250/25-100 ohm
(On 3.5 MHz)

CNW-419

1.8-30 MHz (17 bands)
200 W CW (3.5-30 MHz)
100W CW (1.8-3.4 MHz)
10-250 ohm

CL-680 (no metering)

1.8-30 MHz (17 bands)
200W CW (3.5-30 MHz)
100W CW (1.8-3.4 MHz)
10-250 ohm



POWER AMPLIFIERS

Band: 144-148 MHz
Input Power: 0.5-3 W
Max. Output Power: 30 W plus

LA-2035 144-148 MHz 0.5-3 W 30 W plus
LA-2035R 144-148 MHz 0.5-3 W 30 W plus
LA-2065R 144-148 MHz 0.5-5 W 60 W plus

AUDIO FILTERS

AF-606K & AF-406K

Four stages of filtering... variable bandwidth over broad range... razor sharp CW reception... built-in speaker.
The AF-606K adds PLL Tone Decoder circuitry. PLL locks onto the desired CW signal and reproduces it with utmost clarity.

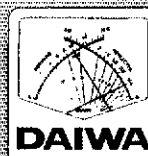
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- 8237 RG8.....40¢/ft
- 8262 RG213.....52¢/ft
- 8262 RG-58 cu milspec.....16¢/ft
- 8000 14ga stranded copper ant. wire.....13¢/ft
- 8448 8 conductor rotor cable.....31¢/ft
- 9405 as above but HD-2-16ga, 6-18ga.....52¢/ft
- 8403 Mic cable 3 conductor & shield.....80¢/ft
- 100 feet 8214 wends installed.....45.00

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FOR MORE INFORMATION CALL

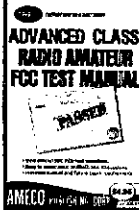
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vention to be held with the "Electronic Fair" in Des Moines July 19-21, even an international WATS line (1-800-532-1470). NOW is the time to start planning SKYWARN Activities. The Section will present a SKYWARN program in lieu of the NWS. 70% upgrade in Des Moines Exam/January.

Net	Freq	Day	UTC	QNI	QTC	Sess.
75 Mtr Phone	3970	M-S	1830-2330	2044	304	52
TLN	3930	0	00-00	322	225	62
CN	3713	M-F	700 PM Dy			17

Please note the change of time of the Sunday ITEX now meeting at 2330, hope to hear you there. I wish to thank all of you who have supported the Section with activities, participation and suggestions. The Section Leadership is here to help you, so give us a "holler" if we can help! Traffic: KA6JRC 343, WA0ALX 338, WD0FVB 336, W8SS 259, K0GP 201, WA1J 256, KA0ADP 145, W0YLS 141, K0CY 90, N0CWW 87, KA0X 85, N0CP 79, K0BRE 58, W0HTP 61, W0BAVW 39, W0WJFF 36, K0BI 34, K0JGI 25, K0GSC 22, N0EFG 20, K0BBG 16, W0PQ 12, KA0STK 3.

KANSAS: SM, Robert M. Summers, K0EXF — The old year is smoldering away as the new year chills us with things anew. Hopefully each of you will feel all renewed (except W0FRC) and are reaching out for the big one. If CLAY ever gets to the hospital all set for his V.S. you can get his renewal papers, he too can catch. Hi, Net reports for Dec are K5BN QNI 1004 QTC 199; KFN 448/31; KWN 966/726; KMWN 806/695; CSTN 2287/197; QKS 325/153; QKS-S5 26/12. KS-RTTY for Nov QNI 25, QTC 0. Understand that 160 meters is the place to operate evenings, now that the sun spots are screwing up the rest of the ham bands. If you are able now is a good time to operate on this band and help preserve its existence. Wouldn't hurt to write FCC to save 160 either. It's nice to be back on the mailing list of the Douglas County ARC. New officers for the year are K0TLQ Pres; K0WVJ V. Pres; Treas. K0WV, Prog. Chair. K0WV and Bulletin Editor. P.I. The Wichita Area elected N0BT, Pres; N0S, V.P.; W0GAFD, Sec; W0AWW, Treas; and N7PM Editor. The Pilot Knob SFC officers are K0MVF, Pres; Sec is W0ABRN, VP is K0ADJR and Treas is N0CWK. Officers of BEARS, Wichita are W0BDUX Pres; N7PM V.P.; K0QWX sec; AEA, Treas. Editor WA0TAH; CKRC, Salina officers — KA0S20, Sec; W0EQZ, V.P.; K0FPC, Sec/Tr. K0BBH Activities Mgr. Traffic: W0FRC 530, K5OU 228, W0KL 210, W0HI 193, W0ABL 128, W0QBK 106, W0BZ 92, W0OY 85, W0FDJ 74, K0BXF 67, W0QMT 49, N0BZ 29, W0MVM 18, K0GSS 15, W0ADW 13, K0DJM 12, W0BQ 11, W0VCH 10, W0PB 10, K0AB 8, (Nov.) A0CE 201, W0BZ 5, K0S 1.

MISSOURI: SM, Ben Smith, K0PCK — On Sunday, Nov. 18 seventeen amateurs provided communications for the St. Louis Marathon that covered 26 miles and 1000 runners participated. SCARC members assisting were: W0BYDQ and N7BQ co-chairman, K0IKU W0BOXX W0BNSM N0BRN K0BJ W0BRAG W0DF K0DJH K0BSW W0BQY W0BRAB K0BZ N0FTF K0CWU K0BLZ N0DBA and W0KG. The Jefferson Barracks Amateur Auction will be Friday evening March 8 at Firefighters Hall in St. Louis. I received information from Dave Rust, W0LKF informing me that the Ozark Mountain Radio Club has been reactivated. At present they have 29 members and are looking for more, so any amateurs in south Missouri that would like to be times members contact W0LKF. Their new club officers are: Pres. W0LKF, VP. K0XJD, Sec. K0MVM, Treas. N0FLR and K0JQH Technical Advisor. It's going to be storm season soon, so when your local net is called up for spring-storm spotting be on the air and help. Numbers and area covered are important in a storm watch. Let your DEC or EC know what your operating capabilities are. If you do not know who your DEC or EC is contact the Missouri SEC, W0BTK. If your county does not have an EC contact W0BTK on information for appointing someone in your area. Election time for many clubs has come around again and new officers reported to me are: Heart of America ARC Pres. K0JAA, V.P. W0EIG, Sec. K0ME and Treas. W0XND; Hannibal ARC Pres. N0BPA, V.P. K0QMV, Treas. K0W and Trustee K0KP. SCARC officers for 1985 are: Pres. N7BQ, V.P. K0DEN, Sec. W0BNSM, Treas. K0PFP and directors K0IKU and W0MCG. PHD officers: Pres. W0KUH, V.P. K0TLM, Sec. N0EVH, Treas. W0DCL, Pub. W0BQK, Ed. N0BBJ, Asst. Ed. W5NI, Membership, W0SOK and Activity K0LUA. Silent Keys reported K0AGV our sympathy to family and friends.

Net	Time	Day	Freq.	QNI	QTC	Sess.
M0SSB	6:00 PM	Dy	3963	813	243	31
M0N/MON2	7:00/9:45	D	3595	290	242	62
MEOW	5:30 PM	Dy	3963	570	78	31
HBN	4:05 PM	M-F	7280	348	45	21
MTTN	7:30 PM	M-Sa	3730	114	31	24
PHD	9:00 PM	Tue	146.43	148	17	6
PTN	9:00 PM	TTSA	21114	44	17	12
M0FON	8:15 PM	We	222.42/4.02	24	9	4
ZAEN	—	—	147.84/24	38	7	6
RRARN	8:00 PM	Dy	146.39/79	256	4	22
LRRN	8:00 PM	Tu	148.10/70	29	1	3
LOZFM	9:00 PM	Sa	148.73/13	82	0	4
GMEN	8:00 PM	We	148.76/16	54	0	4
S4RN	9:00 PM	We	148.43/03	44	0	4
JCCC	8:00 PM	Fr	148.00/00	40	0	4
LOZCW	9:00 PM	Fr	3707	19	0	4
JFN	7:30 PM	Th	147.84/24	18	0	4

Traffic: W0BMA 460, K1SY 406, K0SI 222, N0EVC 208, N0DN 195, K0PCK 145, A1BO 120, K0CAs 109, N0IR 103, K2ONP 71, K0ORB 60, W0BCJB 56, K0GL 42, K0DSQ 39, W0UD 37, N0BKE 38, W0BYJX 23, N0EA 12, K0OCU 9, W0N0B 4, W0KUH 3.

NEBRASKA: SM, Vern J. Wierka, W0BQGM — SEC: James Santord, N0A1H. STM: Jerry Kohn, W0BEGK. Preregistration forms for the 1985 Midwest Division Convention will be mailed this month to ARRL members and affiliated clubs in the division and areas adjacent to the Midwest Division. The AK-SAR-BEN club is sponsoring the September 6, 7 & 8 convention at the Holiday Inn, 72nd & Grover, in Omaha. Individuals are responsible for their own hotel reservations. The AK-SAR-BEN club will not handle room reservations. The AK-SAR-BEN club amateur of the year is Lloyd McElhaney, K0DKM, of Omaha. K0DKM consistently has one of the highest traffic counts, each month, in the Nebraska section. The Pawnee Amateur Club of Columbus reports six new novice class operators. The six new novices attended Pawnee club sponsored classes last fall. The Lincoln Communications Society newsletter is now called the "Midwest VHF Report." The new expanded format now includes VHF activities and news over a much wider area. For further information contact "Midwest VHF Report," 345 S. Dudley, Lincoln, NE 68503. Traffic: W0BTEJ 286, K0DKM 233, W0KK 138, K0BCB 29, W0BEGK 27, K0BY 24, K0BVM 16, W0B0X 15, W0BOK 14, W0BGM 10.

NEW ENGLAND DIVISION

CONNECTICUT: SM, Robert J. Koczur, K1WGO — STM: K1EIG, Sec: K1ECL, BM: K3ZJJ, ACC: K61M, O0RFI: K1AML, TC: W1HAD, PIO: K1B, SGL: K1AH.

Net	Freq	Local Time	QTC	QNI	QTC
CN	3640	1900/2200	219	245	K1EIR
CPN	3965	1800 M-S	193	382	K1BHT
NVTN	22/88	2130	45	275	WA1EMJ
WGN	78/18	2030	268	516	W1GXZ
RTN	13/73	2100	83	255	K1JAN

Happy Valentines Day to all in the Connecticut Section. Congratulations to the FARA Radio Club for their fine efforts for the program. I wish to wish them continued success. The FARA Radio/BEARS has been doing very well. I will have monthly exams in Fairfield County. Tks to SARC for the fine newsletter sent to me this month. Keep up the good work. The American Red Cross has filed supportive comments with the FCC regarding PRB-1, the ARRL's request for relief from local zoning ordinances. Also, Senator Barry Goldwater is planning to introduce a resolution into the 99th Congress urging the FCC to make sure that local zoning laws and ordinances are not used to prevent effective Amateur Radio communication. This resolution will probably have been introduced in late January. In addition the FCC has received many letters supporting PRB-1 from cities and agencies from all across the country. This is an important issue for which we need all the support we can get. There has been a reorganization at ARRL headquarters. Of interest to many of us is the new office of Volunteer Resources, centralizing support for the volunteer community into one office. Anyone wishing to hold an official ARRL code competition at a hamfest or convention can obtain the new guidelines by sending a S.A.S.E. to the Field Services Department at League Headquarters. The new ARRL General Class License Manual has gone to the printer and should be available by the beginning of February. The Advanced class manual should be ready by late spring and the Extra class in the Fall. Effective Jan. 1, 1985, the maximum reimbursement for out of pocket expenses for volunteer administered radio exam will be \$4.18. Once again, there was 100% representation of the 1RN Net. Congrats and well done to W1GXZ 1RN MN. ORS reports: W1NU 15, K1VKO 8, K1LUH 3. Traffic: W1GXZ 614, W1EFW 580, K1GWE 248, K1KTH 211, W1YOL 98, K1EIR 94, K1XG 88, W1BDN 76, K1BHT 74, K1JAN 59, K1PUG 56, N1BOW 32, K1B1Z 22, K3ZJJ 20, N1BPD 16, K1GWE 13, W1NLD 4.

EASTERN MASSACHUSETTS: SM, Rick Beebe, K1PAD — STM: K1GBS, SEC: W1IAY, ASM: KGH1, ACC: K1AZE, O0BIM: W4ASTO, Tech: K1UIU, PIO: W1ATA, SGL: K1BCN.

Net	Mgr	Freq.	Time(Loc)/Dy	QNI	QTC
EMRI	W4LPM	3.658	1900/2200/Dy	292	374
EMRIPN	N1BGW	3.880	1730/Dy	311	437
EM2MN	K1AMR	23/63	2000/Dy	493	351
NEEPN	K1BZD	3.945	0830/Dy	83	12
HHTN	W1TCMQ	04/64	2230/Dy	484	340
EMRIS	N1AJJ	3.715	2030/Dy	192	101
O12MN	N1BYS	045/645	1930/Dy	250	193

Well, here we go with my last report as your SCM/SM. It's been my pleasure to work with you all for the last six years. I leave with the confidence that you will be well represented by W4ASO. He comes with a team prepared that I did since he has already been an SCM in VA. I'll still be kicking around as vice director anyway, so it's not a full retirement. Hi, The VEC program is in full swing in EMass with what I would call a normal number of growing pains. Numerous exam opportunities are available all over the area. To find out where and when the next one closest to you will take place, contact one of the following: F3C7 (Boston), ARRL (Newington) or K1PAD (telephone or 3870 Sundays at 9:30 A.M.). Middlesex club still gathering on Sunday mornings at 9:30 at the Langley Deli for breakfast. Heavy hitters from Waltham Radio Assoc., planning a hamfest for July 20-21. This is a new one for me. If done right, but these guys don't know the meaning of "can't," so keep your eyes peeled for details in the amateur press. Wilesley club station, W1TIC, was heard during phone sweepstakes contest. W1GWN gave a talk on his numerous trips to Antartic at the Colonial club. Acton-Boxboro club had W1PYQ talk about his experiences as a shipboard radio operator in the Merchant Marine and during WWII. Sturdy Memorial group ran a "North Pole DX-pedition" with Santa himself in attendance. Mass maritime training ship, *The State of Maine*, is at sea as I write this with N1ST on board as usual. Traffic halts are in effect for the traffic station. Winter club planning upgrade class to Tech/Gen level. Caps Ann clubhouse got the benefits of a work crew's efforts and it looks great. Billerica club had an interesting talk on packmakers and wish member, K1OJH, well as he departs on another trip to China. He hopes to get on the air this time.

MAINE: SM, Cliff Lavery, W1RWG — SEC: K17JG, STM: AK1W, PIO: K1JTJ, TC: K0IL, O0RFI: W1HX, BM: W1JTH, ACC: K1JF, SGL: K1NIT, Portland Amateur Wireless Assn, elected K1AZX, pres.; K1WJ, V.P.; K1ME, secy.; K1JUT, treas.; K0ZEU and K1M1, chief ops. Sandy River AFA elected N1BCE, pres.; K1CNG, V.P.; W1JZF, secy.; W1AJC, treas.; K1CPC, Treasurer. VE FCC tests are scheduled for Presque Isle April 6, 7, 8 and 9. April 13, Augusta May 7, Ellsworth June 8, PSIR: W1JGLH, W1RWG, WA1YNZ, K17JG, N1BJW, W1CBP.

Net	Sess.	Checks	Tfc	Mgr
Sea gull	26	1016	359	K1GUP
Pine Tree	31	320	142	AG1G
PTN (late)	20	97	27	W1YJZ
Gen Me Emerg	7	141	50	W1WCI
Me Pub Svc	5	102	8	K17JG
RACES	5	76	11	W1RWG
Aroostook Emerg	4	6	6	W1YNZ

Traffic: K1AJJ 474, W1BCB 272, W1BYP 172, K1JAN 168, W1BXM 148, W1BGL 137, W1RWG 128, K17JG 124, W1ISO 112, N1BJW 105, W1KX 99, W1YJZ 81, K1JPR 63, W1JTH 58, N1BZ 57, W1WCP 37, WTGCB 36, W1OTO 28, K1KFC 27, W1VEH 25, K1E1N 18, K1JTJ 16, W1AHM 15, N1BME 11, K1BTP 9, W1CTR 4, K1AFTL 3.

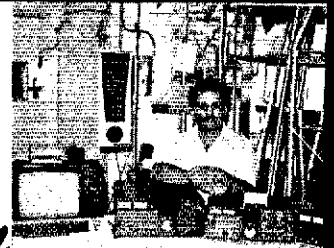
NEW HAMPSHIRE: SM, Robert C. Mitchell, W1NH — STM: W1TN. April 20th is date of Great Bays Springfest 85. N1CIR got married. EC W1FYR reports the Tri State FM emergency net has not missed a session in over 4 years. It is sad to report WA1ASH a Silent Key. Exams by Nashua club scheduled for March 30, June 22, Sept. 14 and Dec. 14. All radio clubs should let K1M1, Pres NHARA, know upcoming exam dates for his distribution. AK1E made BPL. W1TN heard working DX on 80 CW. Anyone holding an FCC commercial license should apply for the new license before they run out of time. So get now on 80 CW. News is short so see next month. Traffic: AK1E 627, N1NH 392, N1CPX 354, W1TN 205, K1UW 186, K6LUX 175, K1KE 165, W1GUX 151, K1M1 106, N1AKS 91, W1ALE 89, K1PQV 72, K1V10 70, K1HPO 60, W1A1ZN 49, K1GOZ 30, W1BGM 27, W1FYR 24, K1TQY 19, N1BVL 15, N1ALM 11, W1HSB 4, W1OKU 4, K1AHRH 2.

RHODE ISLAND: SM, Gordon F. Fox, W1YNE — SEC: Vacant, STM: W1E0F, TD: AB1D, NM: WA1OSL, ACC: N1BEE, SGL: K1DA. No station news received. Traffic: W1E0F 1472, K1AML 272, W1CRY 81.



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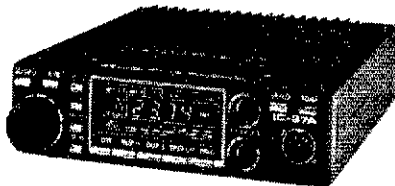
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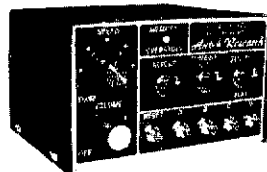
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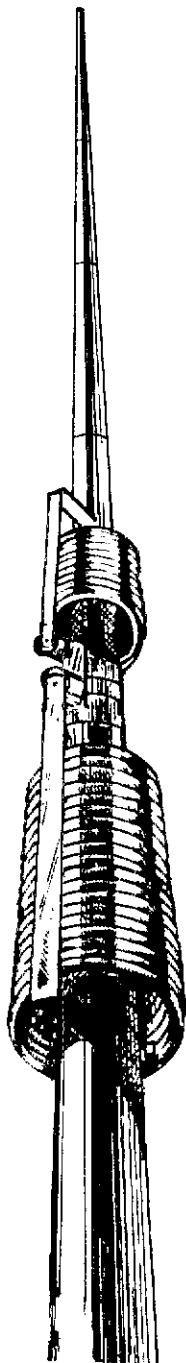
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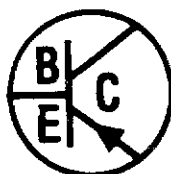
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VERMONT: SM, Ralph Stetson, KD1R — STM: AE1T, SEC: W1CTM, SGL: W1KRV, ACC: KA1AKI, BM: AE1T, TC, PIO: OPEN. Repeater Coordinator (all bands): K1BKK. Although this is not an ARRL Appointment, it is a very important function, not only in VT, but throughout the U.S. and Canada. So, if you are planning to put up a repeater, please check it out with K1BKK first. I understand WARREN is available on a limited basis for technical problems. Remember, if your REPEATER is not coordinated, it's not considered legal by the FCC when looking at interference problems. A big thanks to all of you who sent me copies of their comments to the FCC Repeater Docket. Heard on the grapevine W1HKI has upgraded as a result of VE program. Let's drop me a line, would like to know. Congrats to CVFMA officers 1984-85: Pres. WB1EAE; V.P. KA1ID; Tres. W1FRE; Sec. KA1KAS; outgoing Sec. WA1THF was commended on fine job put in, in addition to other vocational requirements. Sorry to report that W1FRE became a Silent Key on 1/12/85, Nets (Dec) VTN 31/156/119; VTSS (Nov) 11/38/8; VTSS 12/28/7; GMM 26/428/33; VTPHN 5/94/6; VTRFD 5/74/34; CAR 26/82/140. Traffic: KT1Q 276, W1KRV 173, N1COB 88, AE1T 63, W1OAK 51, N1ARI 46.

WESTERN MASSACHUSETTS: SM, Don Haney, KA1T — SEC: WB1HH, STM: W1UD, TC: KA1JUM, OO/RF: N1CM, PIO: WB1CH. Welcome and best wishes to WB1EVL as new Net Manager of WMFN. And many thanks to W1KK who is "retiring" again for time for VHF, OSCAR, and Packet. Congrats to KX1F (ex-KA1GDV) for upgrade. Lots of opportunity to upgrade as VEs are giving exams almost every month in WMA. W1ZPB looking for info on solar photovoltaic, mini-hydroelectric, and wind electric energy sources. W1GQP recently celebrated 80th birthday. W1JP and WB1ABF getting settled into new QTH in Wilbraham and looking forward to sailing weather. What can your club do to promote Amateur Radio to the public and attract new hams? And what can the Section Officials do to help? Let us know. BPL: KA1T. Traffic: KA1T 804, W1UD 23, W1JY 192, W1KK 122, W1EKQ 110, K1HJ 52, WB1HH 53, W1ZPB 30, WA1OPN 27, K1JHC 24, WB1FSV 8, WB1HKN 6.

NORTHWESTERN DIVISION

IDAHO: SM, Lem Allen, W7JMH — SEC: KD7HZ, STM: W7GHT, PIO: WB7PFG, OO/RF: KUTY, CLUB NEWS; The Meridian DX Club is sponsoring VE Exams to be given April 6 at Borah High School in Boise. The Twin Falls Club is sponsoring a Swap/Hamfest at the Moose Hall in Twin Falls on June 15. VE Exams will be held. The annual Kootenai Club Hamfest will be at Coeur d'Alene June 8, VE Exams available. ARRL MATTERS: W7JMH and WB7PFG had the honor of addressing the Pocatello Club at their Xmas Banquet and then they met with W7MJU KCPS WB7CYO W7KA WA7UHW, N7BI new DEC for N ID, WA7MMG new Asst DEC for N ID. New ECs are: N7BHL Bonner, W7GHV Kootenai, KA7SHH Shoshone, WB7REZ Washington, K7M1Y Asst EC Canyon County. PEOPLE AND THINGS: W7EYR, KD7NT and KA7ANM were Communicators for the Caldwell Xmas Parade and received a letter of thanks and commendation from Chamber of Commerce — Way to go, fellows! KA7GQP now NK7K — Congrats! KUTY, WB7CYO, KA7T, K7GQP are all certified FCC Aux. Monitoring Stations now — Congratulations and keep Idaho clean.

NET REPORTS

Net	Freq	Mode	Time	Sess.	QNI	QTC
FARM	3935	Lsb	7 PM Da	31	1673	79
ICD	3990	Lsb	8:10 AM M-F	21	846	29
IMN	3635	Cw	8 PM M-F	17	139	68

GENERAL: The SM would appreciate hearing about anything pertaining to Amateur Radio in Idaho. Please drop him a note or have a short informal with W7JMH during or after one of the above nets or MTN (3910 Lsb 5:30 PM Da). Traffic: W7GHT 430, KA7KAI 191, W7JMH 100, NK7K 153, K7TM 33, KA7HO 24.

MONTANA: SM, Les Belyea, N7AIK — Club officers for 1985: Great Falls Area ARC, Pres.: K7QDA, V.P. WB7WBV, Secy: WB7TIN, Treas.: W7KHU; Gallatin ARC, Pres.: N7LUB, V.P.: K7KY, Secy/Treas.: W7QZH. Interesting to note that Great Falls, Helena and Bozeman have YL presidents. Upgrades in the Missoula area: to Gen., WB2PLX; to Tech., KA7SPI, WA7GVT reports the Lower Yellowstone ARC has changed their name to Lower Yellowstone Amateur Radio System (LYARS). An upgrade session will be held in Bozeman, March 16, contact KB7BJ, walk-ins ok. WA1JXN has put up a new EME antenna system that weighs over 700 lbs. Please remember the Montana Section Net each Sunday A.M. at 9:30 on 3920 kHz, lots of information on this net. I would like to say thanks to all for the support in the past SM election, will do my best to do thank to K7GD for getting involved. PSHR: WA7GQO K7R WB7WVD KA7NMA.

Net	Sess.	QNI	QTC	Mgr.
IMN	18	150	78	KY7I
IMNS	6	21	4	KY7I
MSN	4	50	3	K8PP

Traffic: KF7R 404, KA7NMA 342, K7AF 195, WB7WVD 69, N7AIK 52, WA7GQO 31, WA7UW 18.

OREGON: SM, William R. Shrader, W7QMV — STM: W7VSE, SEC: N7GPA, PIO: KC7YN, SGL: KA7KSK, ACC: WB7WTD, RFI: AK7T, OO: N7SQ, STC: N7ENI. Upgrades: WB7VBZ KA7GUP, KA7ODY (Tech); N7FCA KA7RNN KA7MDD (General); W7ISP (Adv). WA7GFE is newest FCC Auxiliary member. KA7BDB received DXCC (RTTY) and WAC (RTTY). Rogue Valley ARC held its first Amateur exam on Dec 16 at White City. K7S has held the operation, assisted by W7MLM, W7VSE, K7SGO, WA7TEG and K7TWO. OTVARC officers for 1985 are KA7KBH, President; KE7BB, Vice President; K7JF, Secretary; K7ZT, Treasurer. Northwest Shrine ARC officers for 1985 are W7YEM, President; KA7RJR, Vice President; KB7CC, Sec/Treasurer. The station at the Portland Shrine Hospital handled over 500 messages last year in addition to many phone patches for the kids in the hospital. Many amateur exams being given around the section. Support your club or organization sponsoring the exams. If you are advanced or extra class get qualified as a VE. The Northwest Amateur Radio Council consists of members of Clackamas ARC, Hoodview ARC, PARC, and OTVARC is doing a fine job in the Portland area setting up and administering exams. Contact WA7IIM for info. OSN totals are QNI 321, QTC 348. Traffic: W7VSE 1170, N7FLC 387, W7ZB 346, K7OVK 299, A7W 284, WB7OEX 251, N7BFW 70, WA7VTD 53, KX7W 51, W7FDU 40, KA7AID 39, W7HLF 26, KX7T 20, W7LNE 13.

WASHINGTON: SM, Joe Winter, WA7RWK — STM: K7GXZ, SEC: WB1H, BM: KD7G, TC: K7UJ, PIO/SGL: W7CKZ, OO/RF Coord.: KC7FA, ACC: WB7QNS.

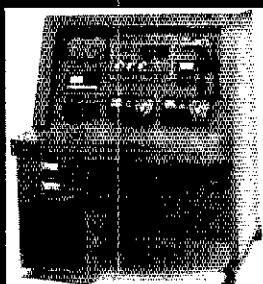
Net	Freq	Time(Z)	QNI	QTC	Mgr.
EW7TN	148.04	0030/0430	72	81	WA7CBN
NTN	3970	2000	1251	145	W7UJ
NWSSB	3948	0130	278	35	W7HFN
PST5	145.33	0030/0630	183	152	W7IEU

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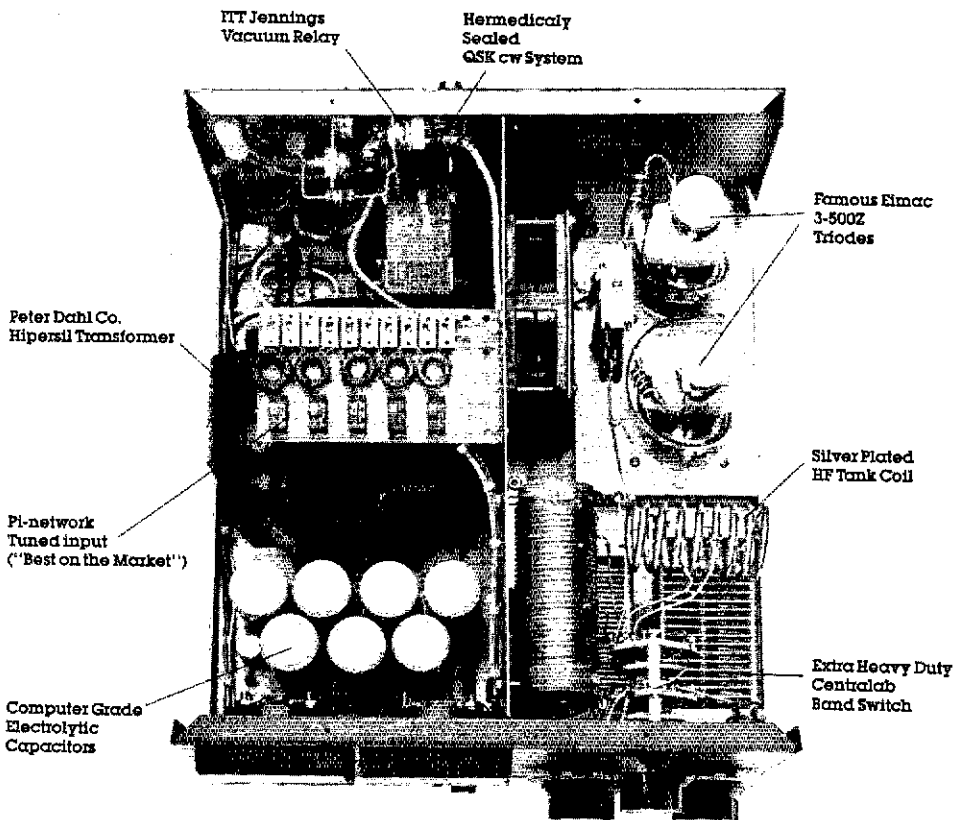
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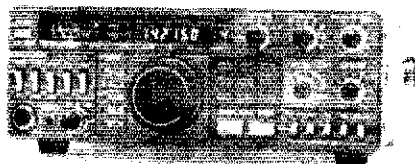
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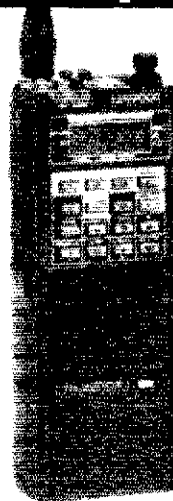


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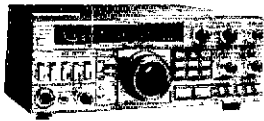


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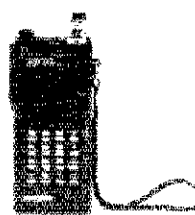


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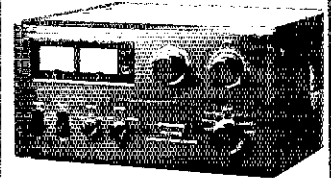
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for an individual to appoint to the position. The countries are as follows: AIKEN, ALLENDALE, BAMBERG, BARNWELL, BEAUFORT, BERKELEY, CHESTER, CLARENDON, COLLETON, DORCHESTER, FAIRFIELD, GEORGETOWN, GREENWOOD, HAMPTON, JASPER, KERSHA W, LEE, LEXINGTON, McCORMICK, NEWBERRY, SALLUDA, SPARTANBURG, UNION, WILLIAMSBURG, YORK. If your county is listed contact me for an application or let me know of an amateur willing to take on this leadership job. Congrats to K4WJR - BPL #3. Traffic: K4WJR 878, K4AZ 456, WAANK 420, W40KT 270, N41JG 136, WB4UD 30, K44JF 80, WD4FJP 49, W41P 43, W4V4B 44, K44LHM 19, KA4YE 13, KB8GT 10, KA4AUR 8, WD4RF 8. VIRGINIA: SM, Claude Feigley, W3ATQ - STM; WD4ALY, W3B4UHC, ACC; WD4KQJ, OO/RF; W4HU, BM; AB4U, PIO; WN4VAL.

VTN 1 P.M. 3907 AA4AT
V6BN 6 P.M. 3947 WB2OMZ
VSN 6:30 P.M. 3680 KB4WT
VN (early) 7 P.M. 3680 K4JST
VN (late) 10 P.M. 3880 KR4V
VLN 10:15 P.M. 3947 KA4IUM

Another outstanding performance by the section traffic handlers during the holiday traffic crunch. The month traffic total was 10,876 with 51 stns reporting activity. N4GHI AA4AT N4EXQ, KA4JF, K4JST, N41JG, W4OCX, KB4WT, W3ATQ made BPL. K4JST handled most of his traffic via RTTY and AMTOR with great success. Lousy conditions are still affecting the late nets but stick in there, they must improve. The Richmond group has exams planned for Mar. 23, May 25 and July 28 with additional ones every other month. Williamsburg club has exam scheduled for May 4. K3RZR has upgraded to Extra, AA4GL has been appointed Ass't Mgr 4RN Cycles 1 and 2. WB4FDT has received his MBA and is returning to Northern VA. PIP has volunteered to bring the VA Ham back to life. We welcome KB4EQ to the traffic nets. Flick K4BKX and Ruth Genter WA4FDV have moved to PA. Make your plans to attend the League Planning meeting, May 11-12 near Raleigh, NC at Apex. All ARRL members are invited to attend. Contact W4UG or W3ATQ for info. Also, plan to attend the Roanoke Division Convention, Charlotte, NC, March 16-17. At the Frostiest Virginia Section Distinguished Achievement Awards were presented to AA4AT N4EXQ and N4GHI for their outstanding performances on the Section, Region and Area traffic nets. We are glad to report OOs KE4EQ W4HU WB4RT K4JJD and WA4PGM were busy with their monitoring duties with WB4RT submitting 4 violation reports. AA4EL joins them with his recent OO appointment. The VFN is offering a certificate commencing 50 years of continuous net operation on 3947 for details. Traffic: N4GHI 1306, AA4AT 1095, N4EXQ 923, KA4JF 718, K4JST 691, N1PG 673, WA4CCK 585, W3ATQ 573, KB4WT 548, AA4GL 420, WD4FTK 365, WD4ALY 315, WB4KIT 254, K3RZR 218, WD4OCW 196, WB4PNY 188, KR4V 181, KA4IUM 155, K4ECD 155, K4JM 134, KB4QG 117, WB4VMX 109, K4LD 101, K4KDJ 100, NN4I 72, KA4ZTB 60, KB4IFS 60, K4MLC 58, N4T5 55, WB4EDB 54, NW4O 41, WB4DQZ 40, KB4PW 29, K4GR 26, N8ANO 23, N4FNT 21, W4LXB 13, W4YE 12, WA4T5 9, WB4ZNB 9, WB4FDT 9, K4JUM 7, W4KX 6, N3RC 6, W4TZO 5, W4PVA 4, WA1VRL 3, K4VVK 3, N4LE 2, WB2OMZ 0.

WEST VIRGINIA: SM, Karl S. Thompson, K8KT - SEC; K8QEW, STM; K8DG, ACC; W8BCT, SGL; K8BS, TC; K8CC, Rpt. Coord.; WD4KHL, W4RTTY - SEC; W8BCT has been established each day at 6:30 P.M. NM is K8BRD. Mark welcomes all check-ins. W8MHR is new EC for Berkeley Co. and also DEC for E. Pan handle. NM is needed for WYNN! WA8KJ was NCS for Santa Claus net.

Net	Freq.	Time	QNI	QTC	SSC	NM
WVFN	3685	6:00	1230	201	31	N8AJC
WVMD	7235	11:45	1056	242	31	WB4FZP
WVN	3567	7:00	221	130	31	WBLYP
Hillbilly	14290	Noon Su	277	20	5	W8PV
WVRN	3840	8:30	0	0	284	K8BRD

Traffic: KZ8O 400, WA3NU1 299, K8T 284, WB4VW 261, N8EMC 185, K8CQF 165, KA0NM 102, W8FZF 93, WB4UD 87, WA8KJ 64, N8AJC 36, K8KT 36, K8QEW 32, K8UQY 18, N8CG 10, W8HZ 10, W8CAL 8, W8DMJE 5.

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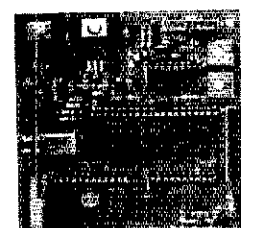
ROCKY MOUNTAIN DIVISION

COLORADO: SM, Bill Sheffield, K0QJ - SEC; W8QFB, STM; W8BAT, OO/RF; N0CF, ACC; W8BDD, PIO; K8PPYH, SGL; W8GQL, TC; K0QP, BM; W8MDT, TC. The month of March will bring two of our major swap tests for Colorado. March 17th, will be the ARRA Hamfest and Colorado State Convention. Many activities are planned for this event with a special guest from the League attending. VE Testing will begin at 9:00 AM. ARRL forum with K8PGM, meetings are scheduled for ARES, NTS, CCARC, RMPRA, and more. The location is Colo Nat'l Guard Armory, 55 S. Potomac in Aurora. March 31st Pikes Peak ARC will host their annual Swap test in Colorado Springs, as always it will be one of the best activities. Contact KL7IPV for info. Packet radio is finally beginning to be recognized for the expert service it can provide. This summer will see coverage into the western slope. The schedule of April VE tests are Grand Junction Swap, Pueblo ARC (WB0YES), Denver Radio Club (DRC-April 17th) Thornton (WB1JR-April 20th). Reminder that 610 & \$4.00 fee must be sent 30 days in advance of test. This month's name droppers: N8CZ K78A, WB0OFR, 73, K0QJ NETS: Col QNI 714, QTC 77-int 94, Time 775, 23 sss; CWV QNI 121, QTC 97, Time 613, 29 sss; CWXN QNI 2891, QTC 3316, Time 2790, 31 sss; HNN QNI 1910, QTC 294, int 455, Time 1789, 31 sss; NCTN QNI 251, QTC 190, Time 451, 28 sss; SCTN QNI 25, QTC 18, Time 89, 6 sss. Traffic: N8BQP 2308, WA8JH 2093, WA8OY 623, K0RXK 505, W8DAUA 429, W8ACH 384, W8DBS 375, KD7EY 320, KB0Z 310, N0BZA 209, K0JG 174, W8BAT 171, A0WV 51, W8HP 15, W8NFW 14, W5HRS 10.

NEW MEXICO: SM: Joe I. Knight, W5PDY - ASL; W5HD, DEC; K85XD, STM; K5VU, NM; WA5UO K8LL W5VFG, TC; W8GY, ACC; W5HD, Southwest Net (SWN) meets daily on 3583 at 1930 local and handled 267 msgs with 210 stations in New Mexico. Roanoke Net meets daily on 3939 at 0100 UTC and handled 91 msgs with 1051 stations. New Mexico Breakfast Club meets daily on 3539 at 0630 local and handled 135 msgs with 937 stations in. Yucca 2-Mtr Net 78/18 & 93/33 handled 17 msgs with 392 check-ins. Caravan Club 2-Mtr Net 68/06 handled 8 msgs with 130 check-ins. SCAT 2-Mtr Net 68/06 handled 30 msgs with 633 check-ins. Earlybirds handled 8 msgs with 456 check-ins. W5FZ installed as WM of Magdalena Lodge #50, AF&AM with W5SKX, K5OPD, N5BKW, W5LJA & N5HEG Installing Officers. Perhaps the first time in history? Sorry to report the passing of W5ECQ. W5RKP moving to Caballo, NM. WA5DUJ with new Tri-band & Yessu 757. W3YK building a super 2-Mtr ant. Traffic: ND51 1310 W0IWI, W5DAD 166, N5EXC 10.

UTAH: SM, Ron Todd, K3FR - STM; W7OCX, SEC; NA7G, BM; WA7MEL, OO/RF; KD7FL, ACC; KB7XO, PIO; N7BHC, TC; K7RJ. Exams: N7IE. KD7ML back on the air with new

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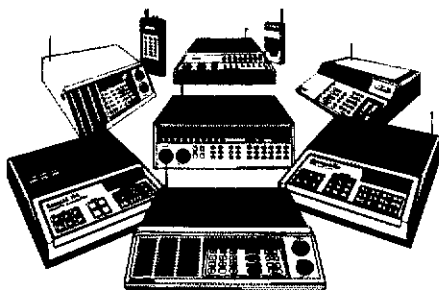
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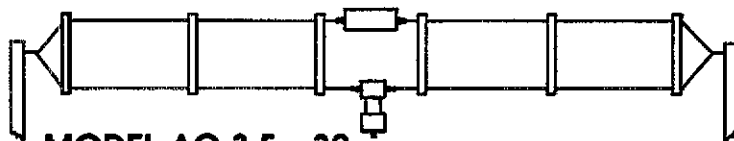
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Large Capacity Display Memory: Covers up to 1,280 characters.

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MARK-AND-BREAK (SPACE-AND-BREAK) System: Either mark or space tone can be used to copy RTTY.

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CW Practice Function: The unit reads data from the hand key and displays the characters on the screen. CW keying output circuit works according to the key operation.

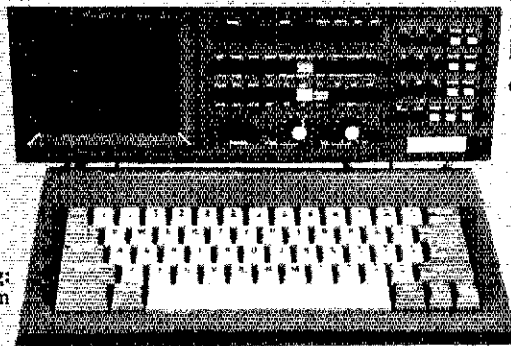
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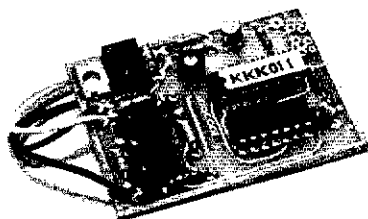
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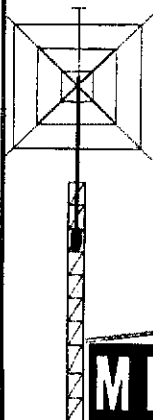
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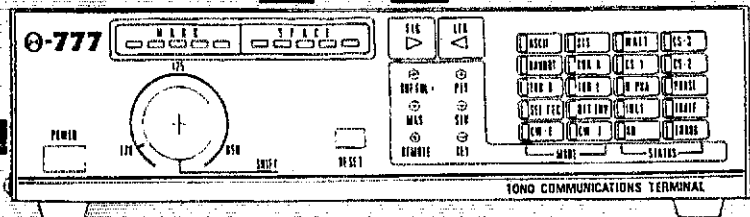


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rigs after Oct storm; Moe says watch those ground systems to avoid damage like his. Utah Packet Radio Assn. held first meeting Jan 5 with 20 attending, hoping to set up links to Denver, Boise and Las Vegas. Traffic: K7HLR 548, WA7WIB 259, KD7NU 142, WA7KHE 134, W7OCX 28, WA7MEL 23.
WYOMING: SM, Dick Wunder, WA7WFC — ASM: KA7AWS, Steve Cochran, SEC: W7TVC, Jim Anderson. The Wyoming Hamfest will be held on July 13 & 14 at the Wyo. State Fair Grounds in Douglas, Wyo. Contact WA7WXO, Doug DesEnfants, North Star Rte., Torrington, WY 82240 for information. Brochures will be mailed to callbook addresses in the near future. This year's hamfest is co-sponsored by the High Plains Amateur Radio Club of Torrington and the Great Plains Amateur Repeater Assn. (Laramie Peak Rptr.). Hope to see you at Douglas, Wyo. Cowboy Net held 21 sessions with 579 QNI & 23 QTC. Wyo. Jackalope Net held 26 sessions with 627 QNI & 5 QTC. Check with local clubs for the next VEC exams. Traffic: WB7NHR 601, W7HLA 101, W7SPQ 22, KD7AN 74.

SOUTHEASTERN DIVISION

ALABAMA: SM, Joseph Smith, Jr., WA4RNP — SEC: N4DMA, STM: NAJAW, SGL: KA4WVU, BM: KF4VV, OO/RFI: K4ELV. Well, the winter's grip on us has loosened and the time has come to get on with the business of new life. It is evident that we, as amateurs, need to grow so if we all help by training one new Novice, there will be twice as many "hams" as before. The ARES/RACES program is going well, so if your ARES group has not become affiliated with your local emergency management agency, "Civil Defense" then make plans to do so soon. The Red Cross filed favorable comments with the FCC regarding PRB1, the ARRL and local zoning ordinance proposal, as did a lot of other organizations. Traffic for Dec.: CAND reports 4,281 messages in 31 sessions with DRN5 rep 100% by NW4X WX4I and W4CKS, DRN5 reports 1,635 messages in 62 sessions with Alabama rep 97% by WA4JDH WB4IXA W4CKS NW4X KC4GS WX4I and W4WJF. BPL: WA4JDH, PSHR: WA4JDH W4CKS WX4I WA4LXP KB4GPN WD4NYL and WA4RNP 73 and come alive in 651 Traffic: WA4JDH 1599, W4CKS 398, WA4J21, WA4LXP, WB4IXA 99, KA4OZ, WA4NYL 67, KB4GPN 65, WA4RNP 54, KC4GS 22, WB4TVY 22, W4WJF 21, W4DGH 14, W8ICM 13.

GEORGIA: SM, Eddy Kosobucki, K4JNL — SEC: WB4ABY, STM: K4VHC, ACC: WA4ABY, BM: W4BIA, OO/RFI: W4RZL, PIO: WA4PNY, SGL: W4BZT, TC: K4UDR, NWS: WA4PZD. It's hamfest time agn. 3rd annual at North Ga Fairgrounds in Dalton on March 9th, Columbus follows on March 30 & 31, same place, etc. Dalton ARC elected KC4TT as Pres, K4IG VP & N4JJK Sec/Treas. W4BIW & his Satellite open on Atlanta & national TV. Keep up the gud work Byron. Central Ga ARC continues to work with local police in helping combat crime. Their new slate is Pres: WB4UHL, VP: K4IEK, Sec/Treas: KC4WU, Prog: W4AN, West: Ga ARS rpts new officers for '85: Pres: KB4H, VP (Tnx & Congrat) N4GX, VP (Prog) W4JOM, Sec/Treas: W4ABWZ, Colquitt County ARS new slate: Pres: KB4DAY, VP: W4NWB, Sec/Treas: AA4P, Savannah ARC, Pres: KF4BA, VP: KA4HHE, Sec: N3BHK, Treas: K4ACQY, Act: KB4ILV & Trustee: W4KGP W4HON & W4PIM continue to make PSHR. With as many net members & tlc handlers in the section won't u take time to send me ur rpt by the 6th of the month? Recent months have taken several of our FB Ga section hams into the Silent Key column. To all of the families our deepest sympathy. Remember them in your prayers. The WX thus far has been great, but we don't know what spring will bring. So please keep that Emergency equipt ready if it's needed. Join the CWVA group at AM local on 3832. They will welcome Tnx to W4ARH for his continuous monitoring as an OO. I am still in need of at least 5 more OOs. If u think u can qualify please contact me or OO/RFI coordinator W4RZL. W4RH tnx all who send him info on the dates & times of their hamfests. My activity on nets has been practically nil in recent months due to work & other problems. Tnx to all who have kept me informed abt happenings. CU in Columbus? Traffic: W4PIM 334, N9ECB 245, W4JWO 209, W9NXC 195, AA4TT 74, N4DOM 69, K4VHC 60, KF4FG 51, WB4NTW 45, N4UJ 32, W4FIZ 30, N4BIM 29, K4BAI 25, K4EY 19, W4HON 18, KF4EH 16, W4BIA 14, K4IG 10, N4UZ 10, N4BWS 8, K4PIK 5, KA4ATM 3.

NORTHERN FLORIDA: SM, Phil O'Dwyer, WF4X — STM: WB4GHU, PIO: WA4PUO, SEC: WA4PUP, BM: KB4LB, OO/RFI: K4JJE, SGL: KC4N. A few changes in the League Official appointments this month as Rudy, WA4PUP, takes over the SEC appointment and his XYL, Petey, WA4PUO, picks up the Public Information Officer job. Congratulations to El Stolberg, AK1M, Spring Hill on being certified for the Amateur Auxiliary to the FCC's Field Operations Bureau. As usual, December was a good month for our traffic handlers, as our Section had 53 stations reporting 14,862 pieces of traffic being relayed. George, WB4YQF, doing a fine job of managing the Slow Speed net, QFN5, will make you feel welcome on 3715 by 2 at 010Z each day. Official Bulletin stations N4PL, W4GUJ, KB4LB are still doing yeoman duty on the HF bands, as is Woody, N4HMD, for our GCVN on two meters. Let me remind you again that all of my reports to ARRL must be in the mail by the sixth of each month and I am such a terrible typist that I must start on the fifth, so please try to get yours to me early. I hope the little political flurry from the EC of Marion county will soon subside and all of you hard working DEC's and EC's will keep up your morale and good work. Traffic: WD4IO 2538, WX4H 1552, N4PL 1247, WF4X 1127, WA4OXT 910, WF4Y 910, WB4ZFR 733, KB9L 500, WB4ADL 429, KC4K 416, N4IT 350, N4PL 305, WD4ALD 281, WB4GHU 251, KB4LB 243, WD4MLO 240, WD4HBP 235, W4MGO 225, NY4E 220, WA4EYU 201, N4HMD 201, KF4U 189, K4VND 149, N4IWO 142, W4XIC 107, WX4J 99, N4GMU 92, KF4TM 84, N4ACG 83, N4ADJ 80, WB4YQP 75, N4EDH 72, NF4O 70, K4MQ 69, N4JAJ 52, N4AF 49, WA4PUP 47, WD4EOB 34, KE4GW 34, N4DY 27, KB8M 27, WB4AWG 26, N4JHI 23, N4IJP 20, KF4GY 19, NQ4P 13, NS4C 12, N4BOY 10, WA4PUO 10, KB4LHP.

SOUTHERN FLORIDA: SM, Richard D. Hill, WA4PFK — SEC: W4SS, STM: K4ZK, TC: K4I, BM: WA4EIC, PIO: W4WYR, SGL: KC4N, OO/RFI: W4SS, WA4EIC reports total bulletin activity of 172 bulletins received and transmitted this month. Bulletin stations reporting were WA4EIC 39, WD4KBW 17, W4I, N4I, K4I 49, N4IT 47, K4I 35, and KA4M 18. VE1SH4 writes that he has been appointed by W4RH as an assistant director for the Naples area. W4RH has also appointed K4I as the Southeastern Division representative on the Emergency Communications Advisory Committee. WB4AID, Manager of the Florida Midway Traffic Net, sent word by radiogram that he and Senior Assistant Manager, N4UF, have asked to be relieved after

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 Licensed amateurs, age 17 or under or age 65 or over, upon submitting proof of age, may request the special dues rate of \$20 in the U.S. (\$25 in Canada, \$28 elsewhere, in U.S. funds)

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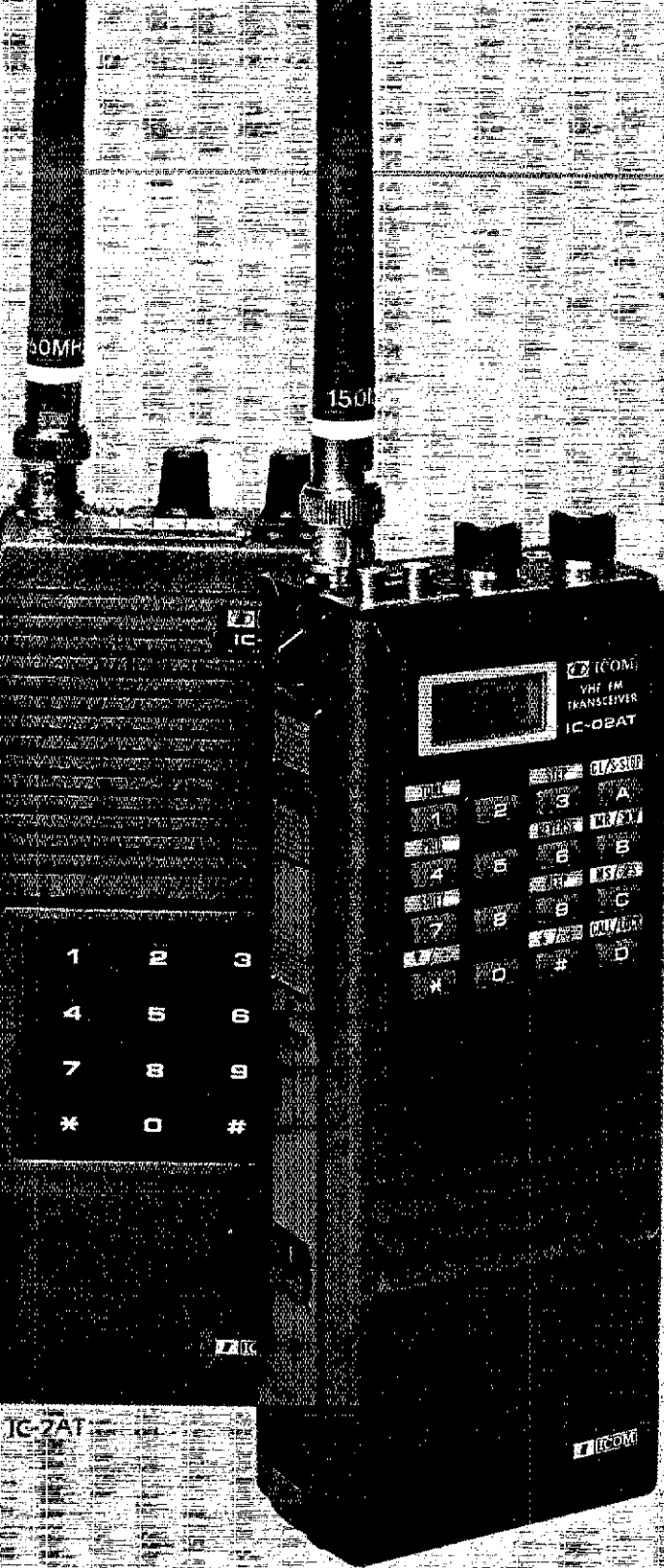
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The American Radio Relay League
 225 Main St. Newington, CT. 06111 USA

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.

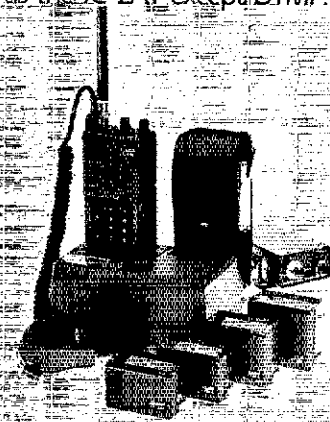
Frequency Coverage. The IC-02AT covers 140,000 through 151.550MHz and the IC-2AT, 141.500 through 149.994MHz, both include frequencies for MARS operation.

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 selec-

tion. 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.

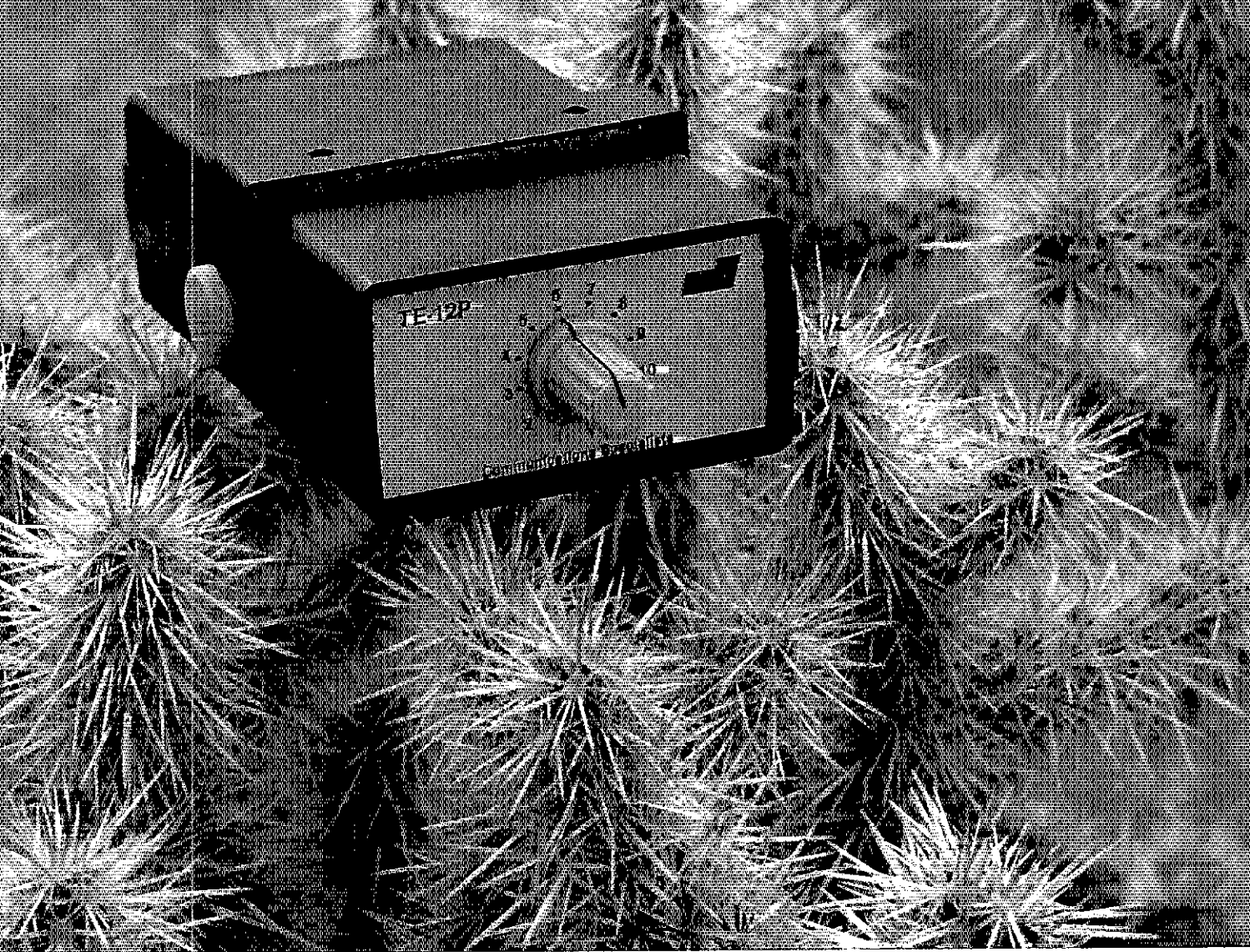
The IC-02AT and IC-2AT come standard with an IC-BP3 NiCd battery pack, flexible antenna, AC wall charger, belt clip, wrist strap and ear plug. See the IC-02AT and IC-2AT 2-meter handhelds at your local ICOM dealer.

Often imitated,
never duplicated.



ICOM

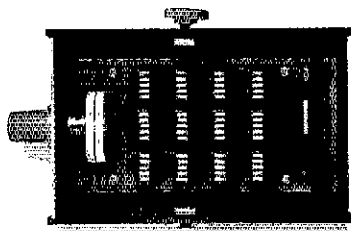
First in Communications



Stuck with a problem?

Our TE-12P Encoder might be just the solution to pull you out of a sticky situation. Need a different CTCSS tone for each channel in a multi-channel Public Safety System? How about customer access to multiple repeater sites on the same channel? Or use it to generate any of the twelve tones for EMS use. Also, it can be used to access Amateur repeaters or just as a piece of versatile test equipment. Any of the CTCSS tones may be accessed with the TE-12PA, any of the audible frequencies with the TE-12PB. Just set a dip switch, no test equipment is required. As usual, we're a stickler for 1day delivery with a full 1 year warranty.

- Output level flat to within 1.5db over entire range selected.
- Immune to RF.
- Powered by 6-30vdc, unregulated at 8 ma.
- Low impedance, low distortion, adjustable sinewave output, 5v peak-to-peak.
- Instant start-up.



TE-12PA

67.0 XZ	85.4 YA	103.5 1A	127.3 3A	156.7 5A	192.8 7A
71.9 XA	88.5 YB	107.2 1B	131.8 3B	162.2 5B	203.5 M1
74.4 WA	91.5 ZZ	110.9 2Z	136.5 4Z	167.9 6Z	
77.0 XB	94.8 ZA	114.8 2A	141.3 4A	173.8 6A	
79.7 SP	97.4 ZB	118.8 2B	146.2 4B	179.9 6B	
82.5 YZ	100.0 1Z	123.0 3Z	151.4 5Z	186.2 7Z	

- Frequency accuracy, ± 1 Hz maximum - 40°C to +85°C
- Frequencies to 250 Hz available on special order.
- Continuous tone

TE-12PB

TEST-TONES:	TOUCH-TONES:	BURST TONES:			
600	697 1209	1600	1850	2150	2400
1000	770 1336	1650	1900	2200	2450
1500	852 1477	1700	1950	2250	2500
2175	941 1633	1750	2000	2300	2550
2805		1800	2100	2350	

- Frequency accuracy, ± 1 Hz maximum - 40°C to +85°C
- Tone length approximately 300 ms. May be lengthened, shortened or eliminated by changing value of resistor

\$89.95

COMMUNICATIONS SPECIALISTS

426 West Taft Avenue, Orange, California 92667
(800) 854-0547/California: (714) 998-3021



hy-gain[®]

“Heavy Duty is Relative!”

In our lineup of rotators, the CD45 II is rated as medium duty. Some of our worthy competitors offer similar rotators which they rate as “heavy duty” and, within their product line, they are. But if you compare all rotators, it's a different picture. Here is a comparison of our CD45 II, our HAM IV and the Alliance HD73 (Specifications as stated by the manufacturer).

	HD73	CD45 II	HAM IV
Output Torque	400 in. lbs.	600 in. lbs.	800 in. lbs.
Gears	Plastic and Steel	All Steel	All Steel
Control Box Weight	3.8 lbs.	6.8 lbs.	6.8 lbs.
Rotor Unit Weight	6.5 lbs.	8.5 lbs.	10.5 lbs.
Direction Indicator Potentiometer	Carbon	Precision wire wound	Precision wire wound
Rotation Limiter	Mechanical stop only	Limit switches with mechanical stop	Limit switches with mechanical stop
Braking Power	1600 in. lbs. “Windmilling”	800 in. lbs. “Holding”	5000 in. lbs. “Holding”
Antenna Size Rating	10.7 sq. ft.	8.5 sq. ft.	15 sq. ft.

Wind load rating is an important specification too. Unfortunately, there is no standard method of measurement. For example, a long boom antenna with an unbalanced wind load is a much tougher problem than the calculated square area of the antenna would suggest. So we take a conservative “worst case” approach and rate the CD45 II at 8.5 square feet. Yet, the HD73, a lighter unit, is rated at 10.7 square feet. You be the judge.

Here is a complete listing of Hy-Gain rotators and the typical antenna systems that each will comfortably and reliably manage.

AR40—Primarily used for small to medium size VHF and UHF beams. Can also be used with a 10 or 15 meter, 3 element Yagi.

CD45 II—Recommended for a 3 element tribander such as our Explorer 14. Will also manage a medium sized VHF stack and is a good choice for the Azimuth rotator on a good sized satellite system.

HAM IV—A favorite for long boom tribanders such as our TH7DX. Would also be a good choice for an Explorer 14 stacked with a VHF DX antenna or a satellite system.

HAM SP—A modified Ham IV with a special control unit for a blind operator. Single knob directional control system includes a compass rose with braille markings. An audible beep indicates rotator start and stop.



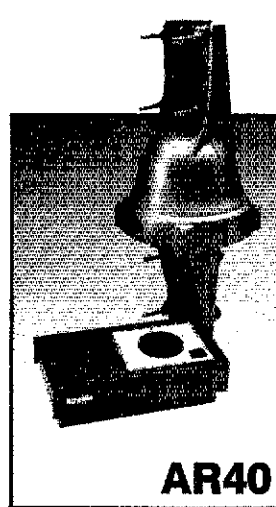
T2X—The well-known Tail Twister manages combinations such as a TH7DX stacked with a small 2 element 40 meter beam. Also a great choice for a substantial VHF “weak signal” array. Of course, the ever popular stack of 3 or 4 element 10, 15, and 20 meter monobanders is a safe match for the T2X.

HDR300—This 5000 inch pound torquer is our idea of heavy duty. This is the choice for stacked HF “Long Johns” or the full sized 3 element 40 meter monsters. A favorite too for the giant VHF “weak signal” systems where the 1° rotator control and indicator accuracy is a must.

CHOOSING THE RIGHT MODEL—The mistake most commonly made is selecting a rotator for the antenna being installed at the time and not looking forward to the antenna system that you ultimately plan. A rotator that is not over-loaded will deliver many years of reliable service. So, when you choose yours, plan ahead and buy the model that will handle the ultimate load. If in doubt, drop us a note. We will share our experience with you. Long term, you will save money.



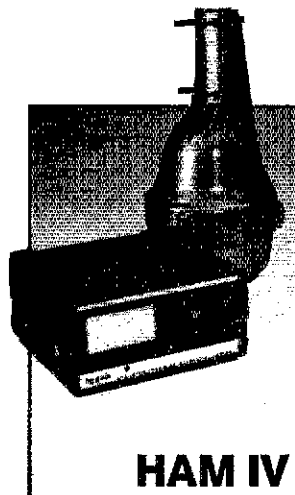
HDR300



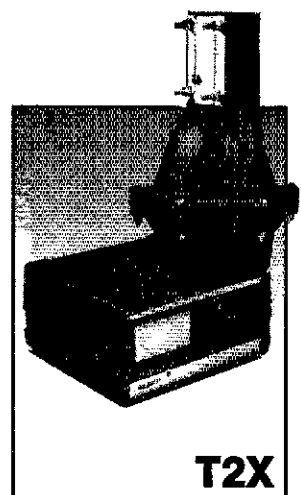
AR40



CD45 II



HAM IV



T2X

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Europe: Le Bonaparte—Office 711, Centre Affaires Paris-Nord,
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JPC/AZDEN[®]

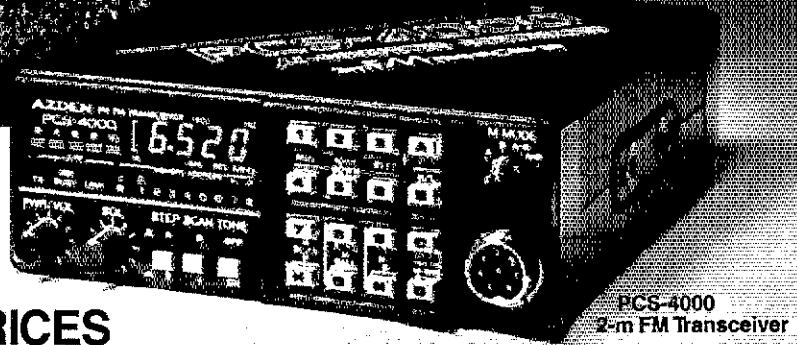
4000 SERIES FM TRANSCEIVERS

10 METERS & DOWN

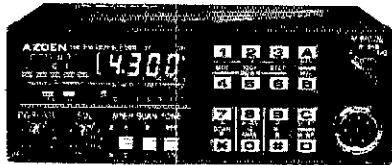
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THE 4000 SERIES



PCS-4300 70-cm FM Transceiver



PCS-4500 6-m FM Transceiver



PCS-4800 10-m FM Transceiver

- **WIDE FREQUENCY COVERAGE:** PCS-4000 covers 142,000-149,995 MHz in selectable steps of 5 or 10 kHz. PCS-4200 covers 220,000-224,995 MHz in selectable steps of 5 or 20 kHz. PCS-4300 covers 440,000-449,995 MHz in selectable steps of 5 or 25 kHz. PCS-4500 covers 50,000-53,995 MHz in selectable steps of 5 or 10 kHz. PCS-4800 covers 28,000-29,990 MHz in selectable steps of 10 or 20 kHz.
- **CAP/MARS BUILT IN:** PCS-4000 includes coverage of CAP and MARS frequencies.
- **TINY SIZE:** Only 2" H x 5.5" W x 6.8" D. COMPARE!
- **MICROCOMPUTER CONTROL:** At the forefront of technology!
- **UP TO 8 NONSTANDARD SPLITS:** Ultimate versatility. COMPARE!
- **16-CHANNEL MEMORY IN TWO 8-CHANNEL BANKS:** Retains frequency and standard simplex or plus/minus offsets. Standard offsets are 600 kHz for PCS-4000, 1.6 MHz for PCS-4200, 5 MHz for PCS-4300, 1 MHz for PCS-4500, and 100 kHz for PCS-4800.
- **DUAL MEMORY SCAN:** Scan memory banks either separately or together. COMPARE!
- **TWO RANGES OF PROGRAMMABLE BAND SCANNING:** Limits are quickly reset. Scan the two segments either separately or together. COMPARE!
- **FREE AND VACANT SCAN MODES:** Free scanning stops 5 seconds on a busy channel; auto-resume can be overridden if desired. Vacant scanning stops on unoccupied frequencies.
- **DISCRIMINATOR SCAN CENTERING (AZDEN EXCLUSIVE PATENT):** Always stops on frequency.
- **TWO PRIORITY MEMORIES:** Either may be instantly recalled at any time. COMPARE!
- **NICAD MEMORY BACKUP:** Never lose the programmed channels!
- **FREQUENCY REVERSE:** The touch of a single button inverts the transmit and receive frequencies.

no matter what the offset.

- **ILLUMINATED KEYBOARD WITH ACQUISITION TONE:** Unparalleled ease of operation.
- **BRIGHT GREEN LED FREQUENCY DISPLAY:** Easily visible, even in direct sunlight.
- **DIGITAL S/R/F METER:** Shows incoming signal strength and relative power output.
- **BUSY-CHANNEL AND TRANSMIT INDICATORS:** Bright LEDs show when a channel is busy and when you are transmitting.
- **FULL 16-KEY TOUCHTONE[®] PAD:** Keyboard functions as autopatch when transmitting (except in PCS-4800).
- **PL TONE:** Optional PL tone unit allows access to private-line repeaters. Deviation and tone frequency are fully adjustable.
- **TRUE FM:** Not phase modulation. Unsurpassed intelligibility and audio fidelity.
- **HIGH/LOW POWER OUTPUT:** 25 or 5 watts selectable in PCS-4000; 10 or 1 watt selectable in PCS-4200, PCS-4300, PCS-4500, and PCS-4800. Transmitter power is fully adjustable.
- **SUPERIOR RECEIVER:** Sensitivity is 0.2 uV or better for 20-dB quieting. Circuits are designed and manufactured to rigorous specifications for exceptional performance, second to none. COMPARE!
- **REMOTE-CONTROL MICROPHONE:** Memory A-1 call, up/down manual scan, and memory address functions may be performed without touching the front panel! COMPARE!
- **OTHER FEATURES:** Dynamic microphone, rugged built-in speaker, mobile mounting bracket, remote speaker jack, and all cords, plugs, fuses, and hardware are included.
- **ACCESSORIES:** CS-7R 7-amp ac power supply, CS-4.5R 4.5-amp ac power supply, CS-AS remote speaker, and Communications Specialists SS-32 PL tone module.
- **ONE YEAR LIMITED WARRANTY!**

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Please circle the scanner purchased:

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Uniden® Bearcat® Scanners are approved for use in neighborhood crime prevention programs.

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Around the corner: Yaesu's VHF/UHF

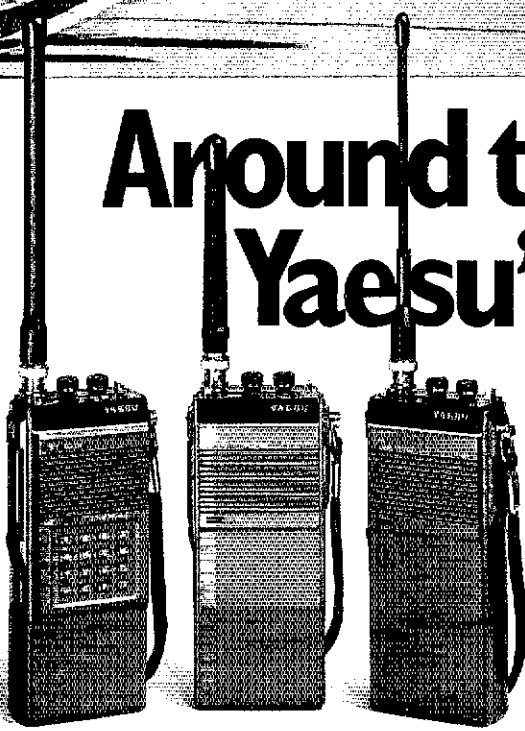
Whether it's for working your favorite repeater or working an exotic land, Yaesu's got the choice in VHF and UHF radios that you need.

In fact, you'll discover that our VHF/UHF line is as diverse as your operating needs.

So when you want to make your VHF/UHF operation complete, just look to Yaesu for the solution.

For your hand. We're constantly raising the standards in handheld radio technology. And our 5-watt, 2-meter FT-209RH and our 4-watt 440-MHz FT-709R are no exceptions.

In fact, you won't find a more flexible, easy to use HT design anywhere.



handheld alternative, we've got your bases covered too.

We give you a choice of three bands of operation: the FT-203R for 2 meters, the FT-103R for 220 MHz, and the FT-703R for 440 MHz.

Each of these lightweight rigs features 2.5 watts of power and an optional DTMF keyboard.

Over land. Our two mobiles give you a lot of power in very small packages.

The FT-270RH is a 2-meter, 45-watt rig that conveniently packs its 45-watt punch into just about any small space in your car.

The FT-2700RH is a 25-watt FM dual-bander that lets you operate on 2 meters or 440 MHz. Or combine the two for cross-band, full-duplex, telephone-style operation.

Either way, both rigs are simple to operate. You get ten memory channels. Flexible band-scanning functions. Dual VFO capability.

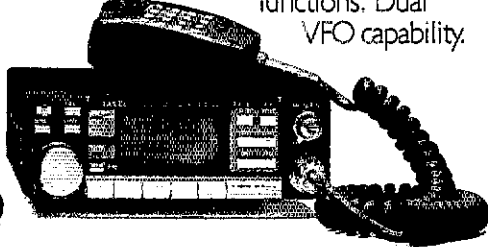
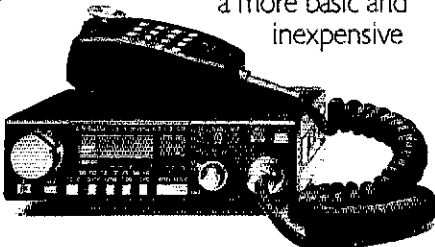
Each rig gives you a battery saver that really helps conserve your battery power.

Two microprocessors make for a wider range of scanning functions. And complete storage capability in each of the ten memory channels.

Even an optional plug-in tone encode/decode module is available.

And best yet, these two high-powered HTs fit very comfortably in your hand, thanks to an ultraslim and lightweight design.

However, if you're looking for a more basic and inexpensive





Around the world. Fine gets you there.

With a clean, uncluttered LCD display for easy readout.

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.

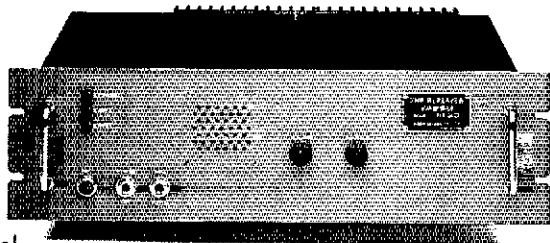
Also, an optional plug-in tone encode/decode board is available.



restricted neighborhoods.

The FT-726R is a 2-meter, 10-watt rig with cross-band capability. To assemble the core of your earth station, simply plug in two optional modules, one for 435-MHz operation, another for cross-band duplex.

You get eleven memories, dual VFO registers, highly versatile scanning functions, and a whole lot



may be. Just write us with your system specifications, and we'll recommend the required hardware.

What's more, you can rest assured that our repeater system is proven and reliable. In fact, it's been used extensively in both amateur and commercial applications.

Yaesu gets you there.

So when you're ready to get out on VHF/UHF, go with Yaesu. You'll discover a new world of innovation.

Across the world. We've got the world's most popular link to OSCAR 10, the triband FT-726R.

And talk about DX. You'll be making worldwide contacts in true 20-meter style. With excellent signal quality too.

And better, you can work the world from just about anywhere. Including apartments and antenna

more to make the FT-726R a highly worthwhile investment.

Tie it all together: Finally, if you're looking for a repeater system, we've got just the repeater and intelligent controller that you need.

We'll help fine-tune your system to fit your individual requirements. No matter what they

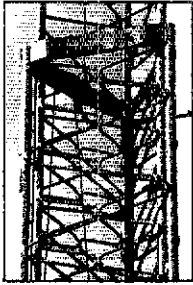
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Rugged Hy-Gain antenna crank-up towers are made as no others. All steel construction and galvanizing after welding meets ASTM material standards. Giant welding fixtures assure straight and true alignment of tower sections for close tolerance crank-up guide systems. Diamond web bracing, 2.5 times the strength of ordinary "W" bracing, adds strength where tower sections meet. Open-end tubular steel legs are galvanized inside and out and permit unrestricted moisture drainage. It all adds up to long lasting, massive tower strength for antenna loads of up to 16 sq. ft. at 60 mph.

	Tower Sections	Height Extended	Height Retracted	Width at Base	Antenna Windload Limit	Weight
HG-52SS	3	52 ft. 15.8 m	21 ft. 6.4 m	16.44 in. 417.6 mm	9.5 sq. ft.-50 mph .88 sq. m-80 km/h	455 lbs. 206 kg
HG-37SS	2	37 ft. 11.3 m	20.5 ft. 6.2 m	13.75 in. 349.3 mm	9.5 sq. ft.-50 mph .88 sq. m-80 km/h	265 lbs. 120 kg
HG-54HD	3	54 ft. 16.5 m	21.5 ft. 6.6 m	19.53 in. 496.1 mm	16 sq. ft.-60 mph 1.5 sq. m-96 km/h	575 lbs. 261 kg
HG-70HD	4	70 ft. 21.3 m	21.5 ft. 6.6 m	22.63 in. 574.7 mm	16 sq. ft.-60 mph 1.5 sq. m-96 km/h	1100 lbs. 499 kg

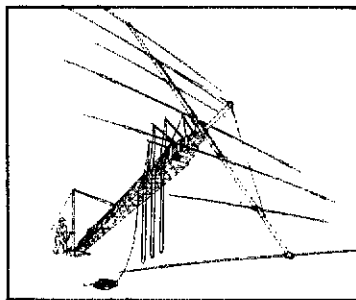
Hy-Gain crank-up towers come complete with hinged base, installation steelwork, pre-drilled rotator plate and a manual winch.

Hy-Gain crank-up towers require no guying and conform to EIA, to the Uniform Building Code, and are approved by Los Angeles (license 1095). UBC documents for building permits are available on request (specify tower model) **before** you buy the tower.

OPTIONAL TOWER ACCESSORIES

Electric winch/Remote control
 • Mast • Thrust bearing • Coax arms • Rotators • Tower Gin Pole

An accessory tilt-over gin pole allows one person to tilt the tower over to ground level.



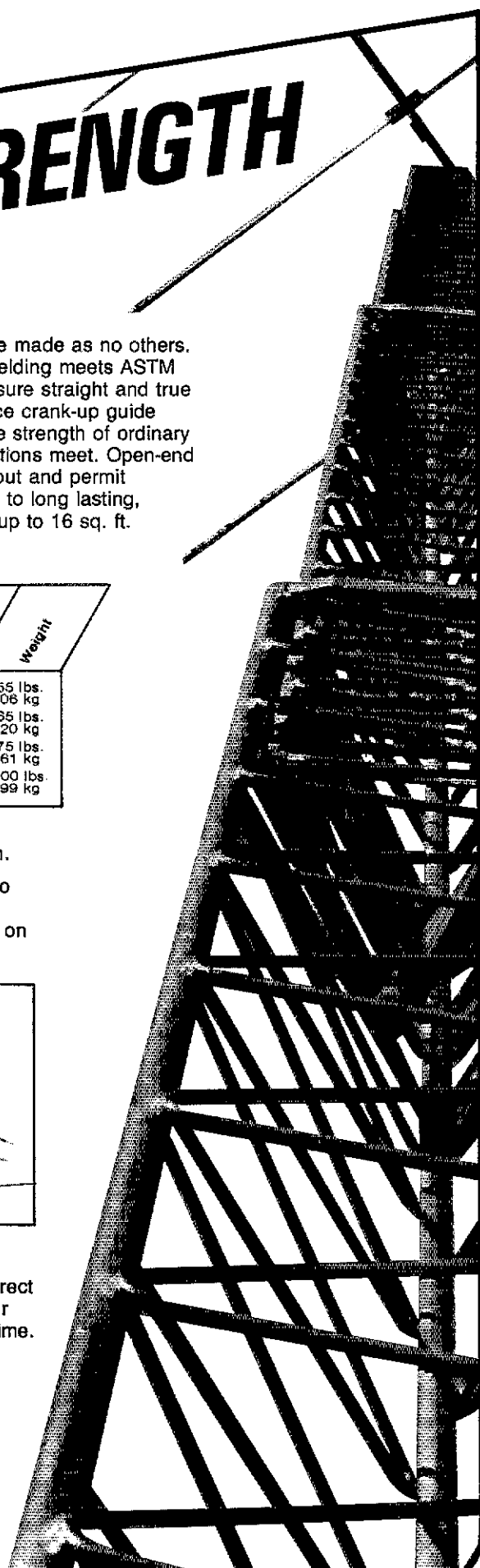
FREE FREIGHT

Order any Hy-Gain tower from your dealer for factory shipment direct to you. Hy-Gain will pay the freight on the tower and any of our antennas, rotators and accessories ordered for shipment at the same time. This offer is limited to within the 48 contiguous United States.

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TM-211A DCS... a new turn in 2 meters/70 cm.

ME 211A

The TM-211A 2 meter and the TM-411A 70 cm mobiles combine ultra compact size with the added feature of a 7 position adjustable front panel, allowing you maximum flexibility in both home and automotive installations! These compact transceivers also feature Kenwood's innovative DCS (Digital Code Squelch) circuit, that allows you to program your transceiver to respond only to transmissions from stations whose radios transmit a pre-selected digital code. Both radios deliver 25 big watts of R.F.

power on HI and 5 watts (approximately) on LO power. Dual digital VFO's, built-in, highly visible yellow LED display, five memories plus COMM Channel add to this impressive array of features. The TM-211A and TM-411A each boast high performance receive and transmit specifications and an external high quality speaker that provides unsurpassed sound quality. Mounting flexibility is also a feature. Yes, all these features, plus priority watch memory and programmable band scan, microphone test function, audible "beeper" for operation confirmation, repeater offset switch and reverse switch. The TM-211A and

TM-411A offer you the best in 2 meters and 70 cm operations!

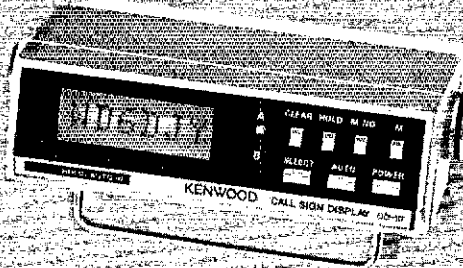
Optional accessories:

- CD-10 Call Sign Display
- PS-430 D.C. Power Supply
- KPS-7A Power Supply
- MC-55 Mobile Microphone with Time-Out Timer
- MA-4000 Dual Band Mobile Antenna with Duplexer
- SW-100A/B SWR/Power meters
- PG-3A Noise Filter

More information on these products is available from authorized dealers of Trio-Kenwood Communications, 1111 West Walnut Street, Compton, CA 90220.

CD-10/DCS

The optional CD-10 helps maximize your use of Kenwood's revolutionary new signalling concept, DCS (Digital Code Squelch). DCS uses digital code information to open squelch on a receiver that has been programmed to accept the specific code being transmitted. Up to 100,000 different 5-digit codes are possible, allowing each station to have its own "private call" code or



to respond to a "group call" or "common call" code. Program your call sign (up to 6 digits) in the ASCII code and it is automatically transmitted when the transmit key is depressed. The CD-10 stores the calling station's call sign in its memory

for future reference, and it is also displayed on the L.C.D. readout. The CD-10 can store call sign data of up to 20 stations, allowing you to quickly check for calls if you have been absent from your station, and review your contacts for logging purposes. The DCS/call sign data transmission system uses mark and space frequencies within the normal speech band width (compatible w/most repeaters).



TM-201A/401A

The extremely popular TM-201A 2 meter FM (25 watts, 142,000 to 149,000 MHz) and the TM-401A 70 cm FM (10 watts, 440-450 MHz) ultra compact mobile transceivers are also available.

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



MADISON

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Call for quotes
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a term of nine years. Congrats to you both on a job well done! K4IA checked into OEN from Ohio several times during the holidays while he was visiting W4LA. His reports only 20 phone patches this month as the ships were in port for the holidays. N4KB reports that most of his traffic is TCC to the west coast. WB9IRV reported that 42% of the candidates received full or partial credit towards a higher class of license as a result of the jointly sponsored examinations given by The Florida Institute of Technology ARS and The South Brevard ARC. WB9IRV reported that Robbins E. Rice, KB4AGU was the only applicant to completely pass all of the required elements to obtain the Amateur Extra Class license. He held a Novice Class license when the exams started! Congrats on an outstanding job! Do you recall the W4RUF report who is now Advanced Class! W4JM writes that he, W2HGV and W4TF are starting classes in Lakeland which will lead to ARRL exams. Congrats also to WD4NEA, for receiving the "HAM OF THE YEAR" award from the Broward ARC! W3GUL and W3WR said that their Christmas present was a new Corsair rig! 73 de W4APFK. Traffic: W3GUL 3973, W3WR 1142, KA4AMC 868, K4ZK 866, WD4KBW 667, W4NFK 639, W4APK 522, K4EUK 559, AA4GF 552, W4WYG 377, K3JT 364, KA4GUS 274, W4AEC 263, KF4JA 249, K4IA 243, K4SCL 243, W4AHXU 197, A4B1 195, KY4U 171, AF3S 169, KA4NF 153, W2BNVJ 152, WD9AEP 149, KC 132, W4DCH 111, K4YHS 106, K4JLL 100, W4YCI 99, WD4CHO 98, N4KE 98, KA4RW 88, W1NJM 88, W4LLA 84, KF4RL 92, KA4FZ 87, W3TLV 84, N4JO 82, W4PKP 81, K4JI 79, W4TF 68, K4BAKY 65, W4B4ID 50, N4JOA 49, K4ABBA 48, AA4WJ 48, WD4NKK 44, K4IHH 35, W4B4CF 34, K4CGR 33, K4A4XG 32, K4ALX 30, VE1SH 29, W4SME 26, K4BXT 19, KA4SIH 19, K4FQU 18, AA4M 18, W4SS 17, W4MPV 16, W3JIR 15, KA4KD 12, N4IX 12, K9EHP 10, W4ANN 9, K84ELO 7, W4UJ 7, N4X4 7, W4KF 6, W4AGIE 6, WD4MCC 5, W4MFD 5, KA4GDU 2, W4AAT 3, W4F4 3, W4ZCBL 3, W4ALYK 3, W4AYNO 2, K4AXD 2, N4ILN 2, W4AJ 2, W4BST 2, K4BCX 2, K4OV 2.

WEST INDIES: SM, Gregorio Nieves, KP4EW - West Indies Net (WINS) call 7:00 PM to 23:00 UTC on 3.710 MHz. West Indies Net Central (WINC) Daily 6:30 PM, (2250 UTC). WINC net is growing rapidly again and new net controls have joined the net. Congratulations, Hugo, for a job well done and thanks to all of you that have helped Hugo run the nets. We regret to inform you the loss of two good amateurs and active ones, Jorge Lugo, KP4DGT and Dr. Fernando Valleclilo, KP4PW. Specially Fernando, KP4PW, was my fellow officer in the Puerto Rico National Guard for some years and was in charge of the Club station there. He selected his call sign, when it was permitted to do so, to fit his sentimental feelings as he was a prisoner of war during the Second World War in Germany. My condolences and that of all of our ham community to the family of both of them. Congratulations to KP4HZ, now W4FA, and W4P4BCV, now KP4IG, for their recent upgrading to extra and advanced respectively. An out of season hurricane formed north of West Indies on December 23rd. That fortunately did not touch us and was called Wilma. By the way it doesn't have to do anything with KP4DJ. KP4DJ reports the following totals for WINS: QND 487, QTC 43, QNI 82, 30 sessions. KP4ABK reports the following totals for WINC: QND 4 408, QTC 19, QNI 382, 24 Sessions. Traffic: KP4DJ 140.

SOUTHWESTERN DIVISION
ARIZONA: SM, Erich J. Holzer, N7EH - STM: W7EP, NPM: K6LL KA7HEV and W7BCG. Well 1984 has become history with this report. We have seen many many of the section's hams participate in numerous public service activities. One of the major challenges to Amateur Radio that has been handled well by Arizona hams has been the "Volunteer Examination Program." All those who volunteered their time and effort deserve a pat on the back for a job well done. A total of 28 members of our members participated in the following public service activities: The Octoberfest Volksmarch, The Camp Wildcat Bikeathon, The Palo Verde test exercise, the Thunderbird Balloon races, and the Children's Fleetsa Bowl Parade. The ARA Squelch Tail has received an award from the Amateur Radio News Service as Outstanding Newsletter. FB job ARA. The Cocooning ARC has been designated by the ARRL as a Special Service Club. New club officers for the Green Valley ARC are: J. Washburne as Pres., S. Steele as V. Pres. and S. Hughes as Sec./Treas. ATEN: QNI 1145, QTC 268, Cactus Net: QNI 700, QTC 233, SWN: QNI 210, QTC 287, DLR: KB7FE, BPL: both Nov and Dec KB7FE and for Dec W7AMM. Traffic: KB7FE 2033, W7AMM 768, K8LL 423, W7EP 291, KA7HEV 155, W7OIF 112, N6NLM 98, W7LVB 71, KA7TCI 68, W7KXE 62, W7CAG 56, N7GQM 44, W47KE 42, K7NMQ 32, K7JKM 29, KA7JUN 29, K7Pof 28, W7ANL 15, W7DQS 4, KA7KHU 4. (Nov.) W7KXE 27, W7CAG 24, KA7KHU 2.

ORANGE: SM, Sandra Heyn, W6WZV - ASM/SEC: W8UBO, STM: W6QCA, ACC: K6NLY, BM: W6DXL, OO/RFI Coord: W6RE, PIO: NS8W, SGL: N6HIO, TC: AA6DD, Congrats to W6QCA on making Brass Pounders League (BPL) for December. Also congrats to new ORS K86CYD and OJ/AA W66GCT. New club officers: OC Council: WRC: NS8W chairman, W6A1A vice chairman, W6BLLI treasurer, AEA Council: ARC: K6N6A chairman, W6OXX vice chairman, and W6LPI secy/treas; OCC Communicators (OC RACES): N6HQI pres/asst, RO, N6GVO training officer, W6BHZ tech officer, K68VCT public information officer; Buena Park ARC: W6BT pres, K6BMRJ vp, K6BEHX treas, N6FSL secy; So Orange ARC: Fullerton Radio Club: W6ZKZ pres, W66GCT vp, K6SAS treas, K6AOB secy; Tri-County ARC: W6WXG pres, K6Q8M vp, W6ATLC secy, K6BLE treas; So CA DX Club: N6VJ pres, N6CGV vp, K6GAR secy, K6BHW treas; Bishop ARC: N6JV pres, W66RIN vp, N6WC secy, K6HII treas; Lake Elsinore Valley ARC: W6ZJQ pres, W6WPP vp, K6B8TM treas, W66AT secy; RFA Carlsbad: W6MIA pres, K6V6G vp, W6UPP treas, K6SUMX secy; Victor Valley ARC: W6OUU pres, 1st vp K6B1KU, 2nd vp K6EP6, K6PVS secy, K6B8LD treas; Coachella Valley ARC: N6B8P pres, K6A1YS vp, W6A0GH secy/treas; Morongo Basin ARC: N6N83 pres, W66RWZ vp, K6B6II secy, K6A8BQ treas; Barstow ARC: N6KUJ pres, W6B8SAK vp, K6B8BLA secy/treas; Downey ARC: K6F8D pres, K6G8N vp, N6A6 Board chairman; Catalina Repeater Association: W6BHTU pres, W6UFS vp, W6JXC secy, K6S1JX treas; Riverside ARC: AH6CL pres, W6K9N vp, K6A1JP secy, N6FRW treas. A past SW Division Director and close friend, W6MLZ, has become a Silent Key. His many contributions to Amateur Radio are too numerous to list. Many thanks to the hundreds of hams who helped with the communications for Banta-vision, operation Santa Claus and Tournament of Roses parade. All ARES/RACES groups are asked to support OC AR Emergency Service Groups (OCARES) headed by chairman W66ORH. ACE W66GCT is heading up the new Fullerton Amateur Radio Emergency Service (FAPES). SW Director, W6WZV, announced Senator Goldwater, KYGA, will be the banquet speaker with Roy Nee, K6DUE, of NBC, Master of Ceremonies for the SW Division Conven-

tion to be held aboard the Queen Mary Aug. 9-11. Also ARRL General Manager, K1ZZ and ARRL Council, N3AKD, San Diego, Calif., in addition, W6AMM has made a "thombic farm" available to registered attendees: PSBR: W6BTF W6QCA K66BNW W6NTN K6A6JK W6B6QZ. Traffic: W6QCA 512, K6A6JK 476, W6BTF 372, N6GOT 333, K66BNW 278, W6B6QZ 198, AG6A 160, K6GGS 115, W6NTN 59, W6RE 45, K6DD 40, K6CZE 25, W6TKV 24, W6C6P 24.

SAN DIEGO: SM, Arthur R. Smith, W6INI - STM: N6GW, SEC: W6INI, PIO: K6GLF, ACC: W6AOC, TC: N6NR, BM: W6A8JJ. San Diego will host the 1988 ARRL National Convention, Sept. 5-7. Those of you throughout the country have an excellent opportunity to plan ahead for a one- or two-week vacation in this area. If you would like to be placed on a mailing list for more information about San Diego's vacation attractions, drop a note to W6INI (page 8 of QST for address). For Section Managers: What do you think about a national meeting of SMs at the convention? It would probably be a first. ARES took part in a county emergency medical drill on Dec. 19. Operators at 8 hospitals provided communications to the scene of the simulated disaster. Participants were W6BFO K6DBJ, W6DGIW N6HLO N6HVK N6BQJ W6INI K6BK W6KPR W6LE W6BLL W6NFG N6DQJ W6ET W6BTF W6UZL W6ZBE. 1985 club officers: Palomar ARC, W9FQN Pres, K6B8NR VP, K6B8DQR Sec, W6OLO Treas; Escondido ARC, W6C2Z Pres, W6A1QY VP, K6F6MM Sec, K6APV Treas. Applicants: K6GU to OBS, K6RYJH to OPR, NCTN: 30 sessions, 408 megs. Traffic: K6U6 830, K6TA 806, K6BAJ 270, K6M1 123, N6GW 110, K6A6J 430.

WEST GULF DIVISION
NORTHERN TEXAS: SM, Phil Clements, K5PC - ASM/ACC: N1SV, STM: A6SI, SGL: W5UXP, BM: W5QXK, PIO: N5FCL, OO/RFI: W5JUB, A total of nearly 4,000 tlc count for the Section this month shows that the holiday season tlc nets were buzzing with activity. Thanks to all of you tlc handlers for making the season brighter for the public, and for your reports! Tomado season is upon us. I hope everyone has made it to a SKYWARN refresher course by now; if not, please plan to attend one if possible. If you have, or plan to organize an ARES quick response team in your area, please let me know. Communications Red Cross ARA's, I.D. cards are available for your group. All that is necessary is a C.P.R. course through your local Red Cross Chapter. Cards will be sent upon request from your local E.C. The D.P.S. Hq. at Garland is now equipped with HF and VHF stations including RTTY equipment. Also the Dallas A.R.C. has installed RTTY and Packet radio gear in the emergency van. There are more than 20 very active packet stations active in the D/FW area. This medium is most valuable in moving large volumes of H&W tlc from a disaster area. When the new generation OSCAR's are operational, we should get nationwide coverage on UHF Packet Radio from any conceivable disaster scene in our S.W. region. We seem to rely on poor conduct and cumbersome rigs and antennas as in the past! The appointment file has been purged as of Jan. 1st. If you have not reported your station activities to me in 1984 at least three times, you have probably been dropped. Let me know if you become active again, or are interested in any of the available appointments. My address is on page 8 of this issue of QST. New officers for the West Texas A.R.C. of Odessa are: N5ETX/pres, K55HJV/P, N5GR/Sec, Treas., and board members, K55MM, K5IID and K5D5L. The Club meets first Thurs. each month @ the Red Cross Bldg. @ 200L. PSHR for Dec. 1984: K5AZZ, N5BT, W5B6B, W5B6F, K5B1, K5ASPT and K5B7H. For 1985: N5BT 589, K5D5R 431, K5UPN 409, K5AZZ 375, K5BNH 354, K5BUI 341, W5OYL 272, W6AHM 195, K5D5F 186, K5SPT 163, A5E1 117, W5QU 71, K5A5FZ 63, W5DEEH 60, N1SV 59, K5EVI 58, W5ERT 52, W5BNFS 40, W5BVIH 29, K5CQYV 14, W5A5EZ 13, K5ANX 12, K28C 10, K5PC 1.

OKLAHOMA: SM, Dave Cox, N65N - SEC: W5ZTN, STM: K5VX, ACC: N5JY, BM: W5AS, PIO: W5SIFB, OO/RFI: K5WVG, SGL: W5N2S, TC: W5QMJ. In response to action by the ARRL Board last Oct. to investigate the feasibility of relocating ARRL Hq., a committee has been formed to promote Oklahoma as a viable option. Members are: N5JY W5REC W5N2S K5KW N65W K5ENA K5ASHC W5ATB and N5BN. Fee forward any suggestions to N5JY. K5CAY has stepped down as ACC after two excellent years. Thanks for FB job Dan, N5JY relinquished OK position to me, and N5JY and W5SIFB named the PIO post. Good luck to Bill and Don. Tulsa ARC has recently applied to become a Special Service Club. They are first in Okla. to apply for the prestigious position. Apologies for error in January QST regarding first ARRLVEC exam in OK Section. Cimarron ARA was the sponsoring club with VEs: K15P, N5NZ, AB5Z and K5E5P. GPARC VEs and others assisting were: N5FL, K5COU, N5C6 and K6B8H. Traffic: K5CXP 358, N5RL 337, K5VX 314, W5B58R 279, K5D5SQ 230, W5REC 213, W5VJU 173, K5COU 188, W5B5LW 149, N5GTP 138, K5B5E 132, K5GBN 120, W5SIFB 79, W5D5J 76, W5FW 76, W5R6B 68, W5FUJ 59, N5B5N 53, W5D5J 42, W5R6B 42, W5R6B 42, W5VJU 26, W5EN 32, W5AZSO 32, W5C5VY 32, W5C5VY 26, W5A5G 26, W5VLLW 26, N5PT 22, N5D5 4, K5GW 4, W5JU 2, K5SAW 2.

SOUTHERN TEXAS: SM, Arthur R. Ross, W5KR - SEC: K5KRI, STM: K5QEW, ASM: N5TC, THE BEAM, bulletin of Sun City ARC (El Paso) reports a grand club auction; K5TRW did the auctioning while all members helped make it a big success. The club is enjoying a jump in membership. Officers for 1985 are D68FV (pres), W5B5LJO (vp), N5RG (secy), W6BQU (treas). The Hispanic ARS (Austin) plans to work in Laredo with the Nuevo Laredo (Mexico) Hams providing communication for the annual George Washington celebration Feb. 23; this group uses 7.264 MHz, 3.984 MHz, and 4.284 MHz for contacts and regular with a band plan. Saturday, Feb. 24, is the busiest period of the week, Texas Southmost ARC (Harlingen) held the first-ever VE test session Dec. 29 at Texas State Tech Institute; 17 applied, 12 showed up, 2 passed code and 1 passed upgrade. McAllen/Edinburg VEs have session scheduled Feb. 2. W6H1 announced appointment of W5TFB as Asst Net Mgr for CAN, Cycle 4. CAND Mgr W5KLV reports 4,281 megs handled in 31 sessions: DRNS represented 100% by South Texas stations WD4AL1 W5TUJ W5B5DD N5E6F K5D5Q W5KLV W5B5DQ W5B6P, N5DKM N5D5C, W Gulf Div Director W5E5Q spoke to the Golden Triangle Awards banquet at Arthur ARC, Orange ARC, Fort Arthur ARC, K5D5Y, W5JGD and W5Q5Y received plaques for Ham of the Year from their respective clubs; AD W5APX received a special plaque from ARRL. N5BB reports Austin ARC sponsored its first VE test session on December 8; examiners N5BB, K5FN and N5BA officiated. OBS W5KLV gave 6 ARRL bulletins, 4 DX bulletins, 1 CRRL bulletin, 27 satellite bulletins and 5 propagation forecasts 150 readings on 8 nets. Brazos Valley ARC elected officers for 1985: N5DF, pres; K5SSC, vp; K5ADSK, secy and W5D5EH, treas.

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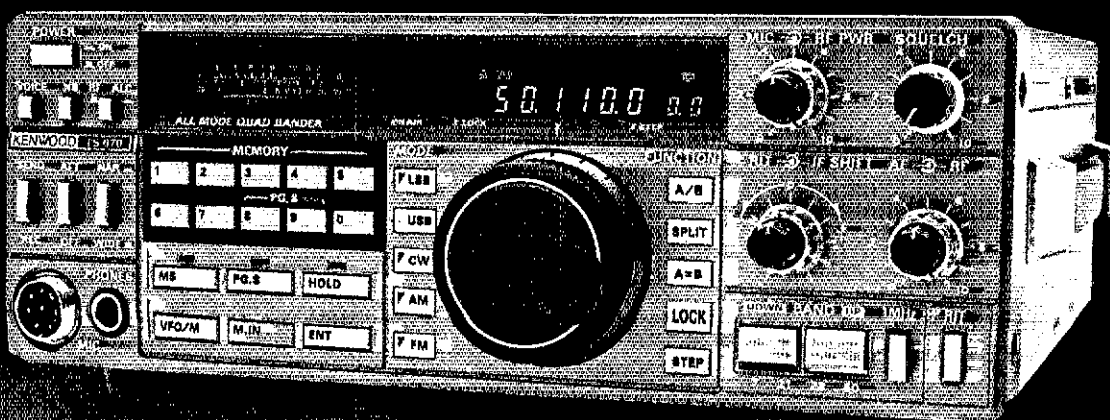
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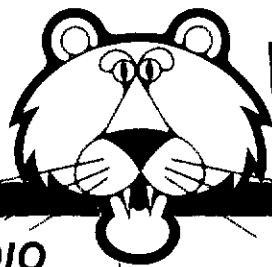
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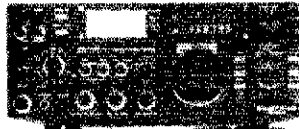
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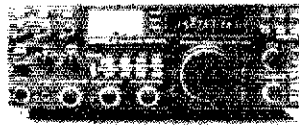
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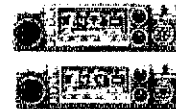
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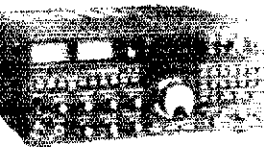
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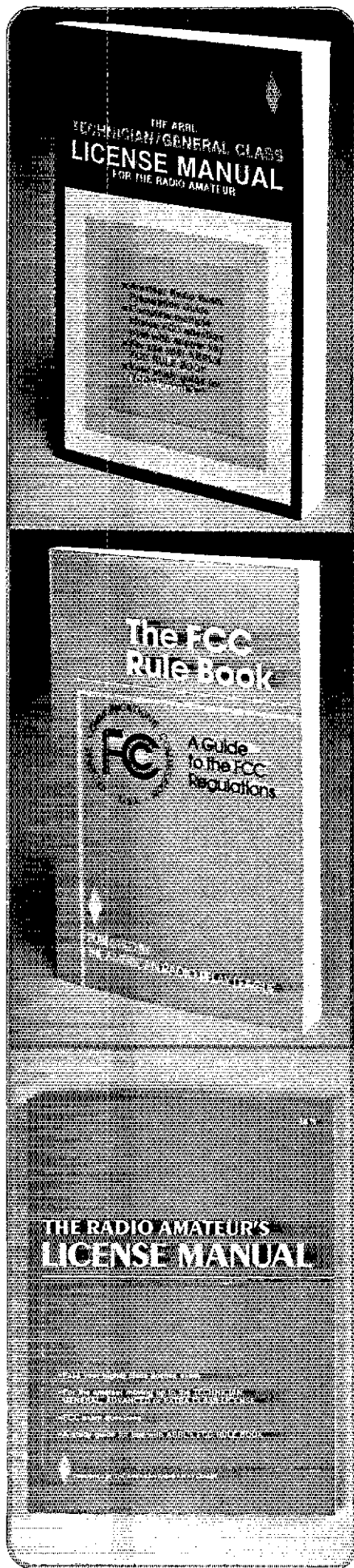
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1

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3

80TH EDITION LICENSE MANUAL

This publication will gradually be phased out as new question pools are released, and new versions of the License Manual Series are published. (See February *QST* page 51.) The material covered is still valid for some General Class exam sessions — most VEC's will have changed to the new pools by April. Material covering the Advanced Class should still be good until June and until September for the Extra Class.

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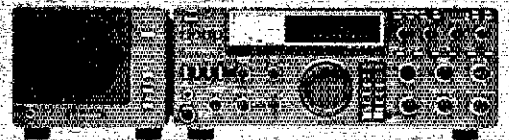
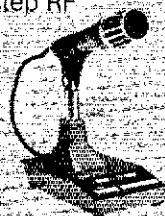
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THANK YOU for attending Warren, Ohio Hamfest. See you August 18, 1985.

1985 BLOSSOM BLAST, Sunday, Oct. 6, 1985. Write "Blast" Box 175, St. Joseph, MI 49085.

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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.

ATLAS 350XL Owners Group. Free newsletter. Send QSL with rig s/n and SASE. Know people who repair them? Information to share? Questions? Rod Sharp, N5NM, Box 2169, Santa Fe, NM 87501.

ON MARCH 10, 1985 the Morgan County Repeater Association Club will sponsor the Indiana Hamfest at the Indiana State Fairgrounds Pavilion Building in Indianapolis. Dealers, vendors, forums, and free paved parking. Doors open to the public at 8AM. Table reservations: contact Aileen Scales, 3142 Market Place, Bloomington, IN 47401.

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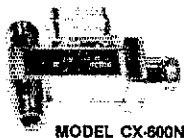
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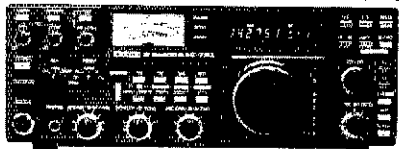
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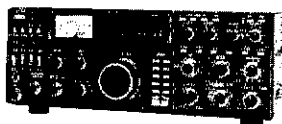


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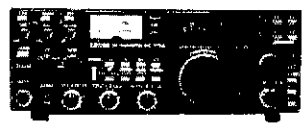
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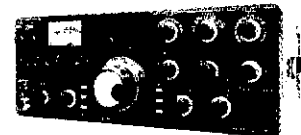


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205BAS	5 element 20 mtr. 'Long John'	\$345.00
214S	14 element 2 meter	\$45.00
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7-2S	Discoverer 2 ele. 40 meter	\$315.00
7-3S	Converts 7-2 to 3 element beam	\$199.00
BN	ferrite balun	\$21.50

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58TV	80-10 mtr. vertical	\$99.00
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Alliance U110	\$44.00
CDE-CD45-2 [8.5 sq ft]	\$139.00
CDE HAM 4 [15 sq ft]	\$219.00
CDE TAILWISPER [20 sq ft]	\$265.00
HYGAIN HDR300 [25 sq ft]	\$515.00

ROTOR CABLE

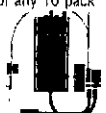
[2-18 & 6-22] 4080 per foot	\$0.18
[2-16 & 6-20] 4090 per foot	\$0.35
RG8X Mini B low loss foam per foot	\$0.17
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49 mhz, FM 2-WAY RADIO
hands free operation, voice activated transmit up to 1/2 mile. Batteries optional model 49S



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\$35 REBATE
\$189.00



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BC100-programable hand held	\$20 rebate	\$199.00
BC300-7 band, aircraft, programable	\$10 rebate	\$329.00
DX1000-show/wave radio	\$10 rebate	\$459.00
BC260-16 chan. 8 band, prog	\$5 rebate	\$239.00
BC270-40 ch aircraft, prog.	\$5 rebate	\$259.00
BC180-16 ch. 8 band, programable		\$139.00
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FOX VIXEN II-new super het detector \$154.90
SUPER FOX REMOTE-super het detector \$184.90
FOX XK-dash mount detector \$62.90
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WHISTLER SPECTRUM-super het detector \$109.90
REL 851-dash mount detector \$99.90
REL 860-dash mount super het \$119.00
REL 834-dash mount super het \$149.00
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Multi band, programmable, synthesized scanner/radio. 20 channels with 12 block chan. space switches. 26-520 mhz. frequency range, AM/FM change mode, momentary memory recall, birdie-free seek, DC or optional AC power, priority, muting circuit, dual squelch control, auto noise limiter/FM IF filter.

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PROGRAMMABLE SCANNER-no crystals, 10 channels to store frequencies you choose, 60 pre-programmed 'hot' frequencies, touch keyboard with audio response, skip, pause and action. Base-mobile or portable capabilities.
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HX1000-programable hand held	\$209.00
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MX3000-6 band, 30 ch., prog. AC/DC	\$209.00

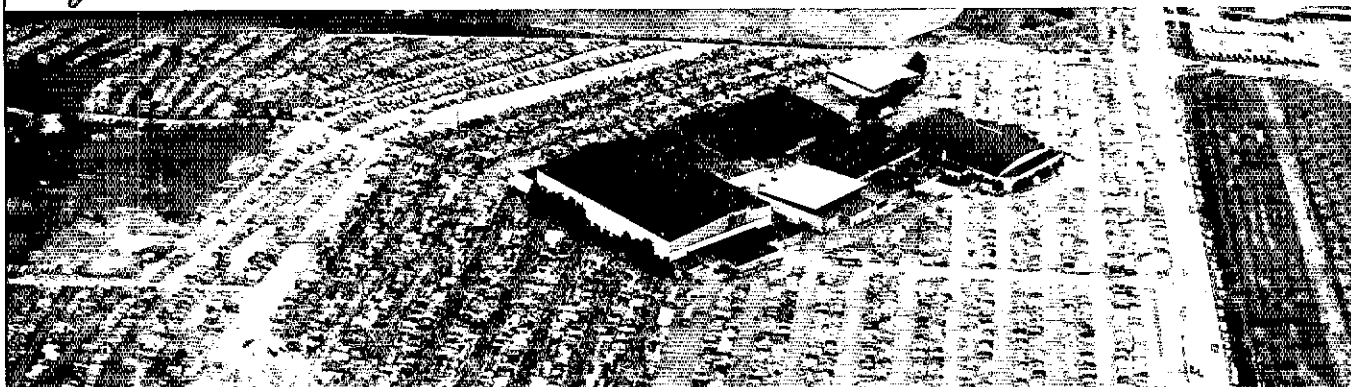
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MX5000-20 chan. continuous 25-550 mhz. including aircraft, search/scan, clock, chan. 1 priority, scan m search delay LCD

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- ★ **ARRL and FCC Forums**
- ★ **FCC Examinations**
- ★ **New Products and Exhibits**
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- ★ **Alternative Activities**
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- \$4.00 check or money order made payable to ARRL/VEC
- Completed 610 form with copy of license
- Indicate preferred sitting time: Sat. 9 a.m., Sat. 1 p.m., Sun. 9 a.m.

Mail registration to: FCC Exams, 203 Bellewood St.
Dayton, OH 45406

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Box 2205, Dayton, Ohio 45401

Registration processing
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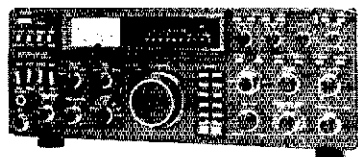
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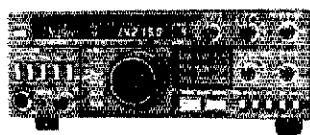
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Most Advanced, Compact

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- IF Shift—Notch Filter
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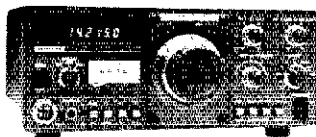
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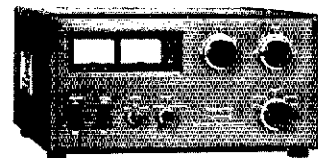


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- Narrow SSB/CW Filter Option

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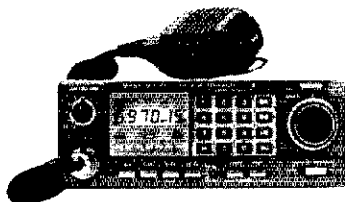


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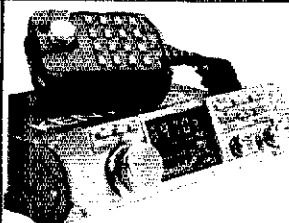
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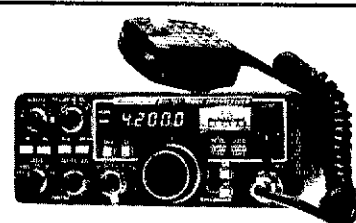
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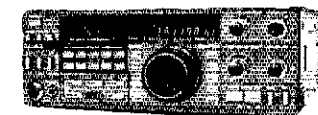
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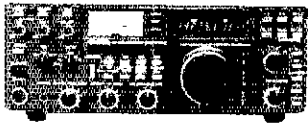
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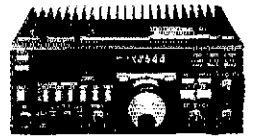
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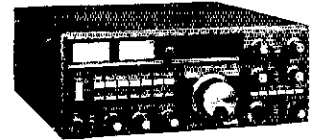
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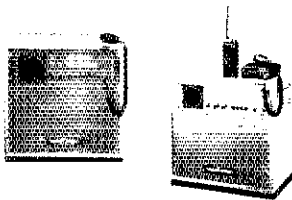
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All Accessories in Stock!
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B215	2M	Yes	2W	150W	25A	\$259
B108	2M	Yes	10W	80W	10A	\$159
B1016	2M	Yes	18W	160W	20A	\$249
S3016	2M	Yes	30W	160W	17A	\$199
C27	2M	No	2W	20W	5A	\$ 79
C106	2M	Yes	10W	60W	10A	\$129
C1012	2M	Yes	10W	120W	20A	\$259
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RS7A	5	7	\$ 49
RS12A	9	12	\$ 59
RS20A	16	20	\$ 89
RS20M	16	20	\$109
RS35A	25	35	\$135
RS35M	25	35	\$165
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MODEL RS-50A

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IC271H 2m Base 100W \$789
IC490A 70cm All Mode 10W \$579
IC471A 70cm Base 25W \$689
IC471H 70cm Base 75W \$949

YAESU

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FT26R Triband All Mode \$779
726/70 70cm module \$269
726/SU Duplex Module \$95
FT790R 70cm All Mode 1W \$349

TEN-TEC

- 2510 Satellite Station \$439

ROTORS

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Ken Pro KR400 Azim Rotor \$149
Alliance HD73 Azim Rotor \$99
Hy-Gain Ham 4 Azim Rotor \$219

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B1016 2m 160W out/10W in \$249
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D24 70cm 40W out/2W in \$179
D1010N 70cm 100W out/10W in \$289

THL CORP.

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HL160/25 2m 160W out 25W in \$269
HL160V 2m 160W out/3-10W in \$289
HL45U 70cm 45W out/10W in \$179
HL90U 70cm 90W out/10W in \$319

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416TB 70cm cir pol \$59
PS4 70cm Circularity Switch \$69
AOP1 2m/70cm Oscar Pack \$149

KLM

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Cushcraft AOP-1 Antenna Package List \$219
Ken-Pro KR500 Elevation Rotor List \$189
Alliance HD73 Azimuth Rotor List \$219
South River 10ft Roof Tripod List \$59

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THL HRA-2 2m Mast Mount PreampList \$159
Cushcraft AOP-1 Antenna Package List \$219
Ken-Pro KR500 Elevation Rotor List \$189
Alliance HD73 Azimuth Rotor List \$219
South River 10ft Roof Tripod List \$59

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THL HRA-2 2m Mast Mount PreampList \$159
KLM 2M-14C 14el 2m Satellite Ant List \$112
KLM 435-18C 70cm Satellite Ant List \$145
Ken-Pro KR500 Elevation Rotor List \$189
Alliance HD73 Azimuth Rotor List \$219
South River 10ft Roof Tripod List \$59

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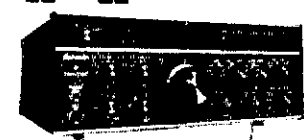
- Yaesu FT726R VHF/UHF Duplex Xcvr List \$899
430/726 70cm Module List \$289
SU/726 Sat Duplex Unit List \$109
Mirage D1010N 70cm 100W Amplifier List \$347
THL HRA-2 2m Mast Mount PreampList \$159
KLM 2M-14C 14el 2m Satellite Ant List \$112
KLM 435-18C 70cm Satellite Ant List \$145
Ken-Pro KR500 Elevation Rotor List \$189
Alliance HD73 Azimuth Rotor List \$219
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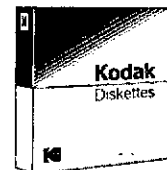
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FD2D-Y	2.89	F2D-S-Y	2.89	3015-Y	1.94			800605-Y	2.69	134-3776-Y	2.69
				3090-Y	2.39			800803-Y	3.14	125-3763-Y	3.14
				3102-Y	2.89						
FB20-1024-Y	2.89	F20-S1024-Y	2.89	3104-Y	2.89			800839-Y	3.14	126-3789-Y	3.14
MD1D-Y	1.49	M1D-S-Y	1.49	3481-Y	1.59	28820-Y	1.59	801187-Y	1.84	111-1806-Y	1.84
MD2D-Y	1.99	M2D-S-Y	1.99	3491-Y	2.19	28821-Y	2.19	802060-Y	2.59	177-3688-Y	2.59
MD20-96TPI-Y	2.99	M2DX-S-Y	2.99	3501-Y	2.99			802067-Y	3.89	130-4344-Y	3.89
MD2-HD-Y	5.29	M2HD-S	4.99	5500-Y	4.49			802914-Y	4.99	198-4806-Y	5.89
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\$99.⁹⁵ MFJ's fastest selling tuner packs in plenty of new features.
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Matches everything from 1.8 to 30 MHz: dipoles, inverted vee, random wires, verticals, mobile whips, beams, balanced and coax lines.

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MFJ-949B 300 WATT DELUXE VERSA TUNER II

\$139.⁹⁵ MFJ's best 300 watt Versa

Tuner II. Matches everything from 1.8 - 30 MHz, coax, randoms, balanced lines, up to 300W output, solid state or tubes.

Tunes out SWR on dipoles, vees, long wires, verticals, whips, beams, quads.

Built-in 4:1 balun. 300W, 50-ohm dummy load. SWR meter and 2 range wattmeter. (300W and 30W).

6 position antenna switch on front panel, 12 position air-wound inductor; coax connectors, binding posts, black and beige case. 10 x 3 x 7 in.

MFJ-940B, \$79.95, 300 watts, SWR/Wattmeter, antenna switch on rear. No balun. 8 x 2 x 6 in. eggshell white with walnut grained sides.
 MFJ-945, \$79.95, like MFJ-940B with balun, less antenna switch.
 MDJ-944, \$79.95, like MFJ-940B with balun, antenna switch on front panel, less SWR/Wattmeter.
 Optional mobile bracket for 940B, 945, 944, \$5.00.

MFJ-900 200 WATT VERSA TUNER

\$49.⁹⁵ Matches coax, random wires 1.8-30 MHz. Handles up to 200 watts output; efficient airwound inductor gives more watts out. (+\$4) 5x2x6 in. Use any transceiver, solid state or tube. Operate all bands with one antenna.

OTHER 200 WATT MODELS:
 MFJ-901, \$59.95, like 900 but includes 4:1 balun for use with balanced lines.

MFJ-1601D, \$39.95, for random wires only. Great for apartment, motel, camping, operation. Tunes 1.8-30 MHz.

MFJ-962 1.5 KW VERSA TUNER III

Run up to 1.5 **\$229.⁹⁵** KW PEP (+\$10)

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 inches.



MFJ-989 3 KW ROLLER INDUCTOR VERSA TUNER V

\$329.⁹⁵ Meet "Versa Tuner V". It has all the features you asked for, including the new smaller size to match new smaller rigs - only 10 3/4" W x 4 1/2" H x 14 7/8" D.

Matches coax, balanced lines, random wires — 1.8 to 30 MHz. 3 KW PEP the power rating you won't outgrow (250 pf-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.

Built-in 2% 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-981, \$239.95. 3 KW, 18 position switched dual inductor. SWR/Wattmeter. 4:1 balun.

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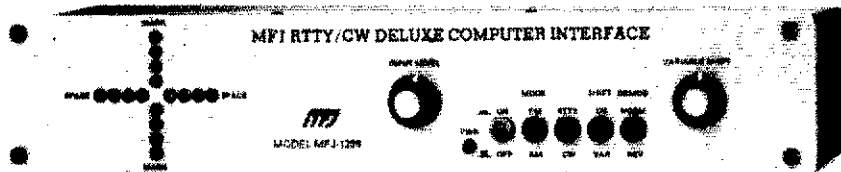
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NEW FROM MFJ

MFJ'S MOST ADVANCED RTTY/ASCII/AMTOR/CW COMPUTER INTERFACE HAS FM, AM MODES, LED TUNING ARRAY, RS-232 INTERFACE, VARIABLE SHIFT TUNING, 170/850 Hz TRANSMIT, MARK-SPACE DETECTION.



MFJ RTTY/ASCII/CW software on tape, cables for C-64/VIC-20.

MFJ-1229 Engineering, performance, value and features sets MFJ's most advanced RTTY/ASCII/AMTOR/CW computer interface apart from others.

FM (limiting) mode gives easy, trouble-free operation. Best for general use, off-shift copy, drifting signals, and moderate signal and QRM levels.

AM (non-limiting) mode gives superior performance under weak signal conditions or when there are strong nearby stations.

Crosshair mark-space LED tuning array simulates scope ellipse for easy, accurate tuning even under poor signal-to-noise conditions. Mark and space outputs for true scope tuning.

Transmits on both 170 Hz and 850 Hz shift. Built-in RS-232 interface, no extra cost.

Variable shift tuning lets you copy any shift between 100 and 1000 Hz and any speed (5-100 WPM RTTY/CW and up to 300 baud ASCII). Push button for 170 Hz shift.

Sharp multi-pole mark and space filters give true mark-space detection. Ganged pots give space passband tuning with constant bandwidth. Factory adjusted trim pots for optimum filter performance.

Multi-pole active filters are used for pre-limiter, mark, space and post detection filtering. Has automatic threshold correction. This advanced design gives good copy under QRM, weak signals and selective fading.

Has front panel sensitivity control.

Normal/Reverse switch eliminates retuning while checking for inverted RTTY. Speaker jack. +250 VDC loop output.

Exar 2206 sine wave generator gives phase continuous AFSK tones. Standard 2125 Hz mark and 2295/2975 Hz space. Microphone lines: AFSK out, AFSK ground, PTT out and PTT ground.

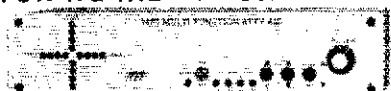
FSK keying for transceivers with FSK input. Has sharp 800 Hz CW filter, plus and minus CW keying and external CW key jack.

Kantronics software compatible socket. Exclusive TTL/RS-232 general purpose socket allows interfacing to nearly any personal computer with most appropriate software. Available TTL/RS-232 lines: RTTY demod out, CW demod out (TTL only), CW-ID in, RTTY in, PTT in, key in. All signal lines are buffered and can be inverted using an internal DIP switch.

Metal cabinet. Brushed aluminum front, 12 1/2 x 2 1/2 x 6 inches. 18 VDC or 110 VAC with optional AC adapter, MFJ-1312, \$9.95.

Plugs between rig and C-64, VIC-20, Apple, TRS-80C, Atari, TI-99 and other personal computers. Use MFJ, Kantronics, AEA and other RTTY/ASCII/AMTOR/CW software.

MFJ MULTI-FUNCTION TUNING INDICATOR MFJ-1221 **\$79.95**



Greatly improve your RTTY copying capabilities. Add a crosshair LED Tuning Indicator that makes tuning quick, easy with pin-point accuracy. Add mark and space outputs for scope tuning. Add LEDs that indicate 170, 425, 850 Hz shifts. Great for copying RTTY outside ham bands. Add sharp mark and space filters to improve copy under crowded/weak conditions. 170, 425, 850 Hz shifts.

Add Normal/Reverse switch to check for inverted RTTY without retuning. Add output level control to adjust signal into your terminal unit. Add a limiter to even out signal variation for smoother copy.

Unit plugs between your tuner and receiver. Mark is 2125 Hz, space is 2295, 2550 or 2975 Hz. Measures 10x2x6 in. and uses floating 18 VDC or 110 VAC with AC adapter, MFJ-1312, \$9.95.

24/12 HOUR CLOCK/ID TIMER

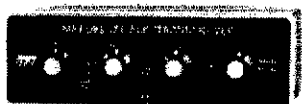
Switch to 24 hour UTC or 12 hour format! Battery backup. ID timer alerts every 9 minutes after reset. Red .6 in. LEDs. Synchronizable to WWW. Alarm, Snooze function. PM, alarm on indicators. Gray/Black cabinet. 110 VAC, 60 Hz.

MFJ-106
\$19.95



MFJ ELECTRONIC KEYS

MFJ-407
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MFJ-407 Deluxe Electronic Keyer sends Iambic, automatic, semi-auto or manual. Use squeeze, single lever or straight key. Plus/minus keying. 8 to 50 WPM. Speed, weight, tone, volume controls. On/Off, Tune, Semi-auto switches. Speaker. RF proof. 7x2x6 inches. Uses 9 V battery, 6-9 VDC or 110 VAC with AC adapter, MFJ-1305, \$9.95.

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MFJ-550
\$49.95



Greatly improves transmitted SSB speech for maximum talk power. Evens out speech peaks and valleys due to voice, microphone and room characteristics that make speech hard to understand. Produces cleaner, more intelligible speech on receiving end. Improves mobile operation by reducing bassy peaks due to acoustic resonances. Plugs between mic and rig. 4 pin mic jack, shielded output cable. High, mid, low controls provide ±12 db boost or cut at 490, 1170, 2800 Hz. Mic gain, on/off/bypass switch. "On" LED. 7x2x6 inches, 9 V battery, 12 VDC or 110 VAC with adapter, MFJ-1312, \$9.95.

MFJ ANTENNA BRIDGE MFJ-204 **\$79.95**

Trim your antenna for optimum performance quickly and easily. Read antenna resistance up to 500 ohms. Covers all ham bands below 30 MHz. Measure resonant frequency of antenna. Easy to use, connect antenna, set frequency, adjust bridge for meter null and read antenna resistance. Has frequency counter jack. Use as signal generator. Portable, self-contained. 4x2x2 in. 9 V battery or 110 VAC with adapter, MFJ-1312, \$9.95.



MFJ PORTABLE ANTENNA

MFJ's Portable Antenna lets you operate 40, 30, 20, 15, 10 meters from apartments, motels, camp sites, vacation spots, nearly any electrically clear location where space for a full size antenna is a problem.

A telescoping whip (extends to 54 in.) is mounted on self-standing 5 1/2 x 6 1/2 x 2 1/4 inch Phenolic case. Built-in antenna tuner. Fold strength meter, 50 feet RG-58 coax. Complete multi-band portable antenna system that you can use nearly anywhere. Up to 300 watts PEP.

MFJ-1621
\$79.95



MFJ 24 HOUR LCD CLOCKS

\$19.95

\$9.95



MFJ-108



MFJ-107

Huge 5/8 inch bold black LCD numerals make these two 24 Hour clocks a must for your shack. Choose from a dual clock that features separate UTC and local time display or a single clock that displays 24 Hour time. Mounted in a brushed aluminum frame, these clocks feature huge 5/8 inch LCD numerals and a sloped face for across the room viewing. Easy set month, day, hour, minute and second function. Clocks can be operated in an alternating time-date display mode. MFJ-108, 4 1/2 x 1 x 2 inches; MFJ-107, 2 1/4 x 1 x 2 inches. Battery included.

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List price \$699.95/CE price \$449.00
10-Band, 20 Channel • Crystalless • AC/DC
Frequency range: 25-550 MHz, continuous coverage and 800 MHz, to 1.2 GHz, continuous coverage
In addition to normal scanner listening, the MX7000 offers CB, VHF, and UHF TV audio, FM Broadcast, all aircraft bands (civil and military), 800 MHz communications, cellular telephone, and when connected to a printer or CRT, satellite weather pictures.

NEW! Regency[®] MX5000-G

List price \$599.95/CE price \$354.00
Multi-Band, 20 Channel • No-crystal scanner
Search • Lockout • Priority • AC/DC
Selectable AM-FM modes • LCD display
World's first continuous coverage scanner
Frequency range: 25-550 MHz, continuous coverage.
Never before have so many features come in such a small package. The Regency MX5000 mobile or home scanner has continuous coverage from 25 to 550 MHz. That means you can hear CB, Television audio, FM broadcast stations, all aircraft bands including military and the normal scanner bands, all on your choice of 20 programmable channels.

NEW! Regency[®] MX4000-G

List price \$629.95/CE price \$394.00
Multi-Band, 20 Channel • No-crystal scanner
Search • Lockout • Priority • AC/DC
Selectable AM-FM modes • LCD display
Bands: 30-50, 118-136, 144-174, 440-512, 800-950 MHz
The Regency MX4000 gives coverage in the standard VHF and UHF ranges with the important addition of the 800 MHz, and aircraft bands. It features keyboard entry, multifunction liquid crystal display and variable search increments.

Regency[®] MX3000-G

List price \$319.95/CE price \$182.00
6-Band, 30 Channel • No-crystal scanner
Search • Lockout • Priority • AC/DC
Bands: 30-50, 144-174, 440-512 MHz
The Regency Touch MX3000 provides the ease of computer controlled, touch-entry programming in a compact-sized scanner for use at home or on the road. Enter your favorite public service frequencies by simply touching the numbered pressure pads. You'll even hear a "beep" tone that lets you know you've made contact.

Regency[®] Z30-G

List price \$279.95/CE price \$166.00
6-Band, 30 Channel • No-crystal scanner
Bands: 30-50, 144-174, 440-512 MHz
Cover your choice of over 15,000 frequencies on 30 channels at the touch of your finger.

Regency[®] C403-G

List price \$99.95/CE price \$62.00
5-Band, 4 Channel • Crystal scanner
Channel indicator LED • AC only • Low cost
Bands: 30-50, 148-174, 450-470 MHz
Regency's basic scanner, the C403 gives you the excitement of police, fire and emergency calls at a budget price. It can tune in to any of five public service bands and brings the signal in loud and clear...on any of four possible channels. It comes with detachable telescope antenna and AC power cord. Order one crystal certificate for each channel you want to receive.

Regency[®] HX1000-G

List price \$329.95/CE price \$209.00
6-Band, 30 Channel • No Crystal scanner
Search • Lockout • Priority • Scan delay
Sidelit liquid crystal display • Digital Clock
Frequency range: 30-50, 144-174, 440-512 MHz
The new handheld Regency HX1000 scanner is fully keyboard programmable for the ultimate in versatility. You can scan up to 30 channels at the same time. When you activate the priority control, you automatically override all other calls to listen to your favorite frequency. The LCD display is even sidelit for night use. A die-cast aluminum chassis makes this the most rugged and durable hand-held scanner available. There is even a backup lithium battery to maintain memory for two years. Includes wall charger, carrying case, belt clip, flexible antenna and nicad battery. Order your Regency HX1000 now.

Regency[®] R106-G

List price \$159.95/CE price \$92.00
5-Band, 10 Channel • Crystal scanner • AC/DC
Frequency range: 30-50, 146-174, 450-512 MHz
A versatile scanner, The Regency R-106 is built to provide maximum reception at home or on the road. Rugged cabinet protects the advanced design circuitry allowing you years of dependable listening.

NEW! Regency[®] R1050-G

List price \$179.95/CE price \$109.00
6-Band, 10 Channel • Crystalless • AC only
Frequency range: 30-50, 144-174, 440-512 MHz
Now you can enjoy computerized scanner versatility at a price that's less than some crystal units. The Regency R1050 lets you in on all the action of police, fire, weather, and emergency calls. You'll even hear mobile telephones.

Programming the R1050 is easy. Merely touch the keyboard and enter any of over 15,000 frequencies on your choice of 10 channels.

Regency[®] HX650-G

List price \$129.95/CE price \$79.00
5-Band, 6 Channel • Handheld crystal scanner
Bands: 30-50, 146-174, 450-512 MHz
Now you can tune in any emergency around town, from wherever you are, the second it happens. Advanced circuitry gives you the world's smallest scanner. Our low CE price includes battery charger/A.C. adapter.

NEW! Regency[®] HX-650P-G

List Price \$189.95/CE price \$104.00
Now, Communications Electronics offers a special packaged price on the Regency HX-650 scanner and the following items for only \$104.00. You get the Regency HX-650 scanner, a set of 4 AAA ni-cad batteries, the MA-506 carrying case, six crystal certificates, AC adapter/charger and flexible rubber antenna for only \$104.00 per package plus \$10.00 shipping/handling. To order this special package, use CE special order number HX-650P-E.

QUANTITY DISCOUNTS AVAILABLE

Order two scanners at the same time and deduct 1%, for three scanners deduct 2%, four scanners deduct 3%, five scanners deduct 4% and six or more scanners purchased at the same time earns you a 5% discount off our super low single unit price.

NEW! Regency[®] HX2000-G

The World's First 800 MHz. Handheld Scanner
List price \$569.95/CE price \$359.00
7-Band, 20 Channel • No-crystal scanner
Priority control • Search/Scan • AC/DC
Sidelit liquid crystal display • Memory backup
Bands: 118-136, 144-174, 440-512, 800-950 MHz
The new Regency HX2000, handheld scanner covers thousands of frequencies including the new 800 MHz band. Selectable AM/FM reception modes on all channels. With the included AC/DC transformer, the HX2000 can be operated on either 120V AC or 6 VDC. Scans 15 channels per second. Size 3" x 7" x 1 1/2". Includes wall charger, carrying case, belt clip, flexible antenna and nicad batteries.

NEW! Regency[®] RH250B-G

List price \$699.95/CE price \$379.00
10 Channel VHF synthesized transceiver
Built-in scanner with programmable priority
Fully programmable CTCSS on every channel
Frequency range: 150-162 MHz, transmit & receive
If you're a fireman, policeman or a person on the go and it's essential that you stay in touch with headquarters, you need the Regency RH250 transceiver. You can program simplex or semi-duplex frequencies including CTCSS tones on all channels. 25 Watts output on VHF. If you need a UHF version of this radio with 15 Watts output and frequency coverage of 450-482 MHz, order model number RU150B-G for \$449.00 each.

OTHER RADIOS & ACCESSORIES

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Z45-G Scanner.....\$399.00
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EC10-G Programming tool for Regency RPH410....\$20.00
SMRH250-G Service man. for Regency RH250....\$20.00
SMRU150-G Service man. for Regency RU150....\$20.00
SMRPH410-G Service man. for Regency RPH410....\$20.00
B-4-G 1.2 V AAA Ni-Cad batteries (set of four).....\$9.00
A-135C-G Crystal certificate.....\$3.00
A60-G Magnet mount mobile antenna.....\$35.00
A70-G Base station antenna.....\$35.00
Add \$3.00 shipping for all accessories ordered at the same time.
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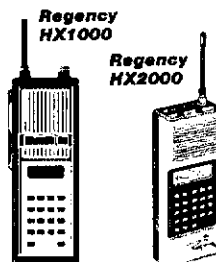
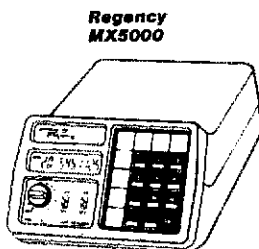
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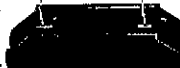
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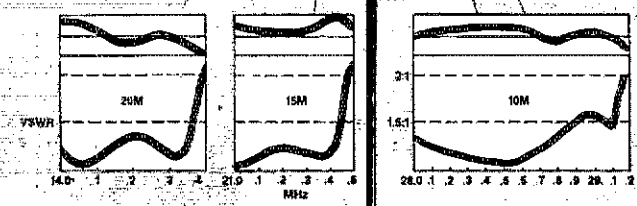
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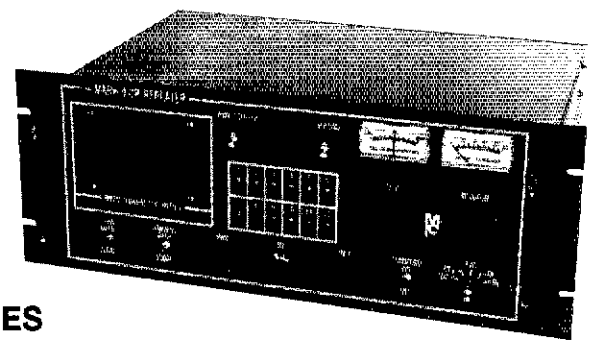
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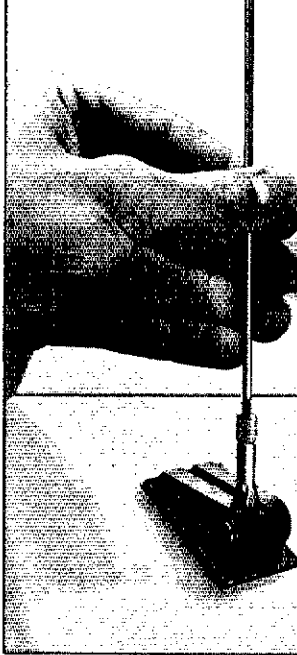
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AEA		ETO	
MM-1 Prog keyer	\$ 99f	Alpha 76A Linear	1269 v
KT-3 Keyer	69f	Alpha 374A Linear	1699 m
MBA-RO Reader	129w	HAL	
MBA-RC Deluxe reader	169f	RKB-1 RTTY keyboard	\$ 49 m
CLIFFORD		SI-5000 Demod	149 m
Vista 50RM Power supply	\$149 m	CI-2200 Terminal	569 c
COLLINS		KB-2100 Keyboard	99 c
75S-3A Ham Receiver	\$299 m	DS-2000 Terminal	169 m
32S-3A Xmtr (round)	469 f	DS-3000KSR Term vers 2	399 m
KWM-2A Xcvr	499 w	OS-3000KSR Term vers 3	499 e
312B-5 PTO console	289 f	CWR-670 Rcv Telereader	169 m
516F-2* AC supply	149 mwfc	CWR-6700 Rcv Telereader	189 m
*Not sold separately		CWR-6850 Terminal	549 v
PM-2* AC supply	119f	HENRY	
KWM-380 Xcvr sn 2205	3895 m	1KD-5 Linear	\$449 mc
DAIWA		2KD-5 Linear	695 m
GNA-1001 Auto tuner	\$229f	IRL	
DENTRON		FSK-1000 Demod w/keyer	\$249 f
MLA-2500 Linear DEMO	\$649 v	ICOM	
Clipperton L Linear	459 m	IC-701 Xcvr w/ps	\$489 w
SWR-1A SWR/power	19 m	IC-720 Xcvr	589 w
DRAKE		IC-720A/CW filter	689 w
SW-4A SWL Rcvr	\$149 c	IC-740/FM Xcvr	599 f
SPR-4/NB/cal SW Rcvr	229 m	IC-740/SSB/2 cw/keyer	689 w
5NB Blanker	29 m	IC-740/internal ps	689 m
2B Ham Rcvr	129 c	IC-740/SSB/cw/mk/fm/lvr	749 m
R-4B Ham Rcvr	199 mc	IC-740/int ps/FL-44 filt	749 m
R-4C Ham Rcvr	249 fv	PS-15 Power supply	99 mw
MS-4* Speaker	19 mcv	PS-20 Power supply	159 mf
*Not sold separately		PS-35 Internal supply	115 m
4NB Noise blanker	49 v	SP-3 Speaker	29 m
FL-500 500 Hz filter	35 v	FL-44A SSB filter	79 w
SC-2 2m rcv conv	59 m	Sprk/patch; 701	99 m
CPS-1 Conv ps	19 m	R-70 SW Rcvr	429 m
CC-1 Conv console	29 m	7072 Xcv interface	69 w
IC-2 2m Xmit conv	229 m	R-71A SW Rcvr	549 m
R-7 SW Receiver	699 c	IC-551D 6m Xcvr	469 w
R-7 Rcvr/NB/4 KHz	799 m	IC-560 6m Xcvr	349 e
Y-4XB Transmitter	199 mcv	IC-251A 2m Xcvr	389 m
T-4XC Transmitter	249 mwf	IC-255A/TTP 2m FM	189 m
IR-4 Xcvr	229 mc	IC-271A 2m Xcvr	495 m
TR-4C Xcvr	269 m	IC-280 2m FM Xcvr	169 m
TR-4C/NB Xcvr	289 m	IC-490A 430-440 Xcvr	399 m
TR-4CW Xcvr	329 c	BU-1 Memory back-up	25 w
RV-4C Remote VFO	89 c	IC-3PS AC ps for ports	35 m
AC-3* AC supply	59 mf	SM-2 Desk mic	25 wf
AC-4* AC supply	89 mwfcv	IC-2A 2m FM HT	149 f
*Not sold separately		BC-30 Desk charger	49 f
DC-3 DC supply	39 m	KDK	
IR-5 Xcvr	469 m	FM-2033 2m FM DEMO	\$239 m
TR-7 Xcvr	599 mwf	KANTRONICS	
IR-7/AUX-7	625 m	Interface II/c64 hamtext demo	\$269 v
IR-7/NB	649 w	Field Day Reader	69 w
TR-7/300/500 Hz	649 mf	KENWOOD	
TR-7/500 Hz/1.8/6/aux	699 m	IS-120S Xcvr	\$389 v
TR-7/300/500/1.8/nb	699 v	TS-130S/cw/SSB flts	529 m
TR-7A/6 KHz	829 m	TS-180S/DFC/cw/SSB	499 f
PS-7* Power supply	189 mwfv	AT-25D Auto tuner	239 e
*Not sold separately		AT-230 Ant tuner	129 m
RV-7 Remote VFO	99 w	TS-520 Xcvr	399 cv
SL-500 500 Hz filter	45 w	TS-520S Xcvr	429 mv
7075 Desk mic	29 m	TS-520SE Xcvr	449 mf
L-4 Linear	695 ms	TS-520SE/FT cw filt	479 m
L-75 Linear	569 m	VFO-520S Remote VFO	99 e
MN-2000 Tuner	149 mc	TS-530S Xcvr	489 mw
9000E Terminal	449 m	TS-530S/CW filter	519 c
7000E Terminal	269 w	TS-820/DG-1 Dig Xcvr	499 mc
TR-22 2m FM port	79 m	TS-820S Xcvr	529 mc
		VFO-820 Remote VFO	129 v

SP-820 Speaker	49 m	TRAC	
TS-830S Xcvr	599 f	TE-122 Keyer	\$ 19 w
TS-830S/500 Hz	629 m	TE-144 Keyer	29 w
DFC-230 (new close-out)	169** mfv	TE-464 Keyer/CW proc	39 m
VFO-230 Digital VFO	219 m	YAESU	
R-2000 SW receiver	389 w	FT-200 Xcvr (Tempo One)	\$249 f
TV-502 2m Xvtr	169 w	AC-200 AC supply	89 f
TS-600 6m Xcvr	449 w	VFO-200 Remote VFO	89 f
TS-700A 2m Xcvr	299 mwfc	FR-101DIG/6m/2m/FM	269 m
TS-700S 2m Xcvr	369 c	FT-101 Xcvr	379 f
VFO-700S Remote VFO	49 m	FT-101B Xcvr	389 f
SP-700 Speaker	19 m	FT-101Z Xcvr DEMO	649 v
TM-201A 2m FM Xcvr	239 m	FT-101Z analog/CW/fan	469 m
TR-7600 2m FM Xcvr	129 c	FT-101ZD Dig Xcvr	469 mv
TR-7800 2m FM Xcvr	199 m	FV-101Z Remote VFO	89 mv
TR-7950 2m FM Xcvr	289 m	FT-301AD/CW filter	369 f
TR-9130/TTP 2m Xcvr	389 e	FI-77 Xcvr	429 c
TR-9500 430 Xcvr	449 f	SP-901P Spkr/patch	49 v
TW-4000A 2m/440 FM	429 m	430 Xvtr module	179 m
TR-8400 440 FM Xcvr	269 c	FI-107M/DMS Xcvr	469 f
RM-76 Control unit	49 e	FP-107E Power supply	99 f
KPS-7 7A ps	59 e	FV-707DM Dig VFO	89 m
KPS-12 10A ps	69 m	FP-757GX Power supply	119 mw
MC-50 Desk mic	29 m	FT-980 Xcvr	1089 fc
MC-60N4 Desk mic	49 m		
MFJ			
989 Ant tuner	\$229 c		
941 Ant tuner	49 w		
943 Ant tuner	39 w		
MACROTRONICS			
CA-650 Interface/Apple	\$ 79 m		
TA-650 Interface/Apple	79 m		
MICROLOG			
ACT-1 Terminal	\$269 w		
MIDLAND			
13-510A 2m FM Xcvr	\$189 c		
PANASONIC			
RF-2600 SW receiver	\$ 99 w		
ROBOT			
70 Monitor	\$129 v		
400 Scan converter	299 mv		
800 Terminal	289 m		
800H/800CH kit Term	369 c		
SWAN/CUBIC			
100MXA Xcvr	\$299 c		
Astro 103 Xcvr	599 f		
PSU-6A Power supply	119 f		
TEMPO			
2020 Xcvr	\$369 m		
Tempo One Xcvr	249 cv		
AC One* AC ps	89 cv		
*Not sold separately			
TEN-TEC			
509 Argonaut Xcvr	\$249 f		
515 Argonaut Xcvr	299 m		
206A Calibrator	19 m		
208 Ext CW filter	19 m		
210 LA power supply	19 m		
251 9A power supply	49 mf		
525 Argosy Xcvr	299 c		
223 Norse blanker	19 m		
570 Century/21 Xcvr	229 f		
276 Calibrator	19 wc		
Triton II Xcvr	289 mf		
540 Xcvr	289 m		
243 Remote VFO	99 e		
560 Corsair Xcvr	769 we		
283 Remote VFO	129 m		
252G Power supply	79 m		
252G/E 110/220 ps	89 w		
252M/O Power supply	79 m		
262G Power supply	89 fc		
260 Power supply	139 mwve		
280 Power supply	99 w		
214 Desk mic	29 mw		
215P Desk mic	25 m		

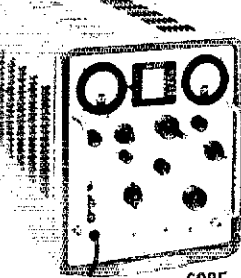
SP-980 Speaker	39 wt
440/726 440 module	179 e
HF-726 HF module	159 e
FRG-7 SW Rcvr	169 m
FRG-7000 SW Rcvr	299 c
FT-620B 6m Xcvr	289 f
FT-627RA 6m FM Xcvr	189 mw
YC-221 Dig display	69 m
FT-225RD 2m Xcvr	469 w
FT-290R 2m portable	199 m
FT-730R 440 FM Xcvr	289 m
SC-1 Stn console	89 m
FP-80 4.5A ps	49 w
FT-708R/SS-32 440 HT	199 e
NC-1 Desk charger	29 e
MD-188 Desk mic	49 f

TVRO EQUIPMENT	
AMPLICA	
100" LNA	\$129 m
RDL-10/M/100" Rcvr	329 m
DRAKE	
100" LNA	\$125 m

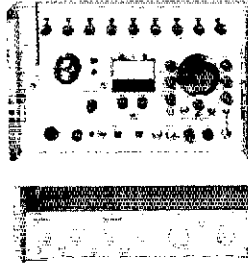
1-23-85

(1) This list was prepared from an inventory taken on the date shown. The letters after the prices indicate in which store the equipment was located at that time. The quantities vary. In some cases there are several of an item; others, only one. Due to the lead and distribution time of this publication, some of the items may have already been sold by the time you see this ad. However, due to the number of trades we are involved in each day, some items are in stock that are not listed. (2) We reserve the right to sell certain power supplies and accessories only with matching transmitters or receivers, depending on our stock situation. (3) Sometimes used gear is serviced after we receive your order. Please allow for a few days delay in shipping your order. (4) No trades on used gear. (5) Used gear policies do not apply to New Equipment special, Closeouts, etc.

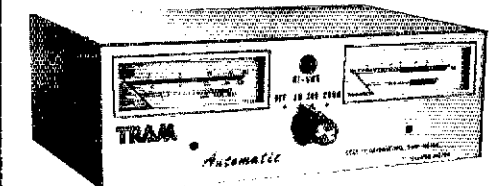
USED AES SHOP TEST EQUIPMENT



HEWLETT-PACKARD
608E .05-65MHz sig gen 895
608E 10-480MHz sig gen 1895
8640B .5-1024MHz sig gen 4995
w/options 002/003 5895





SINGER-GERTSCH
8640B FM-10CS w/RFM-10A, FIM-3 & ODM-1 4995
OAM-1 AM module for FM-10C 395



TRAM SWR/Wattmeter
Fully automatic/self-calibrating. 1.8-30 MHz, 50 ohms. Dual lighted meters show WATTS & VSWR simultaneously! Ranges: 0-20, 0-200 and 0-2000 Watts, Remote RF sensor, AC adaptor (or use 6 "C" cells). 7 1/4" w x 2 1/4" h x 5 1/2" d. 90-day AES Warranty **Closeout \$69⁹⁵**

Location	Local Phone	Nationwide	In-State
m = Milwaukee, WI 53216; 4828 W. Fond du Lac Ave ...	(414) 442-4200	1-800-558-0411	1-800-242-5195
w = Wickliffe, OH 44092; 28940 Euclid Ave.	(216) 585-7388	1-800-321-3594	1-800-362-0290
f = Orlando, FL 32803; 621 Commonwealth Ave.	(305) 894-3238	1-800-327-1917	1-800-432-9424
c = Clearwater, FL 33515; 1898 Drew Street.	(813) 461-4267		
v = Las Vegas, NV 89106; 1072 N. Rancho Drive.	(702) 647-3114	1-800-634-6227	
e = Chicago, IL Erickson Communications (Associate) ...	(312) 631-5181		

HENRY 2KD5, like new \$550, Collins 2S21 with 516FZ \$200, 312B4 \$100, SM1 mike \$20, excellent condition. AA6S 209-732-7163.

WANTED: HY-GAIN or Telrex mono-band beams, 40, 20, 15, 10, 6. Heavy Duty Rotators, MFJ 484 keyer, SB-200. W0A1H, 1616 So. Street, Eau Claire, WI 54701. 715-832-8510.

WANTED: FACSIMILE power supply PP86 Model A-E, good condition for transceiver AN/TXC-1. KA8CKB, Chuck Martin, 692 Sueden Dr., Dayton, OH 45430, 513-426-0984.

QUAD KITS Tribander \$45. Box 927, Cary, NC 27511.

WANTED: GE MASTR Pro UHF TX and RX units with ICOM type osc. KC4ZN, Box 1099, Crowley, LA 70527.

COAX RELAYS SPDT, BNC ** 12 Vdc coil **, Dow-Key DK 77 Reconditioned \$10 ea PPD Others in stock. W3ZD 5200 Centennial Road, Warminster, PA 18974 215-675-4539.

ICOM IC-502-6-meter 3-W portable xcvr, mint; \$100. Lunar 10-120-6-meter solid state amplifier, mint; 50 W out with above exciter \$200. Will ship postpaid. W1XX, 203-727-9295.

"SUPER SAVINGS": ICOM, Yaesu, Kenwood, Gony, Bearcat, Regency, Kantronics, Panasonic, MFJ, Rotors, Antennas, CW/RTTY Decoders, much more!! Free Shipping & Insurance. 25-page Picture Catalog \$1 (refundable) Galaxy Electronics, Box-1202, Akron, OH 44309 216-376-2402 9-5PM EST.

MARCH right out to UPS with your unwanted equipment and ship it to the kids at Junior High School 22 on Manhattan's Lower East Side via WB2JKJ.

HY-GAIN 205-BA 5-el 20-meter beam, brand new in the box. \$200. Prefer pickup. W1XX, 203-727-9295.

YAESU FT-1012D w/fan, mint, \$425 + \$25 shipping. WB7RYB, 206-935-3556.

ONLY EXTRAORDINARY cards need apply for the Junior High School 22 QSL Of The Week Award. Send yours to WB2JKJ today!

SELL HOMEBREW 3-500Z linear, vacuum plate tuning capacitor, separate power supply \$225, 3-400Z \$45, 4CX1500B with socket \$195, 8205S \$350, SBE-34 \$130, 2A1 with spare BP-3 and DC-1 \$195. PC-2000 \$175. Metered regulated supply 14V-20A \$65. W6HHN 3467 Rambow, Palo Alto, CA 94306 415-494-1791.

ARGONAUT TRANSCIEVER Model 505, 5 watts. \$150 or trade for a General Coverage receiver. Gary Marshall, 1162 11th Ave Apt 3, Seattle, WA 98122.

ALUMINUM HARDLINE 3/4". Ship 1000 miles, HQ-110, KA9NBH, evenings 815-562-5612.

1.3 GHz PRE-SCALER kit. Upgrade counter read 10-1300 MHz. Divide by 4 \$24.95 Postage Paid M/C-VISA-COD guaranteed. Digital Instruments, 636 Sheridan Dr., Tonawanda, NY 14150.

WANTED: CB radios, GE 5813B or Lafayette 525, any condition. K9SQG, 2053 Mohave Drive, Dayton, OH 45431.

CUSHMAN CE-3/301,303, CE-5/302,305B, Motorola MITREK 30W UHF 4 freq for sale. Wanted: WESCOM 400-size modules. N0FRZ 319-242-6070.

HAL CWR685-A mint condition - orig owner \$499 Charlie K6DFJ 251 Trianon Way, Los Altos, CA 94022 415-948-7693.

FOR SALE Swan 350 with power supply and speaker \$250.00. Heath kit: Frequency Counter Model 1B-1100 \$50; Phone Patch Model HB15 \$20; SWR & power meter model HM 102 \$25; plus manuals for above. All in working condition. Tel: 305-269-2429 (WA2IDZ).

DRAKE R4-B, extra xtals, all filters. \$209 4 element 15M beam \$79. 4 element 10M beam. \$50. Can deliver. K1BW, 203-848-3796.

KENWOOD TS-820 with Sherwood Engineering 350 Hz CW filter, dig readout and ext. VFO - \$550. Also Hazeltine 1400 terminal and modem - \$250. Dave Krack, K8FJ 1707 Hamlet Dr., Ypsilanti, MI 48197 313-485-0715.

1.3 GHz FREQUENCY Counter-reads 1296 MHz. Freq-10 Hz to 1.3 GHz sensitivity ± 10 mV 1 GHz RF shielding metal case 8.4" digits. \$249.95. M/C-VISA-COD guaranteed. Digital Instruments, 636 Sheridan Dr. Tonawanda, NY 14150.

HEATHKIT HW104 solid state transceiver. Excellent. \$199 WA3JBN, 814-238-1865, 615 West Hillside, State College, PA 16803.

TRADE: Atlas 210X, Clegg FM-28, or IC-2AT for Decibel Products, Wacom, or TX-RX 440 - 450 MHz duplex. Will purchase if reasonable. Blaine Hamrick, WB5LSJ, P.O. Box 610173, DFW Airport, TX 75261.

SONY 2002 receiver like new, manual, AC adapter. \$205. I ship. W4BLX 703-363-5797.

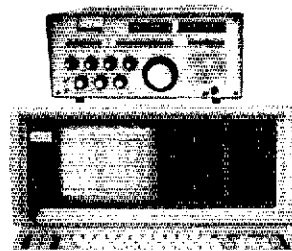
HEATH SB-221 amplifier with 10 meters \$450 W6QT 2805 Russell St., Berkeley, CA 94705.

WANTED: Fall 1970 US Callbook, WB0BJP, Paul Juen, Frazee, MN, 56544.

COMMODORE 64 PROGRAM turns your computer into a sophisticated memory keyer. This program, a simple transistor switch (schematic included), and your transmitter are all that's necessary to put your C-64 on the air. "Keyboard mode" sends characters as they are entered. 256 characters buffer (rather than usual 10) stores characters entered faster than they are being sent. 17 easily loaded message areas, 256 characters each. Change code speed while sending messages. Send BASE for complete description or \$15 for program tape (\$17 for diskette) and directions for interfacing computer to transmitter. Fritz Reuning, K4OAG, 120 Elk Rd., Bristol, TN 37620.

WANTED: TEN TEC 242 Remote VFO, Tony DiGenzo, KX1G, 30 Austin Road, Sudbury, MA 01776, 817-467-7385.

PC COMPATIBLE The Milspec 1030 is now IBM PC or Compaq compatible.



For 1985, the 1030 transceiver now comes complete with an RS-232 computer interface, and a software program that makes it the only fully computer controlled 10hz-30MHz HF system.

The Milspec now connects directly to IBM or Compaq personal computers for computer control and comes complete with a program that includes: full frequency control, full mode selection, tune /PTT function, expanded frequency and mode memory, scan up and scan down, S meter indications, fwd/rev power indications and pass-band tuning. For increased software control, Signal/One offers the optional Softpak 4, with four programs, including Extra Op, DX Logger/Contestor, SigLock, and SWR Plot. The DX Logger/Contestor program allows you to pre-plan an entire contest, and pro-

vides single band or all band logging, as well as checking for dupes. Your sent message is automatically entered into the computer; received messages are entered as you key them into the computer.

1030 DATABASE

Military grade. Fully synthesized digital control system for main tuning, frequency preset, BFO Frequency, and pass band remote computer control. Real time frequency acquisition capability. 200 watts output. Full OSK. Military Frequency stability. 9 low pass filters for unequalled transmit spectral purity. American designed and manufactured. 18 Month Warranty FCC Type Accepted. Full Military Grade Service Manual supplied with unit. Service Manual available separately for evaluation.



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440MHz
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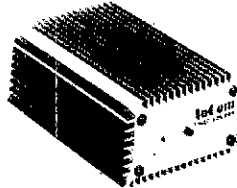


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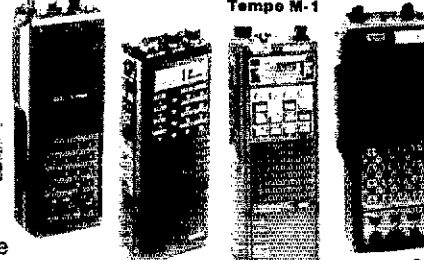


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Complete Butternut Antenna Inventory In Stock!

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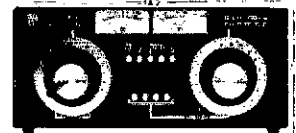
IC-R71A, IC-751, IC745, IC-27A/H, IC-37A IC-47A, IC-271A/H, IC-2KL, IC-471A/H, IC-735



SMART PATCH \$319.95

WELZ

FLUKE 77 Multimeter



Nye-MB-V 3 Kilowatt Tuner

SANTEC ST-222/UP ST-142/UP ST-442/UP HT-7



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JBC soldering line in stock.

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Trionyx-Model TR-1000 0-600 MHz Pro-Com Engineering 0-1 GHz



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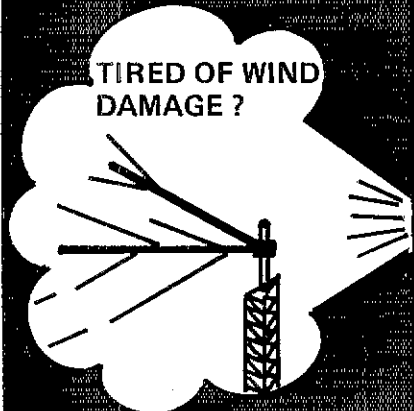
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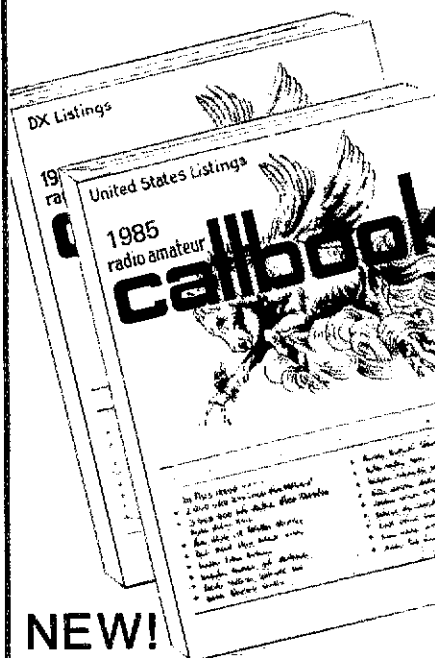
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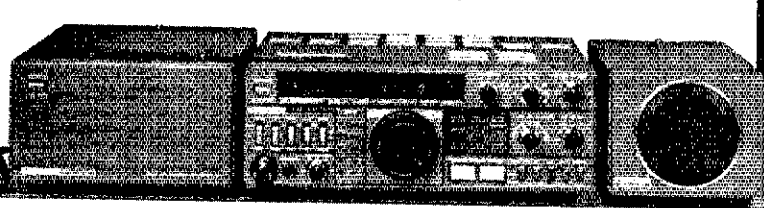
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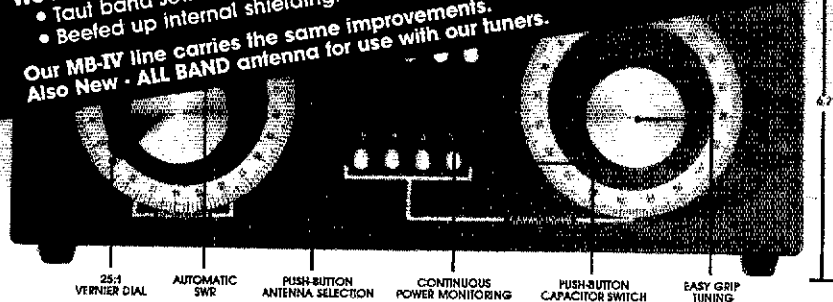
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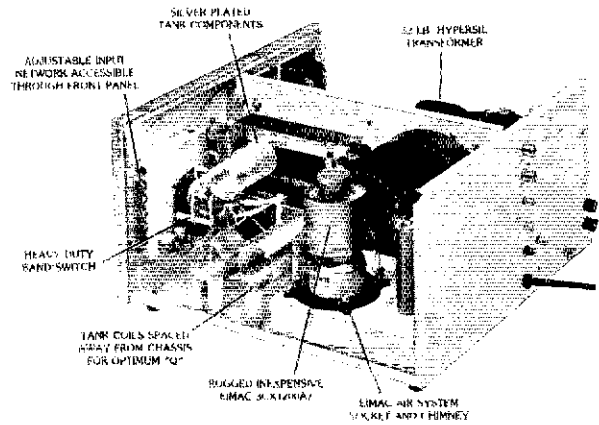
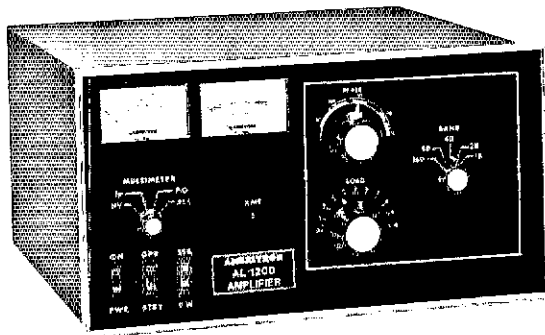
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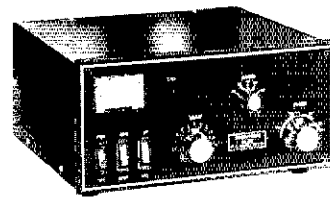
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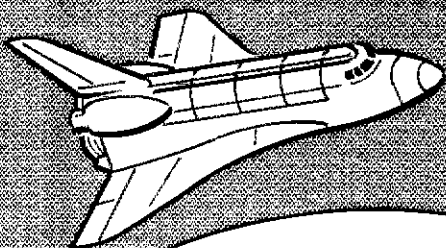
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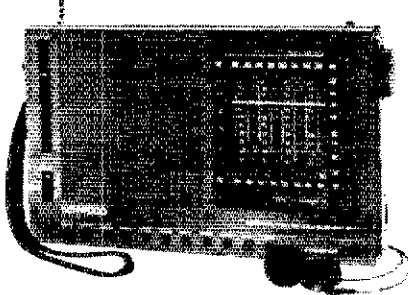
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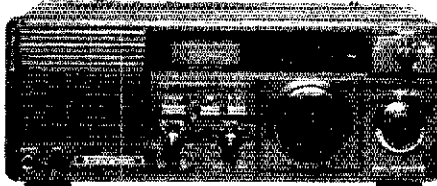
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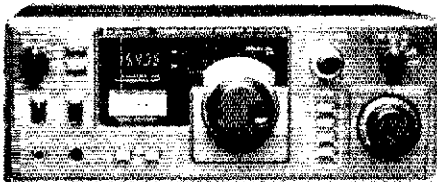
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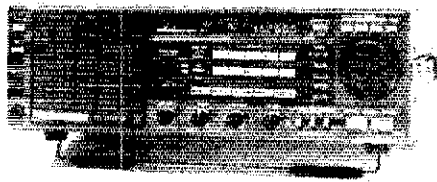


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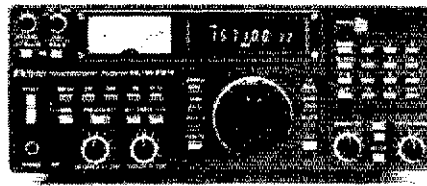
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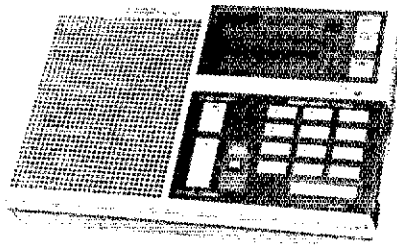


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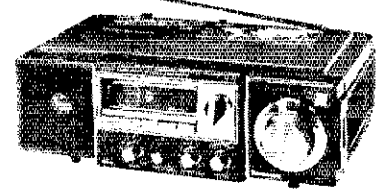
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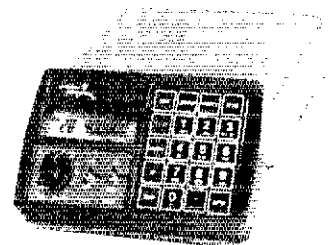
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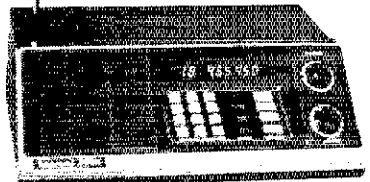
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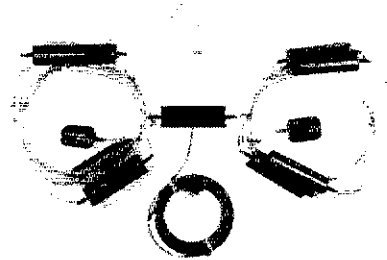


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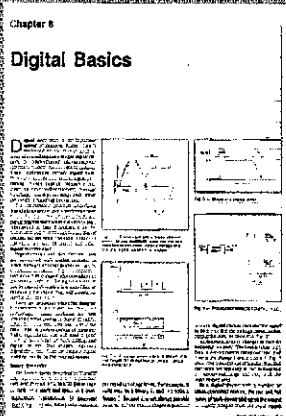
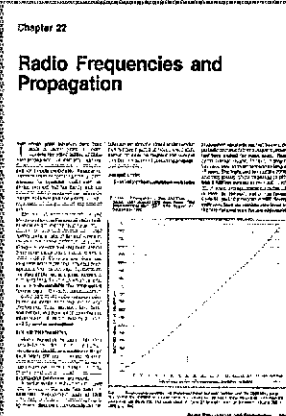
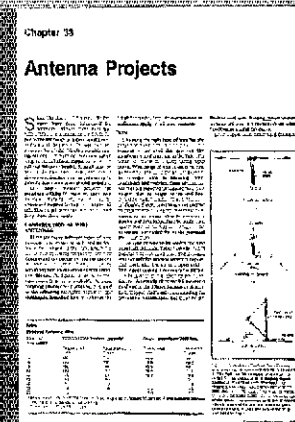
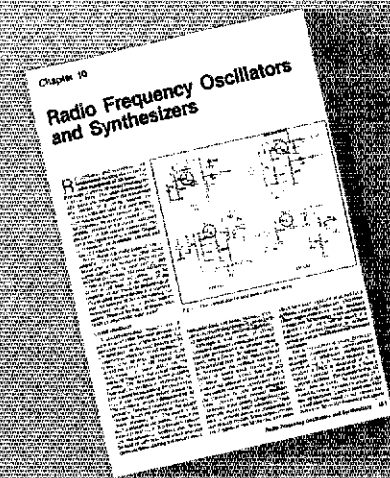
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3. Radio Design Techniques and Language
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5. Vacuum Tube Principles

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6. Power Supplies
7. Audio and Video
8. Digital Basics
9. Modulation and Demodulation
10. Radio Frequency Oscillators and Synthesizers
11. Radio Transmitting Principles
12. Radio Receiving Principles
13. Radio Transceivers
14. Repeaters
15. RF Power Amplifiers
16. Transmission Lines
17. Antenna Fundamentals

MODULATION METHODS

18. Voice Communication
19. Digital Communications
20. Image Communications
21. Special Modulation Techniques

TRANSMISSION

22. Radio Frequencies and Propagation
23. Space Communications

CONSTRUCTION AND MAINTENANCE

24. Construction Techniques
25. Test Equipment and Measurements
26. Troubleshooting and Repair
27. Power Supply Projects
28. Audio and Video Equipment
29. Digital Equipment
30. HF Radio Equipment
31. VHF Radio Equipment
32. UHF Radio Equipment
33. Antenna Projects
34. Station Accessories
35. Component Data

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36. How to Become a Radio Amateur
37. Assembling a Station
38. Operating a Station
39. Monitoring and Direction Finding
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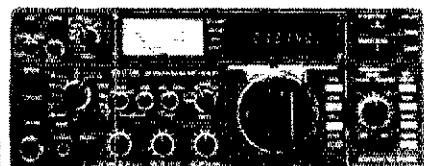
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9. VHF and UHF Receiving Techniques
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14. Specialized Communications Systems
15. Interference
16. Test Equipment and Measurements
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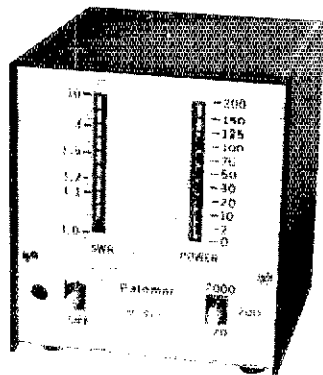
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Index of Advertisers

AEA: Advanced Electronic Application: 4
Advanced Receiver Research: 94
Allcom/Spectrum West: 135
Alpha Delta Communications: 89
Amateur Accessories: 98
Amateur Electronic Supply, Inc.: 103, 107, 150, 158, 160
Amateur Wholesale Electronics: 113, 116, 120
Ameco Publishing: 102
American Radio Relay League, Inc.: 116, 130, 159
Ameritron, Inc.: 156
Amp Supply Co.: 105
Antenna Bank, The: 92
Antenna Specialists: 149
Associated Radio: 97
Autek Research: 95, 103
Autocode: 115
BHC, Inc.: 98
Barker & Williamson: 112
Barry Electronics Corp.: 152
Bencher, Inc.: 92
Break Communications Systems, Inc.: 104
Buckmaster Publishing: 153
Butternut Electronics: 104
C Comm: 108, 109
Colorado Comm Center: 115
Command Productions: 133
Communications Electronics: 111, 142, 143, 146
Communications Specialists: 118
Cubex Co.: 89
Curtis Electro Devices, Inc.: 153
Cushcraft Corp.: 5, 93
DX Edge, The: 99
Daiwa U.S.A., Inc.: 100, 101
Dayton Hamvention: 138
Delaware Amateur Supply: 96, 103
EGE, Inc.: 4, 128, 129
Fox Tango Corp.: 106
G.I.S.M.O.: 132
GLB Electronics: 153
HAL Communications Corp.: 1
Hale, Paul, Listeners & Friends of Radio Peking: 133
Ham Radio Center: 157
Ham Radio Outlet: 86, 87, 88
Ham Shack, The: 112
Ham Station, The: 112
Henry Radio Stores: Cov. II
Herbert Dahm Datensysteme KG.: 151
Hustler, Inc.: 99
ICOM America, Inc.: 2, 91, 96, 117
Idiom Press: 151
International Radio: 95
Johnston, Bill: Computerized Great Circle Maps: 147

Jun's Electronics: 133
K2AW's "Silicon Alley": 147
KLM Electronics, Inc.: 148
Kantronics: 95, 97
LaCue, Inc.: 136
MFJ Enterprises, Inc.: 144, 145
M & M Electronics: 110
Madison Electronics Supply: 102, 106, 112, 126, 151
Meisel Electronics: 133
Memphis Amateur Electronics: 155
Miami Radio Center Corp.: 115
Micro Control Specialties: 148
Microcraft Corp.: 94
Microlog: 136
Mil Industries: 149
Mini Products, Inc.: 132
Mirage Communications Equipment, Inc.: 96
Missouri Radio Center: 164
Mor-Gain: 114
Mountain Computer Accessories: 91
N.P.S., Inc.: 135
NRI Schools: 90
National Tower Co.: 137
Nema Electronics: 99
Nye Co., William M.: 155
P.C. Electronics: 156
Palomar Engineers: 162
Payne Radio: 151
Portland Radio Supply: 91
Processor Concepts: 110
r.f. Enterprises: 114
Radio Amateur Callbook: 154
Radiokit: 132
Radio Warehouse: 114
Radio World: 95
Ross Distributing Co.: 157
Sartori Associates: 157
Signal/One Corp.: 151
Space Electronics Co.: 157
Spi-ro Distributors: 110, 157
Spider Antennas: 157
TNT Radio Sales, Inc.: 134, 135
Telex Communications, Inc.: 119, 124
Telrex Labs: 154
Texas Towers: 139, 140, 141, 163
Toledo Mobile Radio Association, Inc.: 116
TOWTEC Corp.: 149
Trio-Kenwood Communications Inc.: Cover IV, 6, 7, 125, 127, 131
Unadillo Reyco Inline: 161
Uniden Corp. of America: 121
Universal Amateur Radio, Inc.: 161
Universal Mfg.: 147
Universal Radio Co.: 157
VHF Shop, The: 157
Van Gorden Engineering: 98
Van Valzah Co., H.C.: 153
Varian Associates/EIMAC Div.: 10
Vibroplex Co.: 110
W9INN Antennas: 135
Wacom Products: 89
Western Electronics: 147, 161
Wheeler Applied Research Lab: 135
Williams Radio Sales: 151, 153
Wrightapes: 153
Yaesu Electronics Corp.: Cov. III, 122, 123

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H8X48	48 ft	10 sq ft	303	\$429
H8X56	56 ft	10 sq ft	385	\$499
H8B40	40 ft	18 sq ft	281	\$399
H8B48	48 ft	18 sq ft	363	\$489

*Your Total Delivered Price Anywhere in Continental 48 States. Antenna Load Based on 70 MPH Wind.

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MULTI-BAND HF ANTENNAS
A3 3-el Tribander \$219 A4 4-el Tribander \$289
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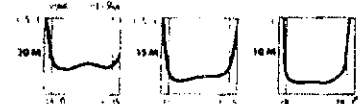
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KLM



KT34A List \$433.95 SALE \$349.00
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HV/N 2KW Deluxe N Type... \$35



KLM

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KT34XA 6-el Broad Band Triband Beam \$499
80m-1 80-mtr Rotatable Dipole... \$595
40m-1 40-mtr Rotatable Dipole... \$179
40m-2 2-el 40-mtr Beam... \$309
40m-3 3-el 40-mtr Beam... \$489
40m-4 4-el 40-mtr Beam... \$649
2m-13LBA 13-el 2-mtr Beam... \$79
2m-14C 14-el 2-mtr Satellite Antenna... \$89
2m-16LBN NEW-16-el 2-mtr Beam... \$99
2m-22C NEW-22-el 2-mtr Satellite Antenna... \$119
432-32LBN NEW-30-el 432 MHz Antenna... \$99
435-18C 435 MHz Satellite Antenna W/CS-2... \$119
432-16LB 16-el 432 MHz Beam... \$69

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Alliance U110 (3 sq ft rating)... \$49
Telex HAM 4 (15 sq ft rating)... \$219
Telex Tailtwister (20 sq ft rating)... \$269
Telex HDR300 Heavy Duty (25 sq ft rating)... \$519
Kenpro KR-500 Heavy duty elevation rotor... \$189
KLM EL-3000 Moon Tracker Elevation Rotator... \$369

Standard 8 cond cable \$.19/ft (vinyl jacket 2-#18 & 6-#22 ga)
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10 ft Stack Sections
20G \$39.50 25G \$49.50
45G \$112.50 55G \$134.50
All 20G, 25G, 45G and 55G Accessories In Stock at Discount Prices - CALL!

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	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... \$219			
	45G Foldover Double Guy Kit... \$249			

*Above antenna loads for 70 MPH winds and Guys at Hinge & Apex.

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1/4" CCM Cable Clamp (1/4" Cable)... \$.55
1/4" TH Thimble (fits all sizes)... \$.45
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1/2" EJ (1/2" Eye & Jaw Turnbuckle)... \$10.95
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- Mil-Spec Non-contaminating Jacket for longer life than RG8 cables
- Our RG-213/U uses virgin materials.
- Guaranteed Highest Quality!

RG-8X \$.19/ft \$179/1000 ft

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- Low Loss
- Non-contaminating Vinyl Jacket
- Foam Dielectric

Cable Type	Imped	10MHz	30MHz	50MHz	450MHz
RG-213/U	50	6	9	2.3	5.2
RG8X	52	.8	1.2	3.5	6.8
RG-58/U	52	1.4	1.9	6.0	12.5
1/2" Alum	50	.3	.5	1.2	2.2
1/2" Heliax	50	2	.4	9	1.6
1/2" Heliax	50	1	.2	.5	.9

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1/2" Alum. w/poly Jacket... \$.79/ft
1/2" LDF4-50 Andrew Heliax™... \$1.69/ft
1/2" LDF5-50 Andrew Heliax™... \$3.99/ft
select connectors below.

Cable Type	UHF	FML	UHF	MALE	N	FML	N	MALE
1/2" Alum	\$19	\$19	\$19	\$25				
1/2" Heliax™	\$22	\$22	\$22	\$22				
1/2" Heliax™	\$49	\$49	\$49	\$49				

AMPHENOL CONNECTORS

Silver PL259... \$1.25 UG23D N Female... \$2.95
UG218 N Male... \$2.95

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14 Ga Stranded Copperwire... \$.10/ft
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Van Gorden 1.1 Balun... \$11
Van Gorden Center Insulator... \$6

HUSTLER

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4BTV 40-10 mtr Vert \$89 5BTV 80-10 mtr Vert \$109
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Discoverer 3-el Conversion Kit... \$199
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OK710 30/40 mtr. Add-On-Kit... \$79
V2S 2-mtr Base Vertical... \$49

TH5MK2S Broad Band 5-el Triband Beam \$389
1H7DXS 7-el Triband Beam \$439
TH3JRS 3-el Triband Beam \$185
TH2MK3S 2-el Triband Beam \$179
205BAS 5-el 20-mtr Beam... \$349
155BAS 5-el 15-mtr Beam... \$195
105BAS 5-el 10-mtr Beam... \$125
204BAS 4-el 20-mtr Beam... \$255
64BS 4-el 6-mtr Beam... \$65
66BS 6-el 6-mtr Beam... \$135
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1A-33B 14-el 2-mtr Beam... \$45
2BDD 80/40 mtr Trap Dipole... \$65
5BDD 80-10 mtr Trap Dipole... \$129
BN86 80-10 mtr KW Balun W/Coax Seal... \$22

MOSLEY

Pro37 7-el Triband Beam... \$469
CL-33 e-el Triband Beam... \$279
TA-33 3-el Triband Beam... \$249
1A-33R 3-el Triband Beam... \$189
TA40KR 40 mtr Kit for TA33... \$119

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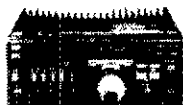
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TR-2600

- 2.5W/300 mW (Switchable) 2 Meter Handheld Transceiver
- LCD Readout • Ten Memories w/Lithium Back-up • Band and Memory Scan • Built-in Sub-tone Encoder

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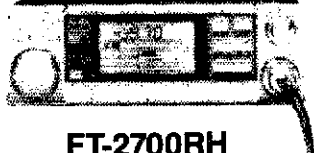


FT-757 GX

Compact General-Coverage Receiver

- General-Coverage Receiver
- USB/LSB/CW/M/Optional FM • Dual VFOs
- Memory/Band Scan • Speech Processor • CW Filter and CW Keyer included

YAESU



FT-2700RH

Dual Bander

- VHF FM
- 144/430 MHz
- 25 WATTS

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FT-209RH

- 5 Watts
- 10 Memories
- LCD
- Compact

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FT980

CAT SYSTEM—Computer Aided Transceiver

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All ham band HF transceiver. 16 memories. 100KHz to 30 MHz general coverage receiver and adjustable noise blanker and AGC.

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A breakthrough in 2-meter mobile communications! Most compact on the market (5 1/2" x 1 1/2" Hx 7 1/2" D), contains internal speaker for easy mounting. 25 watts. 32 PL frequencies. 9 memories. Scanning and touchtone mic.

ICOM



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ICOM



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With the FT-209RH there's no need to fiddle with knobs when you change from one memory channel to another. That's because you can independently store everything you need in each of the ten memories: receive frequency, standard or non-standard offset, even tone encode/decode with an optional module. And then recall any channel at the touch of a button.

It's easy to hear what's happening on your favorite repeaters or simplex frequencies. Just touch a button and scan all memory channels, or selected ones. Or all frequencies between any two adjacent memories. Use the priority feature to return automatically to your special frequency when it becomes active.

Bring up controlled-access machines with the optional plug-in subaudible tone encoder/decoder, independently programmed from the keyboard for each channel. Listen for tone-encoded signals on selected channels—without having to hear a bunch of chatter—by enabling the decode function.

The FT-209RH, which covers 10 MHz for CAP and MARS use, comes complete with a 500-mAh battery, charger and soft case.

For those who want a basic radio without the bells and whistles, consider the compact, lightweight FT-203R. This economical HT features 2.5 watts of power and an optional DTMF keypad. Most all the accessories for the 209 work with the 203, including an optional VOX headset that gives you hands-free operation that's perfect for public service events.

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Prices and specifications subject to change without notice.



FT-209RH shown actual size.

FT-203R transceiver

KENWOOD

pacesetter in amateur radio

TS-430S "Digital DX-terity!"

TS-430S

Digital DX-terity... that outstanding attribute built into every KENWOOD TS-430S that lets you QSY from band to band, frequency to frequency, and from mode to mode with the speed and ease that will give you a dominant position in DX operations.

KENWOOD'S TS-430S, a revolutionary, ultra-compact, HF transceiver has already won the hearts of radio Amateurs the world over. It covers 160-10 meters, including the new WARC bands (easily modified for HF MARS). Its high dynamic range receiver tunes from 150 kHz-30 MHz. It utilizes an innovative UP conversion PLL circuit for superior frequency stability and accuracy. Two digital VFO's allow fast split-frequency operations. A choice of USB, LSB, CW, or AM, with FM optional, are at the operators fingertips. All Solid-state technology permits inputs 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.

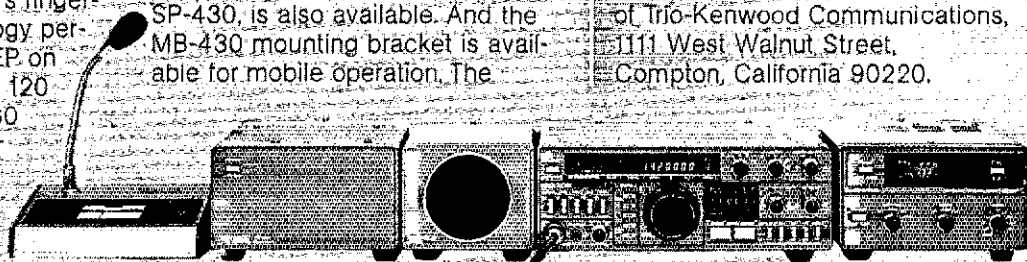
Eight memories store frequency, mode, and band data, with Lithium battery memory back-up. Memory scan and programmable automatic band scan help speed up operations. An IF shift circuit, a tuneable notch filter, and a Narrow-Wide switch for IF filter selection help eliminate QRM. It has a built-in speech processor. A fluorescent tube digital display makes tuning easy and fast. An all-mode squelch circuit, a noise blanker, and an RF attenuator control help clean up the signal. And there's a VOX circuit, plus semi-break-in, with side-tone. All-in-all, it just could be that the expression "Digital DX-terity" is a bit of an understatement.

TS-430S Optional Accessories:

In typical KENWOOD fashion, there are plenty of optional accessories for this great HF transceiver. There is a special power supply, the PS-430. An external speaker, the SP-430, is also available. And the MB-430 mounting bracket is available for mobile operation. The

AT-250 automatic antenna tuner was designed primarily with the TS-430S in mind, and for those who prefer to "roll their own," the AT-130 antenna tuner is available. The FM-430 FM unit is available for FM operations. The YK-88C (500 Hz) or YK-88CN (270 Hz) CW filters, the YK-88SN SSB filter, and the YK-88A AM filter may be easily installed for serious DX-ing. An MC-60A deluxe desk microphone, MC-80 and MC-85 communications microphones, an MC-42S mobile hand mic., and an MC-55 8-pin mobile microphone, are available, depending on your requirements. TL-922A linear amplifier (not for CW QSK), SM-220 station monitor, PC-1A phone patch, SW-2000 SWR/power meter 160 ~ 6 meter, SW100A SWR/power/volt meter 160-2m, HS-4, HS-5, HS-6, HS-7 headphones, are also available.

More information on the TS-430S is available from authorized dealers of Trio-Kenwood Communications, 1111 West Walnut Street, Compton, California 90220.



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

