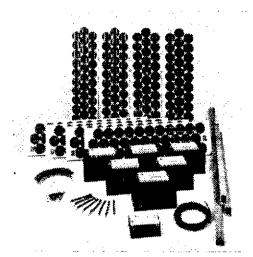
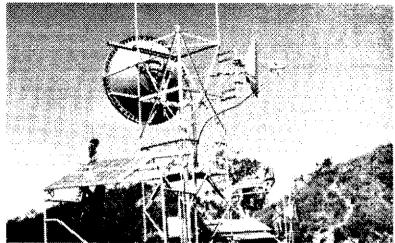
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Page 11





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Photovoltaic generators are finding an ever larger place in the communications industry as the worldwide need for information expands.

ARCO Solar photovoltaic systems have a number of outstanding advantages in powering remote communications equipment:

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IC-740

Extensive Versatility for the Serious Operator



The IC-740 from ICOM

contains all of the most asked-for features, in the most advanced solidstate HF base station on the amateur market...performing to the delight of the most discerning operator.

Study the front panel controls of the ICOM IC-740. You will see that it has all of the functions to give maximum versatility to tailor the receiver and transmitter performance to each individual operator's requirements.

Features of the 1C-740 receiver include variable width and continuously adjustable noise blanker, continuous, adjustable speed AGC, adjustable IF shift and variable passband tuning built in. In addition, an adjustable notch filter for maximum receiver performance, along with switchable

receiver preamp, and a selection of SSB and CW filters. Squelch on SSB Receive and all mode capability, including optional FM mode. Split frequency operation with two builtin VFOs for the serious DX'er.

The IC-740 allows maximum transmit flexibility with front panel adjustment of VOX gain and VOX delay along with ICOM's unique synthesized three speed tuning system and rock solid stability with electronic frequency lock.

Maximum versatility with 2 VFO's built in as standard, plus 9 memories of frequency selection, one per band, including the new WARC bands.

With 10 independent receiver and 6 transmitter front panel adjustments, the IC-740 operator has full control of his station's operating requirements.

See and operate the versatile and full featured IC-740 at your authorized ICOM dealer.

Options include:

- FM Module
- Marker Module
- · Electronic Kever
- · 2 9MHz IF Filters for CW
- · 3 · 455 kHz Filters for CW
- Internal AC Power Supply

Accessories.

- SM5 Desk Microphone
- UP/DWN Microphone
- Linear Amplifier
- Autobandswitching Mobile Antenna
- Headphones
- External Speaker
- Memory Backup Supply
- Automatic Antenna Tuner





October 1982

Volume LXVI Number 10

QST (ISSN: 0033-4812) is published monthly as its official journal by the American Radio Relay League, Newington, OT USA, Official organ of the International Amateur Radio Union and the Canadian Radio Relay League.

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Second-class postage paid at Hartford, CT and at additional mailing offices. Postmaster. Form 3579 requested.

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QST is available to blind and physically handicapped individuals on flexible discs from the Library of Congress, National Library Service for the Blind & Physically Handicapped, Washington, DC 20542.

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Indexed by Applied Science and Technology Index, Library of Congress Catalog Card No.: 21-9421, Microform editions available from Xerox University Microfilms, Ann Arbor, MI 48106.

CONTENTS



OUR COVER

Whether or not you can explain the difference between a PV cell and a PA system, you'll find the article on page 11 a timely introduction to the advantages of solar-powering your station.

TECHNICAL

- 11 Amateur Use of Solar Electric Power Part 1 C. Philip Chapman, W6HCS, Paul D. Chapman and Alvin H. Lewison
- 15 Mobile Antenna Matching Automatically! Don Johnson, WEAAQ
- 24 Build a Microprocessor-Controlled L-C Meter That Sends Morse Code Part 2

 Urs Hadorn, HB9ABO
- 28 Electrical Antenna Null Steering John Webb, W1ETC
- 40 Technical Correspondence

BASIC AMATEUR RADIO

21 Shunt-Fed Towers: Some Practical Aspects Doug DeMaw, W1FB

BEGINNER'S BENCH_

33 The "CHIP" (Cheap, Homemade lambic Paddle) Larry Wolfgang, WA3VIL

NEWS AND FEATURES

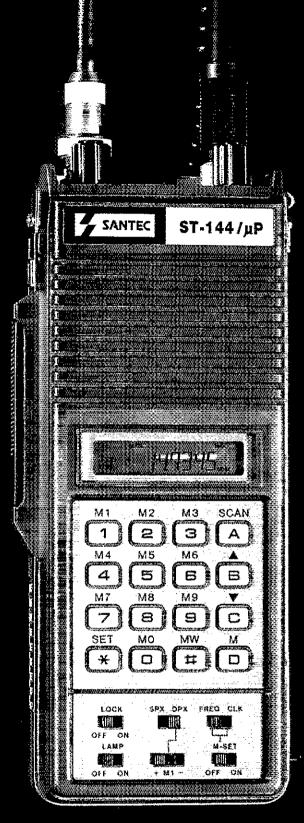
- 9 It Seems To Us: Phone Expansion II
- 46 ARRL Advisory Committees Embark on Dynamic Era Carol L. Smith, AJ21
- 48 WARC Resolution Calls for Amateur, Non-Amateur Cooperation in Disaster Communications Bob Eldridge, VETBS
- 50 Happenings: Amateur Radio Bill Passes Final Hurdle in Congress
- 55 International News: Region 2 Executive Committee Meets
- 56 Washington Mailbox: A Space Cadet's Guide to the ASAT Rules
- 37 Public Service: Crisis in Northern California

OPERATING

- 73 49th ARRL November Sweepstakes Announcement
- 74 Results, 1982 ARRL International DX Contest Mark J. Wilson, AA2Z and Bill Jennings, K1WJ
- 90 Operating News: Confessions of a DX Policeman

DEPARTMENTS -

Canadian NewsFronts	54	The New Frontier	72
Circuit Board Etching Patterns	44	Next Month in QST	14
Club Corner	65	On Line	57
Coming Conventions	66	OSCAR/RADIO Operating	
Contest Corral	92	Schedule	91
Correspondence	45	Product Review	36
Feedback	41	QSL Corner	61
Hamfest Calendar	66	Section Activities	93
Hints and Kinks	42	Silent Keys	68
Hows DX?	59	Special Events	65
Index of Advertisers	178	The World Above 50 MHz	70
In Training	69	W1AW Schedule	67
League Lines	10	YL News and Views	58
New Books	32	50 and 25 Years Ago	68
New Products	35		50



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Compare Santec to anything you like, and you'll see — you've got to get a Santec to get: In memory channels which store standard repeater offsets for instant recall is less than 10 ma drain in receive to conserve power while you're monitoring is extremely wide power options of 0.1 W, 1.0 W or even 3.5 W for varying conditions is an accurate 24 hour clock for instant reference is and a full two year extended service plan which no one else will match.

When you get a Santec, you also get: In the widest frequency range of any handheld odd offsets other than ± 600 kHz variable step sizes in bandscan a 500 ma battery with charger a full six digit backlighted LCD display for full frequency readout plus the memory channel number the easiest keyboard entry of any handheld eight modes of scan, search, manual control and open scan the ability to change batteries without losing memory data easily programmable bandscan a frequency lock switch on the keyboard an automatic low battery indicator and much more.

FEATURE	SANTEC ST-144	YAESU FT-208	KENWOOD TR-2500
Size (mm)	68 x 170 x 47	61 x 168 x 49	66 x 168 x 40
Weight with Batt.	600 gm	720 gm	540 gm
Readout	LCD (full 6 digits)	LCD (4 digits)	ECD (4 digits)
Memory Channels	10	10·	10
Memory of Offsets	YES	NO:	NO
Memory Backup	YES, Capacitance	Yes, Lithium Batt.	Yes, Lithium Batt.
Search Mode	YES	NO	NO
Step Size	5-100 kHz	5 or 10 kHz only	5-30 kHz
Battery	Quick Change Pack 500 ma-hr, 9.6 V	Quick Change Pack 450 ma-hr, 10:8 V	Slide-on Pack 400 ma-hr, 8.4 V
Frequency Coverage	142-148.995 Tx (149.995 optional) 142-149.995 Rx	143.5-148.495 Tx.Rx	143.9-148.995 TxRx
Power (max)	3.5 W High 1.0 W. Medi	Q.5 W High	2.5 W High
	0.1 W Low	0.9 W Low	
Priority	YES (in Mem Scan)	Yes (Priority Ch.)	NO
Ciock	YEŞ	NO	NO
Computer Current			
Saver	YES (< 10 ma)	NO (20 ma)	NO (97 ma)
Display	6 Digits - Mem. #	4 Digits + Mem. #	4 Digits

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Shown with optional SM-3 speaker microphone.



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Accessories for SANTEC Handheld Radios castories for SANTEL Flanditelo Radii wise from upper left Leather Case (ST-LC) Base Charger & Power Supply (ST-5BC) Remote Speaker (MS-50S) Mobile Charger (ST-MC) Speaker Microphone (SM-3)

The ST-144 jtP is approved under FCC Part 15



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Our numbers talk They have talked to winning scores in many important amateur activities including the 1979, 80, 81 June VHF contests, 1981 Central States antenna measuring contest, 1981, 82 EME contests and many more. Now there are three new numbers: the 424B,

24 elements for 432 MHz; the 410B, 12 elements at 432 MHz; and the 416TB, 16 elements at 435 MHz for satellite communications.

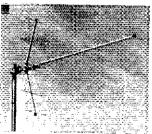
The new Boomer models feature insulated elements, stainless steel hardware, N type connector, T match feed and trigon reflectors.

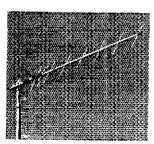
SPECIFICATIONS AND FEATURES

424-435 MHz, 7.6\, gain *maximized, F/B ratio *excellent, beamwidth 19*, length 17.42 ft. 5.2 m.

424-435 MHz, 2.2λ, gain *maximized, F/B ratio *excellent, beamwidth 33*, length 6 ft. 1.83 m.

428-438 MHz, Circular Polarization 2.2λ gain *maximized, F/B *excellent, beamwidth 34*, length 6.7 ft. 2.03 m.





MORE BOOMER NUMBERS

32-19 144-146 MHz 19 elements 144-146 MHz 14 elements 214FB 145.5-148 MHz 14 elements 228FB 145.5-148 MHz 28 elements 220-223 MHz 2208 22 elements 50-51 MHz 6 etements

Our list of model numbers also includes a full line of Boomer power dividers and stacking kits. See your dealer for all of the numbers, then talk to your friends throughout the world with Boomer antennas.

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"Top-notch"...VBT. notch. IF shift, wide dynamic range

The TS-830S has every conceivable operating feature built-in for 160-10 meters (including the three new bands). It combines a high dynamic range with variable bandwidth tuning (VBT), IF shift, and an IF notch filter, as well as very sharp filters in the 455-kHz second IF.

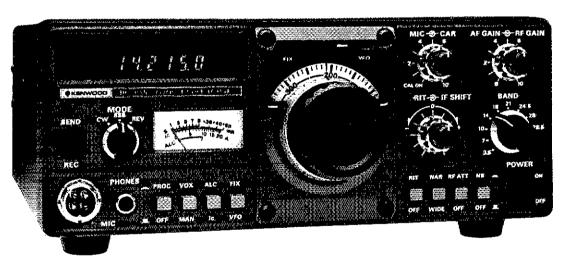
TS-830S FEATURES:

- LSB, USB, and CW on 160-10 meters, including the new 10, 18, and 24-MHz bands. Receives WWV on 10 MHz.
- · Wide receiver dynamic range, Junction FETs in the balanced mixer, MOSFET RF amplifier at low level, and dual resonator for each band.
- Variable bandwidth tuning (VBT). Varies IF filter passhand width.
- Notch filter high-Q active circuit in 455-kHz second IF.
- IF shift (passband tuning).
- · Noise-blanker threshold level control.

- Built-in digital display. ifluorescent tubel, with analog diat.
- 6!46B final with RF negative feedback, Runs 220 W PEP (SSB)/180 W DC (CW) input on all bands
- · Built-in RF speech processor.
- Narrow/wide filter selection on CW.
- · SSB monitor circuit.
- RIT and XIT Itransmitter incremental funing).

Optional accessories:

- SP-230 external speaker.
- VFO-230 external digital VFO with five memories, digital display.
- VFO-240 external analog VFO.
- AT-230 antenna tuner.
- YG-455C (500 Hz) or YG-455C) (250 Hz) CW filter for 455 kHz IF.
- YK-88C (500 Hz) or YK-88CN (270 Hz) CW filter for 8.83 MHz IF.
- KB-I deluxe heavyweight knob



"Small talk"...IF shift, Processor, N/W switch, affordable.

A compact, all solid-state HF SSB/CW transceiver for mobile or fixed base station, covering 3.5 to 29.7 MHz.

TS-130SE FEATURES:

- 80-10 meters including the new 10, 18, and 24 MHz bands. Receives WWV on 10 MHz.
- TS-130SE runs 200 W PEP/160 W DC input on 80-15 meters, 160 W PEP/140 W DC on 12 and 10 meters, TS-130V version at 25 W PEP/20 W DC, all bands, also available.
- Digital display, built-in.
- IF shift circuit.
- · Speech Processor, built in.
- · Narrow/wide filter selection on CW and SSB with optional filters.
- Automatic SSB mode selection (LSB on 40 meters and below, USB on 30 meters and upl. SSB reverse switch provided.
- · RF attenuator, built-in.
- Effective noise blanker.
- Final amplifier protection circuit assures maximum reliability. Output power is reduced if abnormal operating conditions occur. For very severe operations, optional cooling fan, FA-4 is available.
- Dimensions: 3-3/4 H x 9-1/2 W x 11-9/16 D (inches). Weight: 12.3 lbs.
- · Other features: VOX, CW semi break-in with sidetone, one fixed channel, and 25 kHz marker.



Optional DFC-230 Digital Frequency Controller

Frequency control in 20-Hz steps with UP/DOWN microphone (supplied with DFC-230) Four memories and digital display. (Also operates with TS-120S, TS530S, and TS-830S.)

Optional accessories:

- PS-30 matching power supply (TS-130SE).
- KPS-21 power supply (TS-130SE).
- PS-20 power supply (TS-130V)
- SP-120 external speaker. VFO-120 remote VFO.
- FA-4 fan unit (TS-130SE).
- YK-88C (500 Hz) and YK-88CN (270 Hz) CW filters.
- YK-88SN (1.8 kHzl narrow SSE filter.
- AT-130 antenna tuner.
- MB-100 mobile mounting bracket.

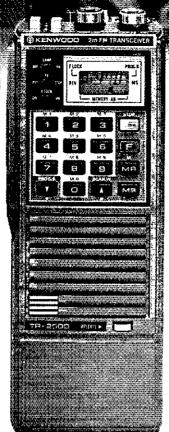


BIG performance, small size, smaller price!

The TR-2500 is a compact 2 meter FM handheld transceiver with every conceivable operating feature.

TR-2500 FEATURES:

- Weighs 540 g, (1.2 lbs). 66 (2-5/8)
 W x 168 (6-5/8) H x 40 (1-5/8) D, mm (inches).
- * LCD digital frequency readout.
- . Ten memories includes "MO" for non-standard split repeaters.
- · Lithium battery memory back-up, built-in, (est. 5 year life).
- · Memory scan.
- Programmable automatic band scan, and upper/lower scan limits; 5-kHz steps or larger.
- Repeater reverse operation. 2.5 W or 300 mW RF output.
- (HI/LOW power switch).
- Built-in tunable (with variable resistor) sub-tone encoder.
- · Built-in 16-key autopatch.
- * Slide-lock battery pack.
- Reyboard frequency selection.
- e Covers 143.900 to 148.995 MHz.



CONVENIENT TOP CONTROLS



- Optional MS-1 mobile or ST-2 AC charger/supply for operation while charging.
- Battery status indicator.
- Complete with flexible antenna, 400 mAH Ni-Cd battery, and AC charger.

Optional accessories:

- ST-2 Base station power supply/ charger (approx. 1 hr.) MS-1 13.8 VDC mobile stand/
- charger/power supply
- VB-2530 2-M 25 W RF power amps., (TR-2500 only).
- TU-1 Programmable CTCSS encoder [TR-2500 only).
- TU-35B Programmable CTCSS encoder (mounts inside TR-3500 only).
- PB-25 400 mAH Nt-Cd batt.
- PB-25H Heavy-duty 490 mAH Ni-Cd battery pack
- BT-I Battery case for AA manganese/alkaline cells.
- SMC-25 Speaker microphone.
- LH-2 Deluxe leather case.



TH-SECO

70 CM FM Handheld

- Covers 440-449.995 MHz in 5-kHz steps.
- Hi-1.5 W, Low-300 mW. TX OFFSET switch, ±5 kHz to ±9.995 MHz programmable.
- Auto/manual squeich control.
- * Tone switch for opt, TU-35B
- · Other outstanding features similar to TR-2500.
- BH-2A Belt hook.
- · WS-1 Wrist strap.
- · EP-1 Earphone.



All mode (FM/SSB/CW) 25 watts, plus...!!!

The TR-9130 is a powerful, yet compact, 25 watt FM/USB/LSB/ CW transceiver. Available with a 16-key autopatch UP/DOWN microphone (MC-46), or a basic UP/DOWN microphone.

TR-9130 FEATURES:

- 25 Watts RF output on all modes, (FM/SSB/CW).
- » FM/USB/LSB/CW all mode. Selectable tuning steps of 100-Hz, 1-kHz, 5-kHz, 10-kHz.
- Six memories, On FM, memories 1-5 for simplex or ±600 kHz offset, using OFFSET switch, Memory 6 for non-standard offset. All six memories may be simplex, any mode.
- Memory scan.
- * Internal battery memory back-up, using 9 V Ni-Cd battery, (not KENWOOD supplied). Memories are retained approx. 24 hours. adequate for the typical move

from base to mobile. External back-up terminal on the rear.

- Automatic band scan.
- . Dual digital VFO's.
- Transmit frequency tuning while transmitting, for OSCAR operations.
- Squelch circuit for FM/SSB/CW.
- Repeater reverse switch.
- " Tone switch.
- CW semi break-in; sidetone.
- Compact size and lightweight.
- Covers 143.9 to 148.9999 MHz.



TR-9500

70 CM SSB/CW/FM transceiver

Covers 430-440 MHz, in steps

- of 100-Hz, 1-kHz, 5-kHz, 25-kHz or I-MHz.
- CW-FM Hi-10 W, Low-1 W. SSB 10 W,
- Automatic band/memory scan, Search of selected 10-kHz segments on SSB/CW.
- *6 memory channels.
- HI/LOW power switch. 25 or 5 watts on FM or CW,
- High performance noise blanker. * RF gain control. * RIT circuit.

Optional accessories:

- KPS-7 Fixed station power supply.
- PS-20 Fixed station power supply (TR-9500 only),
- SP-120 External speaker.
- TK-1 AC adapter for memory back-up.



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THE AMERICAN **RADIO RELAY** LEAGUE, INC.



"It Seems to Us... 99

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

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

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

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Why There, and Not Here?

Amateur Radio history was made on July 3. with the first two-way contact to break the 1000-kilometer barrier on the 10-GHz band. The record was extended on July 10 to 1166 km, or about 724 miles, roughly the distance from New York to Chicago. This was accomplished with no more than 30 milliwatts of transmitter power on a frequency which is the 70th harmonic of the 2-meter band. At this frequency a wavelength is barely more than an inch long, and the leaves on a tree can be enough of a barrier to disrupt a contact. Bridging hundreds of miles on a microwave band, without satellites or repeaters, is truly a remarkable achievement.

It's good to know that some hams were spending the Fourth of July weekend exploring new frontiers. Right? Well, sort of; in fact, the holiday had nothing to do with it because, as far as we know, the Fourth isn't celebrated in Italy. The bulk of the credit for this recordbreaking feat belongs to Nicola Sanna, IØSNY of Perugia, Italy. Nicola has been pursuing this goal for three years, in the process breaking his own 10-GHz record innumerable times. No doubt he knows as much as anyone alive about how microwave signals can carry over great distances in the shallow duets that often form over bodies of water or over deserts. He spent the first part of July near Valencia, Spain, operating as IØSNY/EA5 under special license and beaming his 10-GHz signal toward fellow experimenters across the Mediterranean, back in Italy, IØYLI near Rome was the first to complete a two-way exchange with him, and IWØBFZ, slightly farther away, became coholder of the DX record later in the week. Full credit to all three on this sterling accomplishment,

We report this achievement by the Italian amateurs with some pride, but also with some chagrin. There has been no similar 10-GHz DX accomplishment on this side of the Atlantic; we're not even aware of any serious effort being expended in that direction. Back in November 1980, QST announced an award, sponsored by Microwave Associates (a division of M/A-COM, Inc.) and administered by the Radio Society of Great Britain, to be given to the first amateurs to complete a two-way, 10-GHz terrestrial OSO over a 1000-km path. Since then we've regularly reported on the Italians' quest for the prize, which, subject to RSGB certification, apparently has been won. Why didn't North Americans similarly respond to the challenge? Conditions in the Mediterranean may be favorable for ducting, but amateurs along the Atlantic and Gulf Coasts, especially, are well aware of the phenomenon. Some excellent pioneering work has been done between California and Hawaii on lower frequencies, and no doubt someday will be done on 10 GHz; but the fact remains that American amateurs are lagging embarrassingly behind their European counterparts. If one looks at the 10-GHz DX record as a race, we Americans never left the starting gate.

Why? It certainly isn't for lack of opportunity. At a time when there is great concern over the ability of domestic electronics manufacturers to compete with overseas suppliers, it's interesting to note that the Italians used Gunnplexers - the product of American technology - as the heart of their equipment. Microwave Associates marketed the inexpensive Gunnplexer to amateurs after much pushing by Dana Atchley, W1CF, Fred Collins, W1FC, and the late Jim Fisk, W1HR, of Ham Radio magazine. Their desire was to see amateurs make greater use of the microwave allocations. Numerous articles and even a complete book have been published about the Gunnplexer; the 1982 ARRL Handbook devotes six pages to the subject. Lots of them are out there - more in Europe, apparently - but DXing over here has been mostly over line-of-sight paths between hilltops. Not that one needs a Gunnplexer to get on 10 GHz; the British, in particular, are fond of home-built microwave gear which they claim is simpler, less expensive, and easy to duplicate.

So, hearty congratulations to IØSNY and his compatriots for showing us how it's done. They deserve a lot of credit for their knowledge and persistence; they've achieved a difficult goal, and have set a mark which is worthy of our best efforts to eclipse. In the meantime, there is another Microwave Associates award, as yet unclaimed, for the first two-way amateur OSO over a 250-km path using the 24-GHz band. Will WICF be flying to Furope to present this one, as well? - David Sumner, KIZZ

ON FELLOWSHIP

From time to time a case of prejudicial behavior will surface on the amateur bands, That it is rare is a tribute to the democratic character and maturity of the amateur fraternity.

International squabbles have been a part of the world scene since the dawn of civilization. But they should not be reflected in Amateur Radio.

A few governments have gone so far as to restrict Amateur Radio contact with countries with whom they are experiencing difficulties, This is unfortunate, for it is, in effect, political manipulation of the Amateur Radio Service.

When they sit down to their equipment, radio amateurs become true citizens of the world. They may experience and exhibit patriotism and cultural pride, but there is no place for demeaning or discriminatory treatment of fellow amateurs from other lands,

The hallmark of Amateur Radio is that it transcends barriers of distance, and bridges differences in nationality, race, religion, sex, age and political persuasion. This is a vital and precious commodity in our troubled world. . Let's keep it alive. - Vic Clark, W4KFC

League Lines...

The Amateur Radio Bill has passed its final hurdle in Congress! See this month's "Happenings." At press time President Reagan was scheduled to sign the bill during the week of September 7-14. More details will appear next month.

The ARRL LETTER is the new general interest biweekly newsletter to begin publication at the end of October. Divisional level members of the League's Field Organization will receive the letter automatically (free). ARRL members (only) may purchase a yearly subscription for \$19.50. An advertisement detailing the offer appears on page 170 of this issue. The ARRL LETTER will report news of interest to League members. Any member having news to be considered for inclusion in the ARRL LETTER should contact the ARRL Public Information Office at 203-666-1545. This number may be used 24 hours per day.

The League filed comments September 1 in its petition for rulemaking RM-4040, which requests a ban on CATV use of amateur frequencies. The petition was filed with the Federal Communications Commission on January 12, 1982, in response to growing concern in the amateur community over the CATVI problem. ARRL's comments recognized ongoing cooperative efforts with the cable industry's primary trade association, the National Cable Television Association, but also affirmed its original rulemaking request that cable television companies not be permitted to use frequencies assigned to the Amateur Radio Service. For more information, and copies of League filings in the CATVI matter, contact Richard Palm, KICE, at League Hq.

The International Amateur Radio Union (IARU) has a new President. Noel Eaton, VE3CJ, stepped down in March after eight years of distinguished service, including leadership of the world-wide efforts to ensure effective representation for Amateur Radio at the 1979 World Administrative Radio Conference (WARC-79). To replace Noel, the ARRL Board recommended Richard L. Baldwin, WIRU, the recently retired General Manager of the League and Secretary of ARRL and IARU. Dick's nomination has been affirmed by a majority of the 115 member-societies of the Union. He will continue to conduct QST's International News column from his home in Maine.

Cablesat General Corporation (CGC) has filed an application with the FCC for permission to operate two geostationary communications satellites. Plans include an Amateur Radio Network Transponder (ARNET) for each satellite. The anticipated uplink frequency is 5.65 to 5.67 GHz and the downlink is 3.40 to 3.41 GHz. Amateur Radio stations in earth operation using antennas of 2 meters in diameter and 10 watts of ri power should be able to access the proposed transponders. FCC approval is pending, and the launch, if approved, would occur in late 1985. CGC would be donating the transponders for ARNET use, and CGC President Ray Kassis, WA40HK, has asked ARRL to coordinate all activities and establish standard procedures. QST will cover more details as they become available.

Amateurs in 4-land, with two-letter prefixes: The Post Office requires you to add the word "Call" ahead of Box 599. The complete address is <u>ARRL QSL Bureau</u>, <u>All 2-Letter-Prefix "4" Calls</u>, Call Box 599, Sterling, VA 22170.

Attention repeater enthusiasts! The deadline for registering your repeater for the next edition of the <u>ARRL Repeater Directory is November 1</u>. Please register your repeater on form CD-240, available for an s.a.s.e., to ensure the accuracy of the new edition. Send all information to ARRL Communications Department, 225 Main St., Newington, CT 06111.

AMSAT, the Radio Amateur Satellite Corporation, is looking for a <u>full time</u>, <u>professional executive director/general manager</u>. The position is located in suburban Washington, DC and will require some travel and weekend work. Salary is in the \$30,000 range, plus substantial performance-based incentives. The successful candidate must be able to develop and implement innovative educational programs, manage and coordinate the work of hundreds of volunteers, lead a comprehensive fund-raising effort, and oversee the day-to-day operations of AMSAT. An engineering/technical background is desirable, and an active Amateur Radio interest is <u>mandatory</u>. If interested, send your resume to the <u>Search Committee/AMSAT</u>, P.O. Box <u>27</u>, Washington, DC <u>20044</u>. Deadline is November 1.

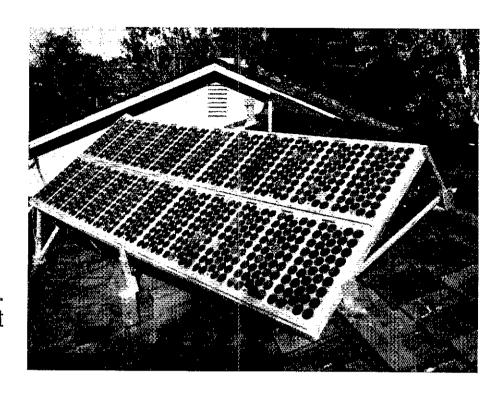
The FCC has amended the table of authorized emissions in Section 97.61 of the Rules to explicitly authorize F ϕ emissions in the frequency band 51.0-54.0 MHz.

There have been two recent additions to the list of countries with which the <u>U.S. has a third party agreement</u>: <u>Australia (VK) and St. Lucia (J6L)</u>. At press time the FCC Treaty Branch expected confirmation of an agreement between the U.S. and Antigua & Barbuda (V2A). More information will appear next month.

Amateur Use of Solar

Electric Power[†]

Part 1: Powering radio equipment using sun energy is attracting increasing attention. This might just whet your appetite to try a similar scheme.



By C. Philip Chapman,* W6HCS, Paul D. Chapman and Alvin H. Lewison

This is a description of the design and construction of a solar-powered Amateur Radio emergency-communications center. While the requirements placed on such a system are more stringent than those of the average Amateur Radio station, the approach is one that should provide a sound foundation for the design of smaller or larger systems. Such systems should appear in ever-increasing numbers as the cost of photovoltaic (PV) cells becomes more attractive.

There are no moving mechanical parts, except for a single relay and some analog meters, in this system. It can power the associated emergency Amateur Radio

communications equipment for about 72 hours of continuous operation without sunlight. The radio equipment operates from storage batteries having approximately 500 ampere-hours (Ah) of energy storage. The batteries are charged by means of sunlight converted to electrical energy through the action of PV modules composed of a number of silicon solar cells. This system is entirely independent of utility-delivered electrical energy, and is noiseless and nonpolluting.

Design Approach

When sizing a PV array and energy-storage system for emergency-communications equipment, answers must be found to such questions as: How long do emergencies last? What is the expected duty cycle (ratio of transmit to receive time)? How long should it take to recharge the battery pack after a practice drill or emergency? How much storage capacity is required? Except for the last question, the others normally are not encountered in most PV-systems applications. System lifetime must be considered,

and provisions included, for component and equipment expansion over that period.

In general, PV modules for any application have to be connected in parallel and, perhaps, in series-parallel to meet the equipment voltage and current requirements. Table 1 lists the current and power requirements for this system. Worst-case conditions occur when both the hf and vhf radios are in the transmit mode at the same time, drawing 24 A (at 13.6 V) from the battery pack. There could be additional battery drain from the dc-to-ac inverter (used for antennarotator-motor power) and emergency lighting in the radio room.

Duty cycles defined the size of the battery-pack, which consists of a number of improved electric-car, deep-discharge, 6-V lead-acid modules. A worst-case condition assumes no output from the PV array, but with the batteries fully charged. The final design provides for 72 hours of continuous operation in total darkness, using the critical emergency-traffic duty cycle (10% transmit, 90% receive time)

[†]Adapted from Jet Propulsion Laboratory publication 82-2, "A Low-Power Photovoitalo System With Energy Storage for Radio Communications," Jet Propulsion Laboratory, California Institute of, Technology, 4800 Oak Grove Dr., Pasadena, CA 91103.

^{*2922} Alta Terr., La Crescenta, CA 91214

Table 1
Communications Equipment Current and Power Requirements

Frequency	Receive Mode	Transmit Mode			ive Mode Transmit Mode	
Band	Amps (A)	Power (W)	Amps (A)	Power (W)		
High	0.20	2.72	9.10	124		
Low	6.00	81.6	15.0	204		
Both	6.20	84.3	24.1	328		

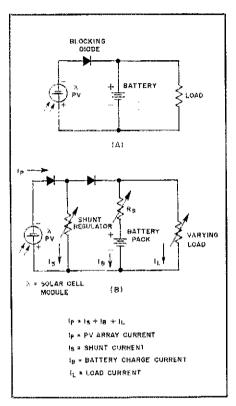


Fig. 1 — Representations of a simple (A) and advanced (B) PV system.

Table 2 Standard Operating Characteristics, PV System Module

Power, maximum	10.1 W
Voltage at maximum power	18.3 V
Current at maximum power	550 mA
Voltage, open circuit	22.5
Current, short circuit	620 mA
Module efficiency	6.1%

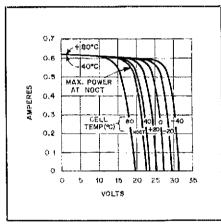


Fig. 2 — PV module I-V characteristics.

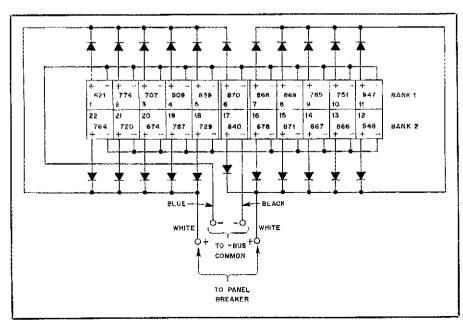


Fig. 3 - Schematic diagram of a PV array.

determined from information applied by manufacturers of emergency service equipment.

System Concept

Fig. 1A illustrates the simplest system concept. A blocking diode prevents the battery pack from discharging through the PV array during no-sun periods. The problem with this setup is that all the battery electrolyte would boil away when the batteries became fully charged and the equipment was not in use. A more advanced concept is shown in Fig. 1B. Here a shunt regulator is used to maintain the battery-pack voltage, independent of the battery-pack state of charge (R_S) or the load. When the battery pack is fully charged and the equipment is not operating, the PV array energy is dissipated as heat in the shunt regulator, and the system efficiency is at its worst. If the battery pack is partially discharged, or if the equipment is operating, or if both of these conditions exist, the PV-array current will be allocated to meeting the load requirements, and any surplus current will be used to recharge the battery pack with no heat being dissipated in the shunt regulator. During this time, the system efficiency is highest. The dynamic resistance of the array, regulator, battery and the load, and the associated time constants of the system, are important parameters that will affect the system stability.

Photovoltaics

Typically, PV modules are rated under standard operating conditions (SOC). The following SOC are defined for the modules used:

- 1) Performance is evaluated when the module is irradiated (illuminated) with 100 mW/cm² of an air mass 1.5 spectrum.^{1,2}
- 2) Nominal operating cell temperature (NOCT) is defined to be 146° F under no-load conditions when the air temperature is maintained at 68° F with air motion of 2.2 mi/h.

Table 2 lists the performance of a sample module based on the foregoing conditions. Fig. 2 shows the I-V characteristics.

Twenty-four Sensor Technology (Photowatt) model 20-10-1674 (block III) PV modules are used. Of this number, 22 are used for the array and two are kept as spares. Within the 39.5 ft² module area, there are 25.6 ft² of active cell area.

Fig. 3 is a PV-array schematic diagram. The last three serial number digits of each module are indicated, and each module is numbered 1 through 22 in order to indentify each protective diode in the diode box. Code tags are wrapped around each cable within the protective diode box. This will allow quick indentification of each module in the event of failure.

The protective diodes are 1N4004s; their purpose is twofold. As shown in Fig. 4A and B, the diodes prevent good modules from being short-circuited by a defective module. If resistance R2 is much less than the load resistance, R1, current from modules 1 through 3 will flow into shorted module 4. Protective diodes will prevent this from happening. Fig. 4C and D illustrate the same diodes being used to prevent potential problems from shadowing. Overheating can destroy cells or modules being shadowed partially or totally. The unshadowed modules will effectively back bias shadowed-module diodes, preventing current flow and heat generation. As an alternative, Schottky diodes, which have a forward bias voltage drop less than that of a normal PN junction diode, may be used.

The diodes are mounted between solder terminals in a black metal box secured beneath, and always in the shadow of, the array. To ensure that the diode matrix could dissipate about 8 W at high sun, holes were drilled in the box top and bottom to allow convection cooling.

All the module positive leads are connected to the diode anodes within the diode box. The diode cathodes are terminated in a bus bar, effectively paralleling the module positive terminals. The negative leads of the modules are "daisy chained" underneath the array, completing the parallel configuration. No. 14 Teflon-insulated wire is used for the interconnections.

As shown in Fig. 3, the array is divided physically into two banks. There are two reasons for this. First, the current path to and from the battery box can be divided into two loops, reducing the cable voltage drop and associated energy loss. Second, comparisons of voltage and current can be made at the battery box to determine array performance. Any difference will indicate a module performance problem.

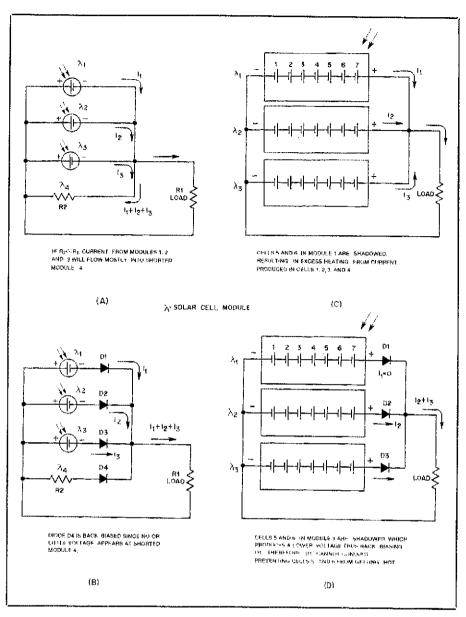
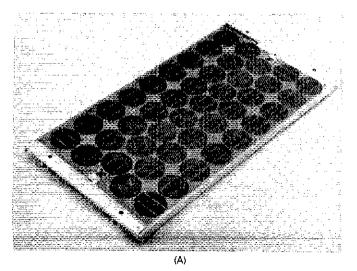


Fig. 4 — Schematic diagrams of solar-cell modules and the ways in which protective diodes may be used. Shown at A, shorted cells, no protective diodes; B, shorted cells with protective diodes; C, shadowed cells without diodes; D, shadowed cells with protective diodes.



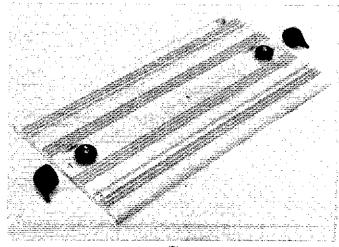


Fig. 5 — Front (A) and rear (B) views of the Sensor Technology PV modules showing the heat sink.

The two positive leads are tied together at a panel circuit breaker in the breaker box, and the two negative leads are connected at an ammeter current shunt where current comparisons can be made.

PV Module Mechanical Aspects

Each of the 22 modules measures approximately 28 × 11 inches, is 1.8 inches in depth, weighs 8.2 lb, and is constructed within an aluminum heat sink. The silicon cells (44 per module) absorb heat from the sun; this derates their performance. Therefore, the modules are mounted in an aluminum framework that allows heat to be transferred from the heat sink by convection and radiation (see Fig. 5). Care is taken not to mount the array too close to the roof surface, which itself transfers heat by convection and radiation.

Strength, rigidity, weight and absence of maintenance are important modulestructure considerations. Based on cost, weight and availability, 6061 aluminum (6063 for extruded shapes) was selected for the structure. The array rests on six legs made of extruded rectangular aluminum tubing. These legs are set inside aluminum channel sections. The entire assembly is butted to 90° angle brackets. Lag bolts fasten the angle brackets to studs, which are secured by means of 12-inch bolts through the roof to the ceiling rafters below. This type of design provides the greatest degree of flexibility when positioning the platform at the desired tilt and wall angles."

After the array is positioned, the legs are braced diagonally to ensure strength and rigidity. Wind gusts of 50 mi/h are not uncommon at the site during the windy season, so guy cables are used to anchor the structure to the studs. Clearance is provided to prevent air compression under the structure and to allow the prevailing breezes to cool the PV module heat sinks convectively.

Part 2, the conclusion of this article, will cover the method of storing the energy collected by the PV modules. Part 2 will appear in a subsequent issue of QST.

Notes

 1 in. $^{2} = \text{cm}^{2} \times 0.155$; $\text{m}^{2} = \text{ft}^{2} \times 0.0929$; mm = in. $\times 25.4$; $^{\circ}\text{C} = (5.9 \text{ }^{\circ}\text{F}) - 32$; $\text{km} = \text{mi} \times 1.609$. The sun spectrum at the top of the atmosphere is defined as AMØ. AMI is the air mass penetrated by sun rays in the most direct optical path. Other air-

aun rays in the most direct optical path. Other airmass values indicate the ratio of the optical path length through the atmosphere to the path length through AM1. Different air-mass ratios imply differently shaped light spectra and, therefore, different module performance. The standard air mass 1.5 spectra is an analytically derived spectra, and represents the mean spectra of sunlight. For detailed information on the subject of performance reference conditions for PV-airay measurements, see R. G. Ross and C. C. Gonzales, "Reference Conditions for Reporting Terrestrial Photovoltaic Performance," Proceedings of the AS/ISES 1980 Annual Meeting, Phoenix, Arizona, June 1980.

Array azimuth angle terminology used in PV engineering is also known as the wall angle in solar heating and cooling engineering. The angle will he referred to as the wall angle in this report, and is simply the projection of the array normal to the horizonal plane. Angles east of south are positive; angles west of south are negative.

Tune in the World — It's Really Quite Elementary

[1] Many of us talk about educating the public about Amateur Radio, but few do anything about it. As science coordinator of an elementary school in Brooklyn, New York, I've had many opportunities to describe to my students and colleagues the wonderful experiences and the fascinating people I've met through Amateur Radio. Recently, however, I decided to turn theory and secondhand stories into a series of hands-on real-time lessons.

1 brought to school a converted 11-meter rig, a 12-V power suppy and a mobile antenna. Setting up took about five minutes.

On the first start-up, I was pleasantly surprised to hear how crowded the band was. It takes a strong signal to move the "conservative" S meter on the rig, but stations from the 4, 5, 7 and 0 call areas were really booming in. Tuning closer to 28.5 MHz brought in fairly strong G, D, I and U stations. Additional careful tuning brought out at least six more European countries.

Since I come in contact with most of the classes in the school, students from 6 to 12 years of age got their first exposure to ham radio. With each class, the sound of the radio alone was sufficient motivation for the lesson ahead. Most, of course, thought it was CB, but as I tuned around, their casual air, laced with adolescent sophistication, dissolved into wide-eyed amazement and a flood of questions. The lesson that was planned as an introduction to ham radio turned out to be the beginning of a multi-lesson unit.

Day two with radio in school was even better than the first. Several classes were thrilled to learn of the wonderful longdistance capabilities of the radio, but more than that they met Ken Dahlmeier, WØMFR. from Sturgeon Lake. Minnesota, When I explained to him on the air that my classes were interested in learning about different areas of the country firsthand, he volunteered to field any questions the kids could throw at him. I was as thrilled as the kids were, listening to his answers regarding such things as the weather in his area, the nature of the land around his home, local wildlife and more.

At the end of the period, the students didn't want to leave. What great motivation! At the request of a 6th-grade teacher who also was excited by the idea of using a ham radio transceiver in school, Ken agreed to run a sked for the following Wednesday at 1500 UTC.

On the following Wednesday, Larry's students came to my room early; they didn't want to miss anything. At precisely the designated time, the kids heard Ken calling me. Smiles broke out all over when they recognized my call now coming through the speaker. With Ken's help, we

ran a great 60-minute lesson.

What can ham radio contribute to a classroom, even in the primary grades? Briefly, it can be used as a self-motivating addition to a host of subjects, and also can be taught as a unit in itself. Follow-up lessons can be planned, along with developing letters of thanks to hams contacted. This aids grammar, spelling and writing. I hope this school will be able to initiate a trial program using Amateur Radio as described above, and that interest in such a program can be developed by the school district and by the Board of Education.

Perhaps a net can be formed to meet between the hours of 1400 and 2300 UTC, enabling schools, as well as individual stations throughout the country, to contact one another to conduct such lessons. The wealth of knowledge to be gained is incomparable, the possibilities are endless, and the potential for good education is infinite. Anyone interested in forming such a net should contact this writer.

Epilogue

In the weeks since this project was initiated, there have been several important developments. Ken, WØMFR, was so gracious to one of my 6th-grade classes that each student with whom he spoke drafted and sent to him a letter of thanks. Ken, in turn, used these letters, and the wonderfully candid enthusiasm contained in each, to convince his local Board of Education in Minnesota to allow him to begin an Adult Education ham radio course. Additionally, Ken and I are attempting to set up an on-the-air "radio pals" club for students in my school and students (on the same grade level) in a school near Ken's home in Sturgeon Lake. - Richard Wolfert, WB2EYI, P.S. 309K, 794 Monroe St., Brooklyn, NY 11221

Next Month in QST

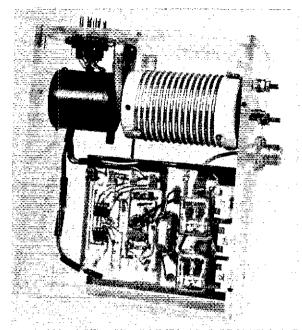
- It could be the most significant law affecting Amateur Radio during the 1980s. Thanks to hard work by many, S.929/H.R. 5008, sometimes known as the "Goldwater Bill," is now law. A recap will appear in November QST.
- Beginner's Bench covers the use of station accessories — those you can't live without, and those that make operating more enjoyable.
- Ready for the new 900-MHz band?
 Construction details for a high-power cavity amplifier are provided in a November article.

Mobile Antenna Matching

— Automatically!

The ultimate in hf mobile operation is here! Band hop or operate band edge to band edge with ease. Before you can transmit your call sign, antenna matching is completed!

By Don Johnson,* W6AAQ



n automatic antenna-matching network opens up a new world of hf mobiling. By using one of the multiband mobile antennas available today, it is possible to switch from band to band and operate anywhere in that band without stopping the vehicle to make adjustments. There's no need to be concerned about antenna matching - it's automatic! And, it is done so rapidly that you can beat most fixed-station operators to the new band or frequency. Numerous "mobileers" have built and enjoyed this low-cost, one-weekend construction project. The design was originated by Bruce Brown, W6TWW, 2 and a number of units were constructed by West Coast hams with his help, starting in 1976.

A glance at the bibliography will show that automatic antenna-matching networks have been on the mobileer's mind for a number of years. I remember a trunk full of dual triodes being used in the first attempt at employing an automatic antenna-matching network for 75 meters in the early '50s.

During the last couple of years I have helped a number of mobileers get their matching networks operational. With all this activity, my place became the clearing house for a few who had construction problems or suggestions. It's time this helpful information is passed to others. To ease construction and installation for the newcomer, this article provides a complete checkout procedure, from workbench to final on-the-air checks.

Twenty-meter capability has been added to the original circuit, and an improved matching section is included. The main pc board is smaller and has been rearranged. A pc board is added to accommodate the modified input circuit, and another is included for the redesigned control head. The parts used are few in number and aren't exotic. Schematic diagrams for the input, main boards and control head are shown in Figs. 1 and 2, respectively.

Packaging and Parts

Before starting a construction project, the builder usually decides on the shape and size of the final assembly. In view of the variety of variable inductors and gearhead drive motors that may be used, no firm packaging suggestions are presented.

Parts layout is not critical. The only requirement is that the roller inductor be as close as possible to the antenna base, and connected to it with a short length of unshielded wire.

Rotary Inductor: A minimum inductance of 10 µH is needed to cover the 75-m band. Some old a-m transmitters with rotary inductors are still around, and in many cases the price of the whole transmitter is less than the cost of a new rotary inductor! One available unit is the ARC-5. "Command Set" transmitter.³

The rotary inductor from a 4- to 5.3-MHz transmitter is ideal.

Mounting and connecting the ARC-5 inductor to the gear-head motor may take a little work and ingenuity (see Fig. 3 and the title photo for some ideas). Over the years, good use has been made of small-diameter gas-line hose for couplings. It is an insulator, it's flexible, and, if the piece is long enough, you can even make it go around corners.

A word of caution: The ARC-5 inductor trolley wheel has a wedge shape and a nonconducting material on one side. With this configuration, an extremely small area of the wheel makes contact with the inductor wire. These 40-year-old coils may have small pits on the wire surface, which can cause an intermittent contact. Before installing the coil, move the wheel the entire length of the inductor while checking the resistance between the input and output terminals. If the resistance deviates from zero, do some investigating, because later on (during testing or after installation) you can have some very frustrating experiences caused by intermittent wheel/wire contact. To remove the oxidation and grime from the coil and mating parts, disassemble it and use household silverware tarnish remover.

Clutch: Using a rotary inductor that has a stop at each end of travel presents a problem when it is to be motor-driven. Limit and automatic-reversing switches are not practical with this circuit. A slipping clutch that goes into action when the

'Notes appear on page 20.
*809 Capay St., Box 595, Esparto, CA 95627

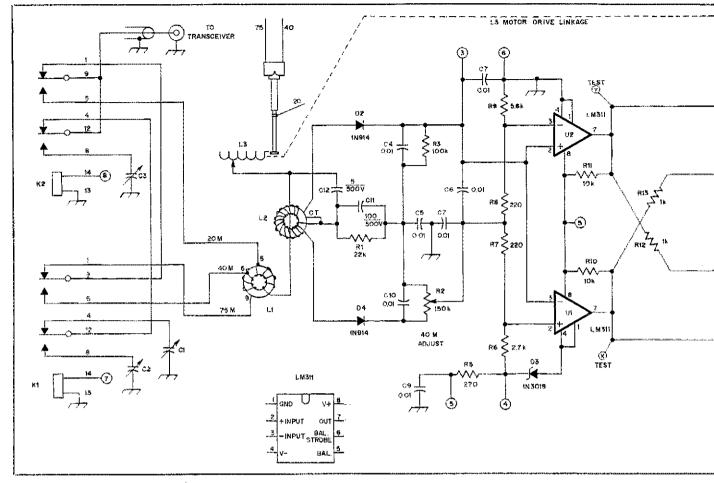


Fig. 1 - Schematic diagram of the antenna-matching unit. Fixed value resistors are 1/4-W, 5%-tolerance, carbon-composition types.

C1 — 1000-pF, 500-V dc mica compression trimmer (Arco 310 or equiv.). See text.

C2 — 750-pF, 500-V dc mica compression trimmer (Arco 307 or equiv.)

C3 — 180-pF, 500-V dc mica compression trimmer (Arco 304 or equiv).

C4-C10, Incl. - 0.01-µF, 50-V dc disc ceramic.

C11 — 100-pF, 500-V disc ceramic or silver mica.

C12 — 5-pF, 500-V disc ceramic or silver mica. D1, D2 — Switching diode, 1N914 or equiv.

D3 — 9.1-V, 1-W Zener diode, 1N3019 or equiv. (any Zener-diode voltage from 7.5 to 11 will suffice). K1, K2 — Dpdt, 12-V dc relay (Radio Shack 275-206B or equiv.).

L1 — 9 turns no. 18 enameled wire on Amidon T-106-2 core; tap at fifth and sixth turn (Amidon Associates, 12033 Otsego St., North Hollywood, CA 91607).

1.2 - 15 turns no. 26 enameled wire, bifilar

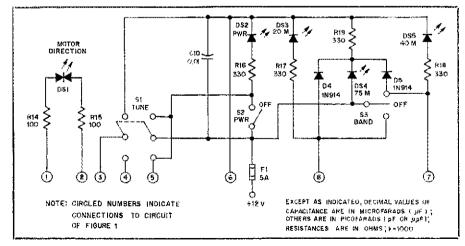


Fig. 2 — Schematic diagram of the control head. Resistors are carbon composition, 1/4-W, 5% types. [Note: Part numbers in parentheses are Radio Shack items. Equivalent units may be substituted.]

DS1 — Bipolar LED (276-035).

DS2, DS5 - Green LED (276-022).

DS3 - Red LED (276-041).

toggle (275-637). S2 --- Spst toggle (275-612).

\$1 — Dpdt, momentary contact, center-off

DS4 -- Amber LED (276-021). S3 — Spdt center-off toggle (275-325). The control-head ac board may be cut to fit in a Radio Shack project case (275-220).

inductor hits the stop solves the problem and prevents motor damage.

A National Radio Velvet Vernier drive works perfectly. Install the vernier between the motor drive shaft and the coil drive shaft, but do not secure the large outer flange that is normally bolted to the panel. There is enough drag in the vernier to rotate the inductor. When the inductor strikes the stop, the motor continues to run and the panel flange starts rotating while the coil remains stationary. In the event the vernier does not have enough drag, disassemble it, remove the grease, and bend the friction fingers to produce more friction.

Drive Motor and Gear Head: For the average constructor, a 12-V, gear-head drive motor has been the most difficult item to procure. Initially, some military surplus 1-rpm, 35-V gear-head motors were used, but that speed is much too slow; 60 rpm would be ideal. The gear-head had six planetary gears in series, but it wasn't much of a task to remove three

OI TIP32

TIP33

TIP34

TIP34

TIP34

TIP34

TIP35

TIP35

TIP35

TIP35

TIP35

TIP36

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wound on Amidon T-44-2 core.
L3 — Variable inductor, see text.
M1 — See text.
Q1 - Q4, incl. — 1-A, 40-V power transistor,
TIP-32 (Radio Shack 276-2025) or equiv

TIP-32 (Radio Shack 276-2025) or equiv. R2 — 150-kΩ, 1/4-W (minimum) potentiometer (see text).

gears and get about 40 rpm with a 12-V supply.

A telephone rotary dial mechanism can provide the gear reduction. It may be driven with an automobile windshield-washer pump motor. Couple the rotary inductor shaft to the shaft that ordinarily connects to the dial.

The 12-V reversible motors used for raising and lowering automobile door windows are another source of gear-head motors. They rotate at the proper speed, and are easy to couple to. However, they demand heavy current, and an auxiliary relay circuit must be used. A suitable circuit is shown in Fig. 4.

Other parts: L2 is usually mounted on the pc board. An insulated, unshielded lead from one of the two output terminal pads on the input pc board is passed through the center of L2 and on to the input end of the rotary inductor. Use as short a lead length as possible.

Type 30 mica compression padder capacitors are used for C1, C2 and C3, These units measure $7/8 \times 15/16$ inch $(22.23 \times 23.8 \text{ mm})$, and are rated for 500 de working volts. While these capacitors are found frequently in junk boxes and at flea markets, they are often difficult to locate as new items. Even when a source is located, the particular unit desired may not be stocked. The only difference between units in the type-30 series is the number of plates in each padder. If a quantity of any value can be obtained, they may be modified so that C1 has a total of 10 plates; C2, 7 plates and C3, 4 plates. Before installation, each capacitor should be adjusted to the value shown in the parts list. If this is not done, the tuneup will be complicated.

Almost any pnp power transistor with ratings equivalent to or greater than those

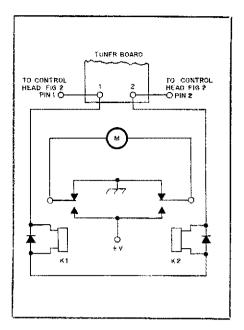
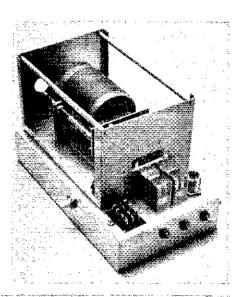
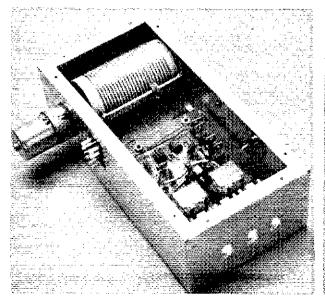


Fig. 4 — An alternative circuit using relays to control a heavy current motor.





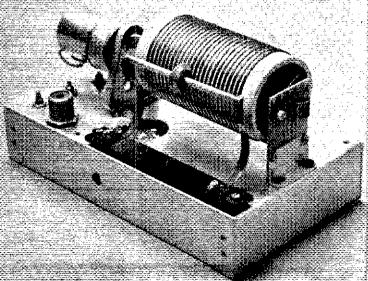


Fig. 3 — Some of many ways in which the automatic antenna-matching network may be constructed. The unit shown in the title-page photograph is used for demonstration purposes only.

of the TIP-32 can be used for Q1 through Q4. These transistors are normally in an off state, and are fully on only when the motor is running. No heat sinking is required.

If surplus LM311s are purchased, they should be checked before use (testing is covered later). R2 may be mounted on or off the pc board. Once it is adjusted, R2 need not be touched again, so it is okay to "bury" it. When R2 is installed on the pc board, set the wiper arm so a resistance reading of $1 \text{ k}\Omega$ is obtained between the potentiometer arm and the cathode of D1. Final adjustment (if required) will be made later.

Fixed-resistor values are not critical. However, the resistances of resistor pairs R7/R8, R10/R11 and R12/R13 should be kept within 5% of one another.

An eight-conductor rotator cable (such as Belden 8448) may be used to connect the control head to the matching-network chassis. Note that no ground connection is made directly to the vehicle at the control-head end of the cable. A ground strap is connected to the vehicle frame at the network chassis location. That is the *only* ground connection in the system.

Control Head

The operator's position control panel is the only part of the system that is continually on display. You can customize it to fit the dashboard or just twist a couple of wires together and let them hang around your knees. One flashy Mercedes has a control head built into an unused ashtray. When the ashtray is opened the control head is turned on automatically and is indirectly illuminated! Others have been incorporated into the face of an analog clock and an on-board computer.

SI permits operator control of the rotary inductor. It is a spring-return, center-off dpdt switch. While the

transceiver accessory socket usually supplies the 12 volts required for the control head, it may be desirable at times to turn the unit off independently of the transceiver on/off switch. S2 performs this function. Note that S2 does not have to be activated for S1 or S3 to function. S3, an spdt center-off switch, selects the proper input matching network for the band in use.

You may want to control the network band switching from the transceiver band switch (see Fig. 5). If control voltages from the band switch are not brought out to an auxiliary socket, you might be able to make connections without even putting a soldering iron to your cherished rig; diodes can be used to achieve this. Locate a connector in the rig with pins that have the band-change voltages on them. This should be a positive 8- to 12-V potential. Push the anode lead of a diode (one for each band desired) in alongside the proper pin, and bring out an insulated lead from the diode cathode. This lead should not be connected directly to the relay coil.

Indicators: A bipolar LED (DS1) is in parallel with the motor winding. It indicates the direction of motor travel and extinguishes when tuning is completed. DS2 shows when power is applied and the system is ready to function automatically. DS3 through DS5 are band indicators. Color coding is used, so the selected band can be determined by noting the LED color: red, 20 meters; yellow 40 meters; green, 75 meters.

DS4 can be turned off only when power is removed from the control-head supply lead. If the supply voltage is derived from the transceiver accessory socket, DS4 should extinguish when the transceiver is turned off.

Workbench Checkout

Before heading out to the car with the

2 - IN914 CONNECTOR TRANSCEIVER (7) Ġ. 7.0 100 Ö D-O+ISV 9N39O4 OR CONTROL 140 CARLE 19.0 $\overline{\circ}$ (3) 18.0 ① TO BANDSWITCHING WIRES IN SET THAT HAVE 8 TO 12 V PRESENT CONTROL HEAD (4) WHEN THE PARTICULAR BAND IS SELECTED. PC BOARD 3

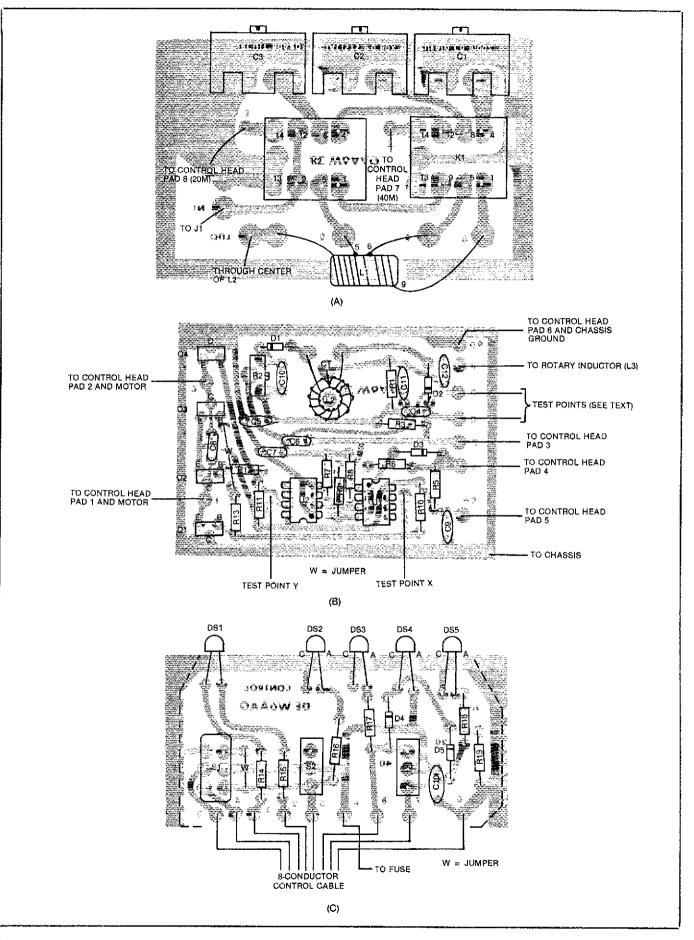
Fig. 5 — If the transceiver used provides band-switching voltages at a connector, this method may be used to control band switching of the antenna matching network automatically.

finished unit, make the following checks (it is a lot easier to do this on the workbench than standing on your head in the trunk!):

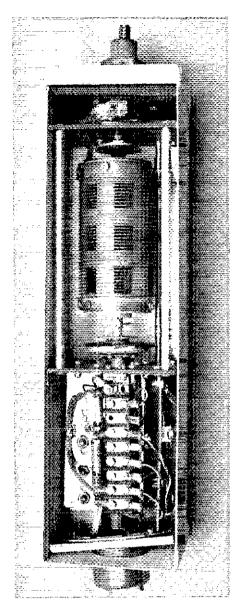
- 1) Locate pads X, Y, C and B on the main pc board. Solder short pieces of bus wire to these pads and let the wires protrude through the board about 1/4 inch (6 mm) on the component side. Do *not* install U1 and U2. (The control head is not needed for the following steps.)
- 2) Apply 12-volts dc to the main board (positive to terminal 5, ground at terminal 6).
- 3) Connect a jumper wire between test point X and ground. The drive motor should run. Note the direction of travel, Remove the jumper.
- 4) Connect a jumper wire between test point Y and ground. The drive motor should run in the opposite direction. Remove the jumper. (So far, the motor circuit and four power transistors have been checked.)
- 5) Remove the power connection to the board and insert U1 and U2 into their sockets. Note that the ICs face in opposite directions.
- 6) Reconnect the supply voltage. The motor may start to turn, but *should not* continue to run. If the motor stops turning, proceed to step 9.
- 7) If, in step 6, the motor continues to run, swap the ICs in the sockets. If the motor now runs continuously in the other direction, you probably have a bad IC.
- 8) In the event the motor continued to run in the same direction as it did in step 6 after swapping the ICs, remove the ICs. With power applied to the main board, measure the voltage distribution across voltage divider (R5, R6, R7, R8 and R9). The voltage at the junction of D3, R5 and R6 should be equal to the Zener-diode voltage of D3. If a 9-V Zener diode is used, the voltage at pin 2 of U1 should be about 6.5 and about 6 at pin 3; the voltage at pin 3 of U2 will be slightly less.
- 9) With the ICs installed and power applied, connect 1.5 V across test points B and C (a battery will do). The motor should run. Reverse the battery polarity, and the motor should run in the opposite direction.
- 10) Temporarily connect a jumper from terminal 3 to terminal 4 on the main board. The motor should run. Remove the jumper and connect it from terminal 3 to terminal 6. The motor should run in the opposite direction. Remove the jumper. This completes the workbench checkout.

Preliminary Checks in the Vehicle

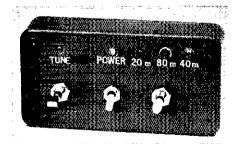
The final resting place of the matchingnetwork chassis must be as close as practical to the base of the antenna. An insulated, *unshielded* lead, as short and direct as possible, is connected from the output of the rotary inductor to the antenna base. This wire actually becomes part of the antenna and a long lead here would



Parts-placement guides for the mobile antenna-matching network. Components are mounted on the nonfoil side of the boards. Shaded areas represent copper on the foil sides of the boards. At A is the input-network board; at B, the main board; at C, the control-head board. The circuit-board etching patterns appear on page 44. Designations C and A near the LEDs indicate the cathode and anode leads.



in this version of the matching network, a vernier drive mechanism is employed as a slipping clutch.



This control head is built into a small, plastic enciosure.

be undesirable. Do not use coaxial cable between the inductor and the antenna base! This error has been one of the most common ones made.

1) With the matching network at the chosen location, place it in a position where you can observe the operation of the relays and reach the padder capacitor adjustment screws.

- 2) Connect a heavy, short ground lead from the matching-network chassis to a clean electrical ground spot on the vehicle chassis. Connect the control head to the network assembly.
- 3) With S2 OFF, actuate S3 (the BAND switch) to determine if the proper relay closes, as indicated by the control-head LEDs, K1 closes in the 40-m position, K2 closes in the 20-m position, and no relays should be energized in the 75-m position of S3.
- 4) S2 is still in the OFF position. Move S1 (TUNE) from the center-off position to one side and then the other. The motor should first turn in one direction and then the other as the switch is operated. During this test, the motor should not run with the switch in the center-off position.
- 5) With S2 in the OFF position, connect a 50-ohm coaxial-cable lead from the transceiver to the input of the matchingnetwork chassis. Manually, position the pickup on the rotary inductor for minimum inductance.
- 6) S2 is still OFF. Turn on the transceiver and set it for operation on 75 meters. Set the control head BAND switch to 75 meters. (It is assumed that your antenna is already resonant on this band at the highest intended operating frequency.) Switch to transmit, and tune the transceiver to the frequency of lowest indicated VSWR. (This will not necessarily be 1:1.) Return the transceiver to the RECEIVE mode.
- 7) Now place S2 in the ON position. Switch to TRANSMIT and move the transceiver down the band about 15 kHz from the point of lowest VSWR. The motor should turn the inductor to increase the inductance until the system is in resonance and it is back at the point of lowest VSWR.

If the motor turned in the wrong direction (decreasing the inductance), reverse the leads that interconnect terminals 1 and 2 of the main board to the motor. Don't move the leads to the control head, There's no way to predict the direction of motor travel initially because the number of reversals in the gear head, the direction in which L2 was wound and the direction the wire was passed through L2 from L1 all affect motor direction. If it ran correctly the first time, consider yourself lucky! Don't install the unit permanently yet.

Tune-Up and Adjustment in the Vehicle

Do not park the vehicle under or near other antennas, telephone- and power-line drops. Get out from under that shade tree too!

With S2 OFF, set the transmitter to the center of the band being used. Key the transmitter, and operate S1 to move the rotary inductor to produce resonance as indicated by the lowest VSWR. Now adjust the appropriate padder capacitor for lowest VSWR indication. If the padders were set accurately to the values indicated, they will have to be moved very little. If the VSWR did not come down to 1:1, move the inductor (using S1) as before, and readjust the padder capacitor. Repeat this procedure for the other bands.

Adjustment of R2

Once the padder-capacitor adjustments have been completed, return the transceiver and matching network to the 40-m frequency at which you adjusted C2. Place S2 in the ON position. Switch the transceiver to transmit, and adjust R2 for the lowest VSWR reading as you rock the transceiver VFO back and forth 10 or 20 kHz. This can all be done while using low power.

Install the unit permanently, and don't forget to use a heavy ground lead to the chassis. Unless you've wired the bandchanging relays to be operated by the transceiver, remember to set the controlhead BAND switch to the band of operation. If you don't, the first thing you will notice is that the receiver sounds dead. Then all you have to do is key the transmitter and the matching network will adjust itself automatically!

With the antenna mentioned earlier," and a 20-m adapter, you will be pleased to see the VSWR will be at "rock bottom" from end to end on each band. Using the information presented here, you should experience success from the first time the switch is turned on.

I'd like to thank all the mobileers who brought their problems, solutions and suggestions to my attention. Maybe a number of readers have the "upstairs gears" grinding with ideas and other applications for this or a similar circuit. I'd be interested in hearing of them.

Notes

D. Johnson, "Build a Weird 2-Band Mobile Antenna," 73, Oct. 1976, p. 20.
B. Brown, "Tennamatic: An Auto-Tuning Mobile Antenna Tuner," 73, July 1979, p. 132.
[Editor's Note: Fair Radio Sales, P.O. Box 1105, 124.

'[Editor's Note: Fair Radio Sales, P.O. 1016 E. Eureka St., Lima, OH 45802.] '[Editor's Note: Available from Strux Corp., 100 E.

Montauk Hwy., Lindenhurst, NY 11757.]

A complete set of drilled pe boards is available from Circuit Board Specialists, P.O. Box 969, Pueblo, CO 81002. A set of wound and dipped toroids (L1, L2) is available from the same source. *[Editor's Note: Types 302 through 306, inclusive, are available from Allied Electronics, 401 E. 8 St., Fort Worth, TX 76102. They are listed in catalog 810 on p. 80.] See Note 1.

Bibliography

Brooks, M. and W.Brooks, "RF Phase-Sensing Unit And Impedance Magnitude Indicator." CQ, Feb.

1956, p. 52. Geiser, D., "Building and Using the Co-ax Phase Detector," CQ. Jan. 1962, p. 24. Geiser, D., "How the Co-ax Phase Detector Works."

CQ, Aug. 1962, p. 62. Hay, R., "The True Matcher." CQ, Dec. 1952, p. 12. Hay, R., Additional Notes On The True Matcher."

CQ, July 1953, p. 30.
Hay, R., "Problems of Automatic Antenna Tuner Design." CQ, Jan. 1954, p. 33.
Hay, R., "The Automatic Matchbox." CQ, June

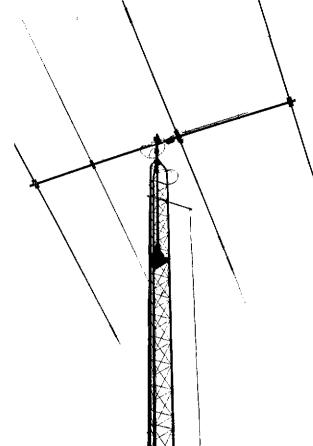
1954, p. 13.
Hutton, L., "Automatic Antenna Tuning For The Amateur." QST, Dec. 1956, p. 15.
Mezger, G., "Phase Angle Detector For RF Transmission Lines." QST, July 1952, p. 17.

Basic Amateur Radio

Shunt-Fed Towers: Some Practical Aspects

The mechanical basics of using a tower as a vertical antenna raise many questions. This article illustrates and describes some of the simple methods amateurs use.

By Doug DeMaw,* W1FB



hall we start with a truism? Like, "One ham's tower installation will be mechanically unlike that at another amateur's site." That pretty establishes the bottom line for any discussion about shunt-fed towers. But, the feed methods and grounding techniques remain essentially the same, no matter what the physical considerations are,

I have given a number of technical lectures at hamfests and ARRL conventions and have, therefore, been asked many questions about antennas. One area of high interest encompasses the use of existing towers as low-band vertical antennas. I have promised many times to write a QST article that spelled out some ground rules (pun not intended) for shuntfed tower verticals. This treatise is aimed at fulfilling that pledge. It deals more with the physical than the theoretical nature of tower verticals.

I want to say early on that you need not have a tower to apply the principles discussed here. Any vertical conductor that can be used as an antenna is suitable for use with most of the methods described here. That is, a telescoping TV mast, a vertical drop wire (or slanted one) from a tall tree or a nonconductive building, a wooden mast with sidemounted metal tubing, or whatever, can be used as a vertical antenna. But, most amateurs have a tower of some kind for supporting hf or vhf beam types of antennas, and this paper is based principally on that consideration.

First Things First

Regardless of the type of conductor used for the vertical antenna, the electrical integrity must be excellent. This means that all joints between tower or tubing sections must show a low resistance under all conditions, especially when the wind is blowing! The shield braid from RG-8/U coaxial cable is suitable for ensuring a good electrical connection across towersection joints and the sections of telescoping masts. The pieces of shield braid (or thin flashing copper) can be affixed by means of stainless steel hose clamps. This, of course, brings up the question about corrosion at those points where dissimilar metals are joined. Yes, oxidation can occur. I have been able to retard corrosion by applying a thin coat of silicone grease to the mating surfaces of dissimilar metals, or by wrapping a tight layer of vinyl electrical tape around the jumper joints. Coax Seal® tape is excellent for the purpose, but is the more expensive method of preventive maintenance.

Crank-up and tilt-over towers present the greatest problem with respect to topto-bottom continuity. The best approach

to solving the dilemma is to run a continuous length of shield braid or other flexible conductor from the top of the tower to ground level. This will permit raising and lowering the tower without restrictions. Be sure to allow sufficient slack in the flexible conductor at the break-over point on tilt-down towers.

Another point of concern for proper continuity is between the beam-antenna mast and the collet at the top of the tower. especially if the rotator is installed partway down the tower. A flexible jumper with adequate slack for 360° rotation can be connected between the collet and the mast at the point where the mast exits from the collet. If this is not done, the VSWR is apt to change erratically when the wind is blowing (likewise with poor tower-section joints). This is caused by changes in top-loading capacitance (the beam antenna acts as a capacitance hat). I have experienced this problem, and the jumper cured it.

We must be concerned about poor joints in any antenna system for another reason: TVI, RFI and harmonic generation in general are likely to become manifest through unwanted rectification at inferior joints (as with a galena crystal and a cat's whisker). Interference to reception may occur also if commercial or amateur stations are near your location. Signals from those sources can be rectified by the poor joints in your antenna system,

causing "blurps" and spurious signals in your receiver.

What About Guy Wires?

I am asked many times, "What if there are guy wires on my tower?" Factually. guy wires can be a blessing or a handicap, It depends on the electrical height of the tower and what you have placed atop the tower in the way of a beam antenna. If the overall tower system is a 90° (quarter wavelength) or less radiator, the guy wires can be used as additional top loading to provide resonance. Top loading will increase the bandwidth of the antenna, as compared to a nonresonant short vertical. This will be helpful on 160 meters especially. If the guy wires are commissioned as a top hat, they will need to be trimmed to the proper length for resonating the composite antenna. This is a cut-and-try proposition, which can be accomplished by means of a dip meter (Fig. 1).

Resonance can be checked by dropping a shunt-feed wire from the top of the tower to ground level. A two- or threeturn loop (small) of wire is connected between the lower end of the shunt arm or wire and the ground. The dip meter is used to probe the loop. A dip in the meter reading indicates system resonance, inclusive of the shunt wire. It's best to beat the dip-meter signal against the station receiver to determine the precise frequency of resonance. Although a VSWR meter can be used to find resonance (the point of lowest VSWR, generally), it might require that the transmitter be operated outside the amateur bands (don't do it!) when looking for the resonant frequency. This makes the technique impractical until resonance is within the band of interest,

Once the correct guy-wire length is determined for top loading, isolate the remainder of each wire by installing a strain insulator. If the guy wires aren't needed for establishing resonance, be sure to divorce them from the tower by placing insulators between each of them and the tower. The remainder of each wire should be broken up in nonresonant lengths by means of additional insulators.

Ground Systems

The question of ground systems (radials) seems to frighten some of the hams I've talked to. Many of them envision the need for a so-called "ideal" ground screen. They feel that it is pointless to use a vertical antenna if they can't duplicate, for example, the W2FMI system described in QST. As a result, they capitulate before they get started. Sure, the better the buried or on-ground radial system, the better the performance. But, don't "toss in the towel" if you can't develop an elaborate ground screen under your vertical.

'Notes appear on page 23.

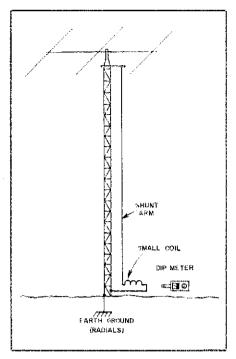


Fig. 1 — Method used by W1FB for checking the resonant frequency of a tower with or without an ht-band beam antenna mounted on top of it. A dip meter is coupled to a coil that is placed in series with the shunt-feed arm.

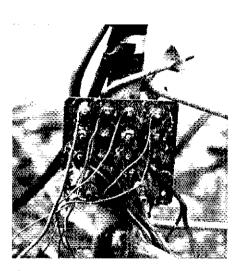


Fig. 2 — An aluminum plate (1/8-inch thick) is attached to one leg of the tower by means of a U bolt for use as an attachment point for some of the ground radials. No. 8 bolts and nuts are used with star washers to connect the wires to the ground end of the tower. Since there is no critical diameter for radial wires, various gauges are shown here. A coating of paint protects the attachment points from corrosion.

I use a 50-foot Rohn 25 tower, which has a Cushcraft A4 tribander atop it (no guy wires). Experts like W2FMI would doubtless cry themselves to sleep if they saw my radial system. I have only 16 buried wires, and none of them are a quarter wavelength long (Fig. 2). The longest are 110 feet in length, and the shortest ones are only 40 feet long. Furthermore, they are not deployed linearly. They run north on one side of the

tower and south on the other side. The north radials wrap around my house. My east-west radials are the short ones. A 6-foot metal fence post is driven into the ground at the base of the tower. It serves as additional grounding. The system is aided further by the copper water-pipe network in the house, which is also connected to the ground system of the tower. Despite this mediocre ground screen, I worked 72 countries on 160-meter cw in two winter seasons of casual DXing, while running 100 watts. On 80 meters (casual again), I worked 78 countries in three months.

The moral of this story is that you should use what you can manage for a ground system. It might yield very good results! I recall working W7DOL/6 a number of times on 1.8 MHz. He always had one of the better West Coast signals into Connecticut. He told me he was using a 90-foot tower with no ground radials! In the final analysis it will be the conductivity of the earth in your region that determines how well your vertical performs.

Tower Height

We've already discussed towers that are less than 1/4 wavelength high, But what about those that exceed 90 degrees at 80 meters? So much the better for 160 meters, and if they are resonant at some frequency lower than 3.5 MHz, they will still perform well on 80 meters. Many operators prefer a 3/8- to a 1/4-\(\lambda\) vertical. They feel that the added electrical length elevates the point of maximum current, which makes the radiator more effective for DX work. Shunt excitation is effective, regardless of the tower height, assuming the tower does not exceed 1/2 wavelength overall. Beyond a half wavelength, the radiation angle increases (becomes higher), making the antenna more effective for short-haul communications than for DX work. My experiments on 40 meters with shunt-fed, 1/2-\(lambda\) verticals have left me somewhat "underwhelmed" during DX efforts.

Shunt-Feed Methods

single-band. quarter-wavelength (resonant) vertical that is grounded at the base can be fed effectively with a gamma match. Details for the gamma-arm length, diameter and spacing from the tower are given in Chapters 5 and 11 of The ARRL Antenna Book, 14th edition (1982). If the tower is less than a quarter wavelength electrically, a horizontal extender wire can be attached at the top of the tower for use as a resonator. Alternatively, you can install a loading coil and a tubing extension above the beam antenna, as was done by W9UCW.3 Or, as discussed earlier, you can use guy wires as a top-loading mechanism.

My ultimate preference favors the use of a shunt arm that runs from the top of the tower to ground level (Fig. 3). The

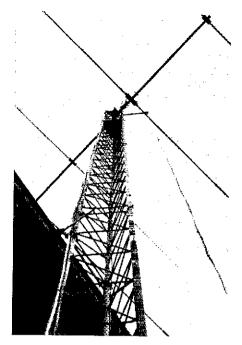


Fig. 3 — The shunt-feed arm consists of a drop line made from RG-59/U cable. A yardarm near the top of the tower supports the drop wire (see text). This photograph shows a Heath triband Yagi. It was replaced by a Cushcraft A4 tribander after the photographs were taken.

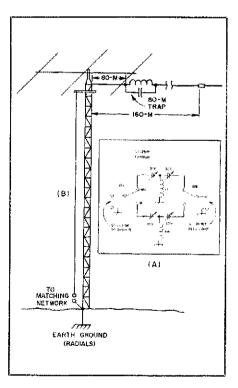


Fig 4 — Details of the two-band T network used at W1FB for providing a 50-Ω match on 160 and 80 meters (A). At B is the method used to effect resonance on each band. An 80-meter trap is installed a few feet out from the tower in the horizontal resonator wire for 160 meters. The wire that extends out to the trap resonates the tower and Yagi at 3525 kHz, and the trap divorces the remainder of the wire from the system during 80-meter operation. All of the extender wire is used for 160-meter operation. Resonance for the latter is set at 1810 kHz.

height of the attachment point is not critical. Neither is the diameter of the shunt-arm conductor. I use an arbitrary spacing of 1 to 3 feet (not critical) between the shunt arm and the tower. This method will work fine if you're willing to install a matching network at the feed point. Fig. 4 shows the L-C network I have used for two-band operation (160 and 80 meters). A remote-control type of network can be employed for multiband matching.4

My shunt arm is attached by means of two yardarms made from 1-1/4 inch diameter aluminum tubing (Fig. 5). Each is affixed to the tower legs with U bolts, A turnbuckle is used at the bottom of the arm to maintain tension in the drop wire, I desired a heavy-gauge conductor for my shunt-feed wire, so a suitable length of RG-59/U coaxial cable was used. I joined

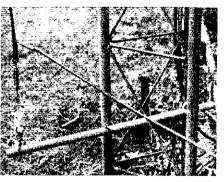


Fig. 5 — Closeup of the lower yardarm, Two U bolts are used to attach it to the tower. In this example, the shunt arm extends away from the bottom of the tower and is routed into the shack some 10 feet away. A Transmatch in the station permits multiband matching. The tip of a 6-foot metal tence post (used also as a ground) is visible on the far side of the tower. A run of Hardline, and another of RG-8/U cable. can be seen taped to one tower leg. The rotator cable is taped to the leg in the foreground (see text).

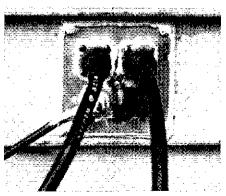


Fig. 6 - The W1FB feedthrough panel that has an identical plate on the inside wall of the shack. The end of the shunt-feed arm is shown at the lower left of the plate. Coax Seal® protects the cable fittings from corrosion, and caulking compound seals the outer edges of the plate to prevent leakage.

the center conductor to the shield braid at each end of the cable, No. 12 or 14 enameled wire would probably work just as weli.

Feed Lines and Rotator Cables

Another area of concern among hams seems to be, "How can I keep rf out of my shack if I shunt feed my tower?" They assume that rf will enter the station via the rotator cable and the beam-antenna feeder. This can be prevented by bringing those wires down to ground level at the base of the tower. The cables then are run along the ground (or buried in it) to the station. This technique always has provided excellent decoupling for me, I have not experienced unwanted rf on my equipment or in the rotator control box. A feed-through panel on the side of my house (Fig. 6) where the station is located provides ingress for my feed lines. The rotator cable enters through a window.

Summary Comments

Some amateurs are concerned about what the family or neighbors might think about burying radials in the lawn. They also believe it to be a monumental task. I slit the turf with a lawn edging tool, then bury the radial wires two or three inches in the ground. The tiny trenches can be closed easily by stepping on them with my shoe. Sure, there will be trace lines visible for a short while, but soon the lawn will reinstate itself where the cuts were made. and the radials will be out of sight forever! I've always held to the belief that any reasonable act for the cause of better signals was worth the effort, even if the XYL was tempted to question my motives. After she was licensed (W1CKK), such debates ended, and she has even helped install our buried radials!

I've had good results also with onground radials. The first two winters after I became revitalized for DXing on 160 meters I had no choice but to use onground radials (the earth was frozen and covered with snow). In the spring, I coiled the wires and tied the rolls to the tower. The following October, the radials were unrolled and used again. This method may appeal to seasonal DXers on 160 and 80 meters, assuming they live in areas where winter is a cold, snowy season.

A shunt-fed tower is handy for emergency use on all hf bands when one or more of the regular antennas are down for repair or disabled from acts of nature. In any event, I hope these ideas will inspire you to try using your tower as a DX vertical.

Notes

- 'J. Sevick, "The Ground-Image Vertical Antenna," QST, July 1971.
- 'm = ft \times 0.3048; mm = in. \times 25.4. 'B. Boothe, "The Minooka Special," QST. Dec.
- D. DeMaw, "Antenna Matching, Remotely Some Thoughts," QST, July 1982.

Part 2: Sorry to have kept you in suspense for a whole month! Let's get down to the nitty-gritty of putting the unit together, after we examine how the program works.

By Urs Hadorn,* HB9ABO

ast month the fundamentals of the meter circuit were presented with a circuit description.† This installment describes the program action and provides alignment and operating instructions for the unit.

Program Sequence

After power up, the program initiates at the starting point, reporting readiness by displaying t.c. Thereafter, the program waits to allow the oscillator to stabilize. The oscillator is assumed to be stable as soon as two consecutive counting sequences have produced the same result. Then the "nuLL" display prompts the user to depress the NULL button, S3. By so doing, the program is informed that the existing frequency should be stored as fi and that there is no component in the test terminals. After receiving the NULL signal, the program proceeds by verifying that the frequency is within the $\pm 0.17\%$ tolerance allowed. If this is the case, the program enters the main measuring loop; if not, the warning "FrEq" is displayed for one second, and the program returns to the starting point. "FrEq" indicates an oscillator malfunction or that there was already a component in the test terminals when the NULL button was depressed.

The main measuring loop, which is executed four times per second, performs the following steps:

- 1) Count the frequency, and store it as
- 2) Verify f2 (if any of the following conditions is true, the program displays an error message and returns to step 1; otherwise, it continues at step 3):
 - 2A) f₂ is too low the value of the

unknown is too large. Display: "OFLO" (overflow).

- 2B) $f_2 = 0$, i.e., the oscillator does not oscillate. This happens regularly when measuring inductances when there is no inductor connected momentarily. Dis-
- 2C) f2 is higher than the stored value of f1. Display: "-UF-" (underflow).
- 3) Compute the value of the unknown using Eqs. 3 or 4, depending on the position of S2.
 - Display result; return to step 1.

Note that condition 2C theoretically can occur only when the oscillator drifts. In practice, we have to deal with the typical behavior of a digital counter, which may cause such an effect because of the limited resolution, even when the oscillator is stable. Consider this example: Suppose the idling frequency (f₁) is 120,000.5 Hz, and when you are pressing the NULL button a value of 120,000 Hz has

†See Sept. 1982 QS7, pp. 14-17. *Im Riedtli 1, CH-8154 Oberglatt, Switzerland been stored (because the last digit doesn't fit into a six-digit counter). Subsequent measurements may well produce a result of 120,001, even with the oscillator stable at 120,000.5 Hz. Because 120,001 is greater than 120,000, the program has to issue the -UF- warning to prevent a computation yielding a negative result.

The program leaves the main loop when:

1) S2 (L-C) has been operated. The idling frequency of the two configurations differ by about 400 Hz. For that reason, f₁ has to be measured and tested again.

2) TEST (S4) has been depressed. The instrument enters a test mode, displaying the four least-significant digits of the oscillator frequency. This mode is useful for alignment and maintenance purposes. If TEST is pressed again, the program quits this mode. In both cases, the program returns to the starting point.

Electronic-Keyer Program Sequence

When the key dot contact is closed, the L-C meter immediately switches into the keyer mode. In doing so, the display shows "E20.0," E being an identifier for the Electronic keyer mode and the figures being an indicator for the speed in words per minute. Because the keyer program is not as straightforward as the L-C meter program, it will be described in the form of operating instructions.

Speed Variations: Every time the NULL switch is depressed, the speed decreases by 0.2 wpm. If NULL is held down during transmission, the speed decreases by 10% after each dot or dash. When you are not transmitting, pressing NULL for more than 0.3 second causes the speed to be reduced by 10%, 5 times per second. Increasing speed is done similarly by using the TEST switch. Thus, sending speed is adjusted easily and rapidly to any value within the range of 6 to 50 wpm. Attempting to increase speed beyond 50 wpm sets the speed to 6 wpm, and decreasing speed below 6 wpm sets the speed to 50 wpm. Any speed change is displayed immediately. The speed indication in words per minute is based on the standard PARIS. The keyer speed (and its displayed value) is accurate and stable, as it is derived from the computer clock.

Keying Modes: If both keying contacts are held closed simultaneously, then that element whose contact has been closed last is transmitted. If, for example, P is to be keyed, the dashes can be "squeezed" into the string of dots; the dot contact remaining closed. On the other hand, if a hyphen is keyed, the dash lever can be left closed, and the dots dominate the dashes by closing the dot contact after the dash contact. An investigation of all Morse code characters reveals that this method (I call it the "dominant mode") is preferred to the so-called iambic keying method with the majority of characters because the keying levers have to be moved less

often. Those who prefer iambic can inform the processor by tying pin 30 to ground (jumper 0W8 of Fig. 4). Then, dots and dashes are sent alternately when both contacts are closed. I have tried a dot/dash memory, but since I couldn't see any advantage to using it, the present software does not have it.

To send a continuous signal for tuning, the L-C switch (S2) has to be toggled. The actual position of this switch is not important because the program, when initializing, automatically defines the "other" position as KEY DOWN.

The internal counter of the 8035 operates as a timer in the keyer mode. It produces the audio signal of 781 Hz, which may be used to monitor keying.

Automatic Morse Tutor

This feature seems to have had the greatest impact on the builders of this instrument. I was surprised to learn that a number of them rediscovered the attractiveness of cw. More than one was then in the market for a new keying paddle, and I have been told that there are some among them considering the L-C meter as a secondary function to that of the cw modes of the instrument!

In this mode, the unit serves as a training aid for cw operators of all levels by sending randomly composed groups of characters. Word length can be adjusted from 1 to 10 characters. The characters sent are taken from a character subset whose size can be operator-defined. (A beginner might select a subset of 8, i.e., the first eight characters of the set.) The character set is comprised of 44 characters

(U.S. version), as shown in Table 1. The selected subset always starts from A. Subset size is entered by using a number from 1 (A only) to 44 (all characters).

After 65,535 characters are sent, the random sequence selecting the characters repeats itself. This equates to almost nine hours of continuous sending at a speed of 30 wpm! As it is desirable for practice purposes to repeat the same random sequence several times, the computer must be told where to start in this cycle of 65,535 characters. This is done by sending a key character (to be described).

The automatic cw-tutor function can be entered from the keyer mode by simultaneously depressing NULL and TEST. The program responds by displaying "Auto." After exiting the keyer mode, the following parameters are set:

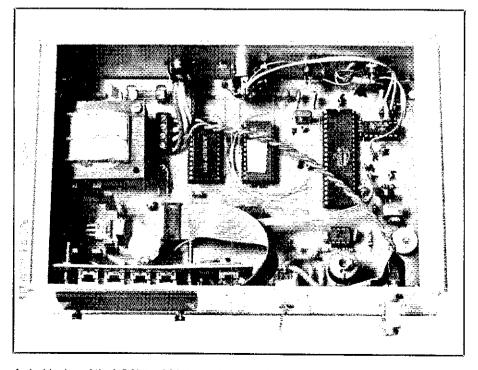
Word length: five characters Character subset: first 40 of 44 Speed: same as in the keyer mode.

"Auto" marks the readiness of the program to accept commands. At this time, the following commands can be entered:

1) Optional Commands

A) Increasing word length by depressing NULL. A word length of 11 will cause the computer to generate word lengths of 1 to 15 characters in random sequence.

B) Increasing the selected character subset size by depressing TEST. As soon as one of the previously mentioned controls is activated in the "Auto" mode, the selected word length and character subset size are displayed on the left and right, respectively, separated by a decimal point. Increasing either parameter beyond the



An inside view of the L-C Meter. L3 is located near the front panel on the right-hand side. The sidetone and transmitter-keying-line jacks and the multipin keyer paddle jack are on the rear panel.

respective maximum of 11 or 44 causes the count to resume at 1.

2) Key Character

The key character is mandatory and entered by means of the keying paddle exactly as in the keyer mode. A key character is any combination of one to seven consecutive dots and/or dashes. Hence 127 different key characters are possible, corresponding to 127 different starting points in the cycle of 65,535 characters.

Immediately after reception of the key character, the program assumes a standby mode with A followed by the speed indicated on the display (A = Automatic). In standby, characters can be sent (e.g., framing characters for a recording), and the speed can be adjusted just as in the keyer mode. Characters sent in the standby mode do not influence the code sequence, which was previously defined by the key character.

Toggling the L-C switch to the opposite side starts the tutor sending the code sequence which continues for as long as you want. The sequence can be interrupted by using the L-C switch, putting the program into standby. After switching back S2, the generator resumes sending at the place it stopped before. A return to "Auto" (to change parameters) can be achieved by closing the dot contact during the automatic transmission. If P is entered as a key character, then the transmitted code sequence is PARIS PARIS PARIS. This feature has been included merely for fun, but it is nice to prove to others that the speed indication is correct.

Construction

Twenty of these units have been built as a project of the Zurich Airport Dippers ham group. Except for minor wiring errors, we have had no problems in duplicating the instrument. As this is being written, another group of 30 units nears completion within the ranks of the Airport Dippers. If circuit operation is understood and the hints described are observed, no problems should be encountered when building this instrument.

L3 is a key component of this L-C meter. The particular coil form used has a threaded ferrite core and a removable ferrite cap. This inductor was purchased locally, but there is no reason why other adjustable inductors of suitable quality could not be used. A suggested replacement is a Miller 4412 or 4514-1. 5.6 The inductor has to be adjusted by means of a lab type of instrument to produce an inductance of 700.0 µH. Any deviation of the inductance value from this figure will cause measurement errors of the same percentage. The inductor used for L3 has a Q of 87 at 100 kHz.

Mechanical Construction

To keep costs low, a single-sided pc Notes appear on page 27.

board is used. More than a dozen hand-wired jumpers are necessary because of the circuit complexity. A pc board is not absolutely necessary; we have hand-wired "breadboard" units performing well. While other stages are not critical with regard to layout, the oscillator should be built like a VFO, using short, mechanically stable leads.

The unit is built in a steel enclosure measuring approximately 2.6 × 8 × 5 inches (HWD)'. Choose a cabinet that provides sufficient cooling for the internal components. The transformer used in this unit runs hot after hours of operation, although it is loaded to only half of its nominal power rating. This is because of the high pulse load of the half-wave rectifier circuit. U2 must be mounted on a heat sink with a thermal resistance of about 9 C°/W.

It is advisable to use sockets for U4 through U13. The display with U10 through U13 is on a separate pc board and is linked to the main pc board with a 14-conductor flat cable that is terminated with DIP plugs. A 6.3-in. length of RG-58/U coaxial cable with two alligator

Table 2 L-C Meter Technical Data

Range†	Resolution
0 to 9.9 μH	0.08 μΗ
10 to 203.9 μH	0.1 μH
0 to 203.9 pF	0.2 pF
204 to 2030 pF/µH	1.0 pF/µH
Automatic range selection.	
Cw speed: 6 to 50 wpm.	

†Extending the measuring range beyond 2 mH/2nF is not possible because of the properties of the oscillator used. A low-cost instrument that will cover this range is the BR-8 AC Bridge, manufactured by Belco Electric Works, Tokyo, Japan.

Self-test of oscillator

clips on one end acts as a test lead. The opposite end of the cable is equipped with BNC hardware for connection to the instrument.

Alignment

The following alignment procedure assumes that the inductance of L3 has previously been adjusted to exactly 700.0 μ H. Plug the test lead into the L-C meter and place S2 in the C (pF) position.

- 1) Set C10 to approximately half capacitance.
- 2) Turn on the power; depress the NULL switch after being prompted by "nuLL" in the display.
- 3) If the display shows "FrEq" after "nuLL," slightly detune C10 and press NULL again. If "FrEq" persists, try another setting of C10.
- 4) Press TEST. After one second, the display should show the last four figures of the oscillator frequency. Using C10, tune the oscillator to 120,000 Hz.
 - 5) Place S2 in the L (µH) position.
- 6) Short the test-lead clips, and record the frequency displayed.
- 7) Connect a 10-ohm resistor to the test clips, and record the frequency displayed.
- 8) If the frequency obtained in step 7 is higher than that obtained in step 6, decrease the value of R2. If the frequency obtained in step 7 is lower than that of step 6, increase the value of R2.
- Repeat steps 6 through 8 until the frequency difference obtained with the clip leads shorted and with the 10-ohm resistor between them is no more than about 20 Hz.
 - 10) Set S2 to C again.
- 11) Adjust C10 to get a display of 0000 (120,000 Hz). Keep the "hot" test clip clear of your hands and other objects when tuning.

Table 3
Text and Error Messages

Display

L-C

nuLL	Oscillator frequency okay
	Idling frequency stored or oscillator ceased to oscillate
OFLO	Overflow (Ueberlaut)
UEb	unknown too large
FrEq	Idling frequency out of tolerance
-UF-	Underflow (Unterlauf) — the frequency
1011	is now
-UL-	higher than when pressing NULL
E	Instrument is in the keyer mode.
A	Instrument is in the automatic Morse tutor mode.
Auto	Ready to accept commands in the automatic Morse tutor mode

Action to be Taken
C: Open test clips.
L: Short test clips.
Wait for NULL.
Depress NULL switch.
Release NULL switch, connect an inductor, or short test clips.
Bemove unknown

Remove anything connected to the test clips or connect coaxial cable with test clips, or check oscillator and realign.

No action if UF (UL) flickers with 0.0.. When measuring C: Clear test clips, depress NULL; L: Short test clips, depress NULL.

Send a key character or increase character set size (NULL) or word length (TEST) and then send key character.

12) Press TEST again. The instrument is now ready for use.

Operating Instructions

To measure capacitance, set S2 to C. Check that the test-lead clips are open and clear, and apply power to the unit. "L-C" and then "nuLL" should be displayed. Depress the NULL switch. The display should now show a value of about 0.0. Because of the counting uncertainty of ±1, the display may flicker between "-UF-" and 0.0 or between 0.0 and 0.2. Connect the unknown and read the value in picofarads. When using the instrument for a protracted period of time, especially when small values are being measured, press NULL from time to time to compensate for any oscillator drift or change in the position of the test clips.

When measuring inductances, the procedure is similar to that just described, with the exception that "---" is displayed when there is no inductor between the test clips, or they are not shorted. To measure inductances, set S2 to L and short the test clips, then follow the foregoing procedure.

Resolution and range information can be found in Table 2. Refer to Table 3 for an explanation of the display indications, the error messages and actions to be taken.

Summary

I highly recommend the construction of this instrument as a group project for a number of reasons: Quantity purchases reduce costs, more "junkbox power" is available, labor can be distributed according to individual skills, test equipment and know-how can be made accessible to all members of the group, and ham spirit — often said to be dead — is raised by mutual help and support.

Notes

⁴An HVS,2349 form, purchased from Grieder AG, Nauenstrasse 63, CH-4002 Basel, Switzerland, is used in the unit described here. This form has a threaded ferrite core and a removable ferrite cap. A total of 180 turns of no. 30 enameled wire is hand wound on the form, and the inductor is adjusted to a value of 700.0 μH. These forms are not available from the author.

Our group had no trouble finding access to a laboratory-grade L-meter with which the inductors were adjusted. Within an hour of placing a request on the local repeater net for information leading to the availability of such an instrument, we had our answer.

Ave., P.O. Box 5825, Compton, CA 90224. These inductors are available from Radiokit, Box 411,

Greenville, NH 03048 $mm = in. \times 25.4$

Born in Berne, Switzerland, Urs Hadorn has been licensed as HB9ABO since 1961. He has also operated under the calls VU2ABO and HB9ABO/LX. Urs has been a radio operator in the Fixed and Mobile Aeronautical Telecommunications Services and in the Marltime Radio Services. Since 1963, he has been employed as an air-traffic controller at the Zurich airport. His favorite hobbies include software development for microprocessors, the technical side of Amateur Radio, and cw QRP and QRQ operating.



RFI PROBLEMS AND QRP — A BLESSING?

☐ We usually hear that QRP (low power) operation is done because it's fun, a challenge or an exercise in learning for a beginner. But, we seldom recognize a perhaps greater advantage of QRP involvement: freedom from RFI and TVI! Norm Fleming, W8PJ, writes in with some interesting observations that are worth sharing with the readers of QST.

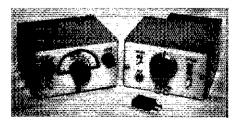
Norm says he acquired a shiny, new commercial transceiver "with all of the bells and whistles implanted." Alas, the rig turned out to be a prolific generator of RFI in his neighborhood. This led him to some research concerning QRP circuits in QST. He had never been very keen about cw operation or QRP work, but he was impressed with the W7ZOI "Universal QRP Transmitter" by DeMaw in QST, and with the W1FB/WAØUZO VFO article in another issue of the League's journal."

The two units were "built and united," in his words, and the result sounded great . . . except for his "fist," which he says had grown old and stiff along with the rest of his body. The photograph shows the gleanings of his workshop efforts (congratulations, Norm).

Norm has worked 35 states, Canada and several maritime-mobile stations with his 1-W rig on 20 meters. He was especially elated when he worked UB5ZBX in Odessa from his QTH in Ohio. Despite heavy QRM, he received an RST 559 signal report! The antenna is a 2-element Delta Loop, as described in Norm's June 1973 OST article.

In addition to curing his RFI problem, he reports a much lower utility bill these days, because his "old linear amplifier doesn't gobble up power" since he went the QRP route. RFI, he has learned, can be a blessing in disguise! — Doug DeMaw, WIFB

'D. DeMaw, "Experimenting for the Beginner," QST, Sept. 1981, p. 11. Also, D. DeMaw and R. Shriner, "A Beginner's 3-Band VFO," QST, Jan. 1980, p. 19.



The result of W8PJ's workshop union of the W1FB/WAØUZO VFO (left) and the W7ZOI Universal QRP Transmitter, two construction projects gleaned from past QST articles. In addition to curing an RFI problem, W8PJ reports lower utility bills since going the QRP route.

W4CIZ HONORED FOR WORK WITH ARRL RFI TASK GROUP

☐ The ARRL Board of Directors passed a motion at its September 1981 meeting to commend ARRL TA Hal Richman, W4CIZ, for his untiring efforts as a technical advisor to the ARRL RFI Task Group since its inception. Because of his work, and because the results of his endeavors have been of significant help to amateurs and the public, Board Minute 36 directed that Richman be awarded a commemorative plaque. A Life/Senior Member of the IEEE and currently a director and advertising manager of the IEEE Northern Virginia Section Bulletin, W4CIZ was nominated recently as an IEEE Fellow. - Doug DeMaw. W1FB



Hal Richman, W4CIZ (right), receives the special commemorative plaque from Bill Grenfell, retired chief of the FCC Personal Radio Division.

MOVING? UPGRADING?

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

I would like to get in touch with . . .

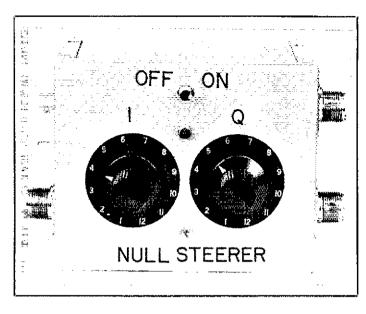
☐ anyone with information on using a frequency counter to hook up the Drake TR-4CW transceiver for direct frequency readout. Fred Simon, WA3MVP, 444 King St., Milton, PA 17847.

Electrical Antenna Null

Steering

Take some readily available components, add a few hours of enjoyable assembly time, and you've got an effective means of combating QRM.

By John Webb.* W1ETC



his null steering work began as an experimental solution for a deliberate jamming problem on the 27-MHz band, An undesired signal from a nearby source on an adjacent channel prevented reception of desired signals. The null steerer solved the problem, eliminating the need for other "less technical" countermeasures that were being contemplated. Later, the device was employed in controlled jamming environment tests for the U.S. Air Force on government-used frequencies. That demonstration produced tape recordings of intelligible a-m and ssb signals with jammer-to-signal ratios as high as 30 dB.

Another unit was built for further experiments. That model was tested at Eglin Air Force Base on 6 MHz. There, jammers were nulled effectively, except in cases where multipath conditions required more than one null. Throughout these demonstrations, the device was used successfully by a number of people, most of whom were only briefed on how it was supposed to work.

Results indicate that although a null will not solve all QRM problems, it is beneficial when interference comes from

sources free of large multipath spreads.

Description

Null steering is a technique that is used to cancel undesired interfering signals. It combines the signals received by the main antenna with those from an auxiliary antenna positioned near the main antenna. The device shown in the photographs is the null steerer control unit. It provides the phase and gain adjustments necessary for cancellation of one undesired signal at a point where signals from both antennas are combined. The two controls on the unit are operator adjusted for the most favorable ratio of desired to undesired signals. The resulting audible effect is similar to that of adjusting a notch filter that attenuates one of several signals.

Placement of the auxiliary antenna is not critical, and the technique works equally well with a-m, cw, ssb and noise in any combination. The null may be directed against interfering signals within the receiver bandwidth or on nearby frequencies from which strong signals may overload the receiver front end.

This electrically steered null capability does not require mechanical rotation of an array. It is implemented with two simple antenna elements located close to one another.

Principles

The elementary null steering antenna

principle shown in Fig. 1 will be recognized as a two-element interferometer. A plane wave from some arbitrary direction passes through the antennas, arriving first at antenna A, and later at antenna B. Baseline (d) is the distance between the antennas and the angle between the baseline and the wave is θ . The time differential occurring between the wave passing the two antennas is given by

$$d \sin \theta / s$$
 (Eq. 1) where $s = \text{speed of light.}$

Thus, signals from all directions appear at the two antennas, with a time difference depending on the direction of wave arrival. One signal from A can cancel the same signal from B, provided the signal from A is delayed by the time corresponding to d sin θ /s and the voltages from the two antennas are equal and of opposite phase. The cancellation, or null, of that signal is effective for the bandwidth over which the time delay and antenna responses remain equal. However, the time delay function is neither easy nor inexpensive to obtain. Instead of a time delay, the null device is designed around a continuously variable gain and phase shift concept that does almost the same thing as a variable time delay. The phase-shift device adjusts the relative amplitude and phase of signals over a wide range for any relative phase from zero to 360°. It is implemented with simple circuitry at low

MITRE Corporation, Burlington Rd., Bedford MA 01730

cost. While the nulls are effective over small frequency spreads, the bandwidth is sufficient for use on amateur frequencies.

The variable phase and amplitude approach is usable at a single frequency because signals that are delayed by the distance d sin θ appear at the second antenna with some phase difference within 360° of the same signal at the first antenna. Then, the electrical length of the baseline becomes involved as a limitation of null depth, bandwidth and width of the null angle.

There are two or more directions of arrival that will satisfy the null phase condition, but antenna responses to all signals do not necessarily satisfy the null amplitude requirements simultaneously. Phase shift and gain values required for a null are different for each direction. Thus, the likelihood of nulling both a desired and undesired signal is remote. As the baseline increases from 1/2 wavelength to one or more wavelengths, the number of simultaneous possible null directions increases because the number wavelengths in d sin θ increases. (A detailed analysis of these relationships is available from the author.1) Generally, the baseline should not be more than 1 wavelength long on the lower hf bands (1.8 to 4 MHz) for good null depth within

'Notes appear on page 32.

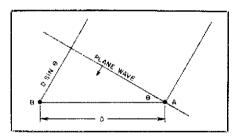


Fig. 1 — Representation of a plane wave passing two antennas, A and B.

the amateur bands. Figs. 2 and 3 are graphs of idealized geometric limitations of null angular width and bandwidth for 0.5- to 2-wavelength baselines.

Antennas

Auxiliary antenna requirements are not critical. The antenna must receive the interfering signal, but does not have to be a good receptor for the desired signal. If it receives less interference than the main antenna, the null steering unit must provide enough gain to satisfy the equal-amplitude requirement. Both antennas should have the same polarization, although dissimilar antennas using different polarizations may work. This is an area in which experimentation remains to be done for various types of interference,

For example, a vertical auxiliary antenna is preferred for countering radiated power-line noise, which is vertically polarized. When an omnidirectional auxiliary antenna is used with a beam antenna, it may be possible to null signals only outside the main lobe because of the gain limits of the control unit. Or, if the control unit has enough gain to null signals in the main lobe, the unit amplifiers may oscillate when the beam antenna is pointed at the auxiliary antenna. If a beam antenna is employed, using an attenuator with the beam antenna accomplishes the same result as control unit gain while diminishing the potential for oscillation.

At this point one might ask, "Aren't the receiving antenna patterns just like all the published patterns for two elements with various relative spacing and phasing values?" Not necessarily! If the two antennas are both vertical dipoles, then the patterns will be about the same as those ideal patterns for vertical radiators over perfect ground. However, if one or both antennas is horizontally polarized, or if the antennas are of dissimilar types, then it may be hard to find published pat-

terns representative of practical antenna installations. Also, the pattern with respect to the desired signal and the interference may be different, particularly if each signal has different polarization characteristics.

The next question that seems almost invited is, "Will mutual coupling between the antennas prevent it from working?" No, because the null is a cancellation of waveforms and any mutual coupling effects can be compensated for in the control-box phase and amplitude adjustments. The null depends only on both antennas receiving the interfering signal and correlation of the interference waveform at the combination point. Decorrelation occurs when two antennas are separated at such a distance as to cause a received signal to fade independently at the two antennas, or to otherwise allow the waveforms to change phase or amplitude independently. This property has been widely used for space-diversity reception; however, it is not desired in this case. Therefore, the recommended antenna separation is on the order of one wavelength. As the antenna separation is increased, the null depth for skywave signals will decrease rapidly because of decorrelation of the signals at the two anten-

A block diagram and a schematic diagram of the null steerer unit are shown in Figs. 4 and 5, respectively. The auxiliary antenna feeds a broadband input transformer which couples a balanced output to two 250-ohm potentiometers (R1 and R2) that function as bipolar quadrature gain controls. A sample of the input signal is taken from R1 and passed to a broadband amplifier, while R2 sends a sample of the input signal through a quarter-wavelength delay line (or 90° phase shifter) to the second amplifier. Component values are chosen to provide an input impedance near 50 ohms for a wide range of R1/R2 settings. The two

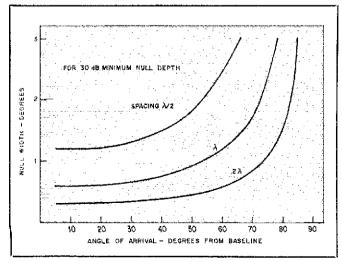


Fig. 2 — Angular null width versus direction of wave arrival.

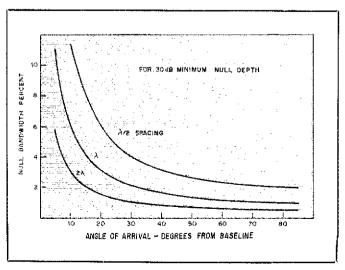


Fig. 3 — Null bandwidth versus direction of wave arrival.

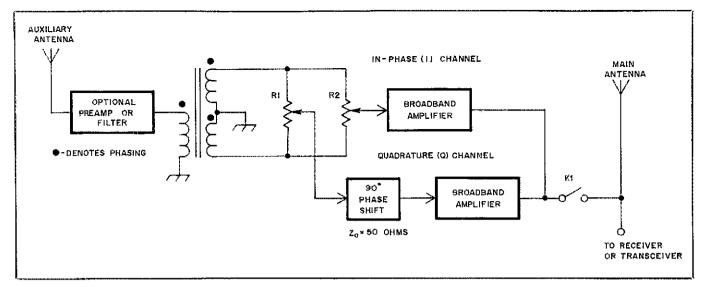


Fig. 4 — A block diagram of the manually controlled null steerer.

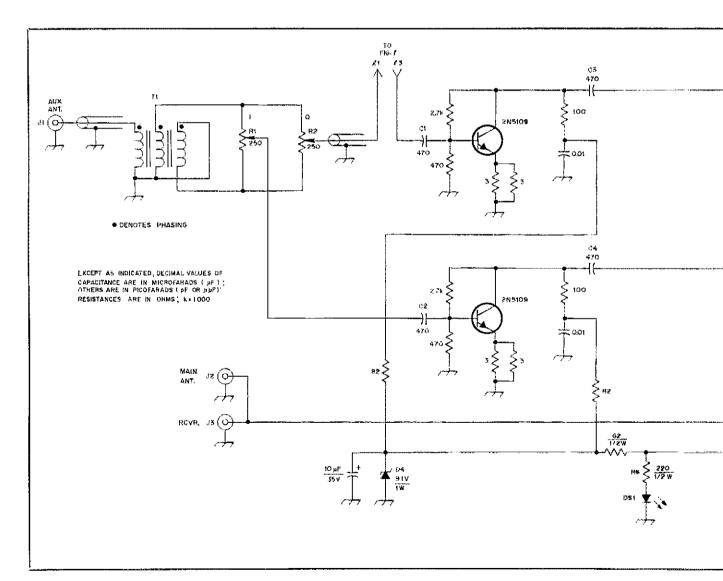


Fig. 5 — Schematic diagram of the null steerer control unit. A positive control voltage should be applied to P1-4 in the receive mode. Unless otherwise specified, resistors are carbon composition, 1/8-watt types. Capacitors marked with polarity are tantalum units.

J1-J3, incl. — SO-239 female, chassis-mount connector.

K1 — Sigma 191TE2A1-5G dpdt DIP relay, 200ohm coil or equiv. A heavier-duty relay

should be used with transceivers having input powers over 100 watts.

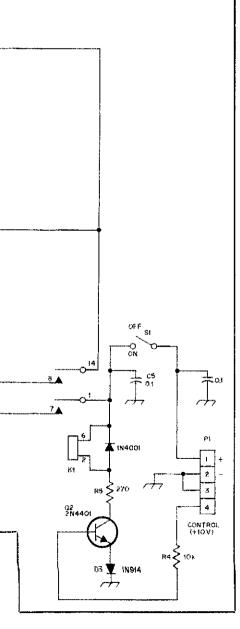
P1 — Chassis-mount plug, four-contact.

R1, R2 — 250-ohm, linear-taper, carbon potentiometer.

T1 — 5 trifilar turns on Palomar F37-Q2 core (Amidon FT-37-63).

amplifiers, each with an output impedance of 100 ohms, are paralleled to provide an output impedance of 50 ohms. Adjustment of R1 and R2 causes the input signal to appear at the output, amplified and phase shifted by any angle over 360°. This output is combined with signals from the main antenna, and algebraic addition equal-amplitude, opposite-phase signals creates the null. When several signals appear on both antennas from different directions, the settings of R1 and R2 will be different to null each signal. S1 disconnects the amplifiers from the main antenna when the device is not used, such as during transmitting periods.

The amplifiers use transistors such as the 2N3866, 2N5109 or TRW LT1001A. With 2N5109 devices, the gain at all phase shift angles was measured as 10 dB up to 15 MHz, decreasing to 4 dB at 30 MHz. The linearity was good at input signal levels to just below 0 dBm with R1/R2 set



for maximum gain. Linearity is important because all signals received by the auxiliary antenna appear in the amplifiers.

Input filters may be required to reject nearby strong signals, such as those from broadcast stations or multiple-transmitter stations. Fig. 6 is a schematic diagram of a high-pass filter for attenuation of broadcast signals. The cutoff frequency is 3.4 MHz, and the attenuation exceeds 70 dB below 1.6 MHz.

Gain controls in the control unit can cause a decrease in the receiver noise figure. This can be offset by using a preamplifier at the control unit input port.²

The quarter-wave phase shifter can be made from 50-ohm coaxial cable, but at lower frequencies the physical length is great and packaged delay lines become attractive. Cable length may be determined by

Length_(m) =
$$\frac{(75 \text{ m}) (V)}{f}$$
 (Eq. 2)

where

f = the quarter-wave frequency in MHzV = velocity factor of the cable

m = meters4

The equivalent time delay is equal to 250 ns divided by the quarter-wave frequency in megahertz. Three delay values are sufficient to cover the requirements for the present and future amateur bands from 3.5 to 29.7 MHz with a gain decrease of no more than 1.0 dB because of departure from the exact quarter-wave or 90° condition (see Table 1).

Fig. 7 diagrams a method for implementing the delay values listed in Table 1. The 25-MHz delay line consists of the total length of the coaxial-cable segments from R1 through S1 and S2 to the input of the Q amplifier. The total length of that cable (11 + 12 + 13) should be 6.4 feet. S1 and S2 are dpdt switches used to select two additional delay increments or jumpers. With S1 connecting a second 10 ns (14) delay line, the total delay is 20 ns, and with S2 selecting 15, the 30-ns delay line, the total delay is 50 ns. Inserting 15 alone (S1 switched to the jumper) provides a 40-ns total delay. Addition of another 50-ns delay line (for a total delay of 100 ns) would permit coverage from 1.8 to 3.3 MHz; however, this would require the use of a high-pass filter with a cutoff frequency below 1.8 MHz.

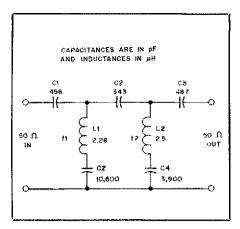


Fig. 6 — Schematic diagram of an elliptic highpass filter for use with the null steerer.

The given delay line values are calculated to produce a gain decrease of 1 dB at the edges of the frequency ranges given in Table 1. Note that the cable shields of 11 and 13 are connected to a nearby circuit ground at the input and output ends. Also, the shields of the leads and delay line segments are connected together at each switch. The line between S1 and S2 (12) does not need to be coaxial cable if the switches are separated by no more than 1 inch. Because the circuits operate at low rf impedances, no special layout provisions are required, except that short lead lengths and a shielded enclosure should be used.

Results

Observations recorded after many hours of null-steerer use throughout the hf spectrum include;

- 1) The available null depth on signals propagated over short paths of up to 20 miles is large and stable, limited only by how finely the controls are adjusted.
- 2) Nulls on signals arriving over short skywave paths of up to a few hundred miles are in the order of 30 dB, provided there is a single mode of propagation and one direction of arrival. Nulls are usually
- 3) Signals propagated over paths of 10 to 100 miles may arrive as a mixture of ground wave and skywave. A single null is thus ineffective.
- 4) Signals propagated by skywave over long distances frequently involve several paths each having a different number of

Table 1 Null Steerer Delay Values

,,				
Frequency Range (MHz)	Quarter-Wave Frequency (MHz)	Delay (ns)	Length (m)	$\frac{1}{(t)} (V = 0.66)$
3.5-6.5	5.0	50	10	33
4.4-8.0	6.25	40	8	26
10.0-14.4	12.5	20	4	13
18.0-29.7	25.0	10	2	6.4

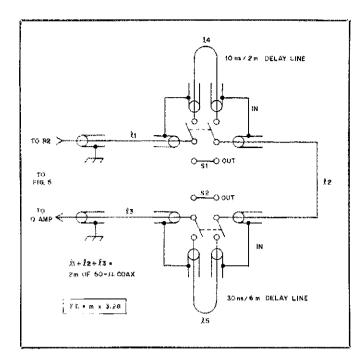
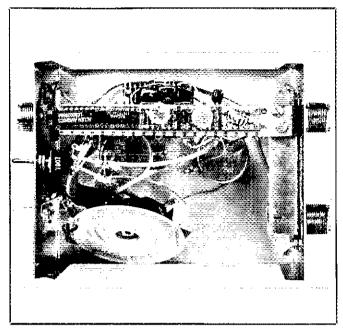


Fig. 7 — Schematic diagram of the delay line for use with the null steerer control unit at frequencies from 3.5 to 29.7 MHz.



An inside view of the null steerer control unit. In this unit, a 10-ns coaxial-cable delay line is wound on a small spool. A 40-ns delay line is encapsulated in the 14-pin DIP package at the upper left of the unit.

reflections. A single null will have little effect.

5) Broadband radiated noise can be nulled as deeply as any radio signal. This seems to be a more effective counter to noise than any blanking or limiting technique. These observations have some special meanings when propagation differences between desired signals and interference are considered. When the desired signal is of a type that nulls poor-

ly, then it is almost certain that only interferers will be nulled. Close, strong interferers have the deepest nulls.

Acknowledgments

I would like to thank Arthur Truckenbrodt (W1GMM) for his support during the controlled jamming tests, and to acknowledge the sponsorship of the demonstrations by the U.S. Air Force.

Notes

'J. K. Webb, "Electronic Steering of Antenna Nulls for HF Interference Reduction," British IEE Conference on HF Communications Systems and Techniques, London, Feb. 1982.
'W. Hayward and D. DeMaw, Solid State Design for

W. Hayward and D. DeMaw, Solid State Design for the Radio Amateur (Newington, CT: ARRL, 1977)

³Delay lines in [4-pin DIP packages are manufactured by Allen Avionics, Inc., Division of A. K. Allen, Co., Inc., 255 E. 2nd St., Mineola, NY 11501.

 4 ft = m × 3.28. 3 km = mi × 1.609.

New Books

☐ Electronics Engineers' Handbook, by D. Fink and D. Christiansen. Published by McGraw-Hill Book Company, 1221 Avenue of the Americas, New York, NY 10020. Hardbound, 9-1/2 × 6-3/4 inches, 2253 pages and 2189 illustrations, \$75.

Technically inspired amateurs and professional engineers should find this second edition of *Electronic Engineers' Handbook* a fine reference to use as a sophisticated adjunct to the ARRL *Radio Amateur's Handbook*. The volume covers a full range of engineering themes that are germane to the technology of today, including a substantial amount of logic and digital information. This will no doubt have considerable appeal to those amateurs who are involved with microprocessors, computer-aided circuit design

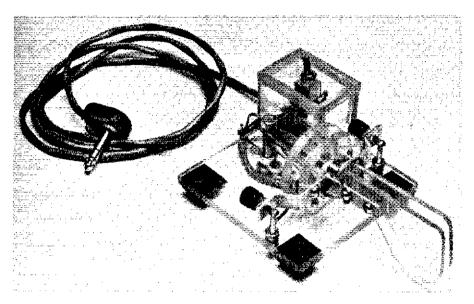
and other computer applications of interest to hams.

Other sections of the publication deal with (1) principles of electrical engineering; (2) materials, devices, components and assemblies; (3) electronic circuits and their functions. (4) electronic systems and their functions. Each of the four major book sections breaks down into numerous subcategories. Notable among the topics treated throughout the book are the properties of materials, discrete components, integrated circuits, uhf and microwave devices, transducers and sensors. Other subjects covered are filters, attenuators, amplifiers, oscillators, modulators, demodulators, detectors, converters, pulse circuits and waveform generators. Another part of the massive book deals with sound reproduction and recording systems, TV and FAX, broadcast systems, radar, medical electronics, electronic navigation and underwater sound.

It should be stressed that this is not an experimenter's handbook. That is, one should not expect to find myriad practical circuits with assigned parts values. There are plenty of circuit examples, but those wanting to work with specific circuits must be willing to apply the design principles that are given. If mathematics frightens you, don't buy this book: there are numerous equations (necessary in any routine design work), and some are pretty complex. But, they are not beyond the capability of those who know how to use a scientific calculator.

This reviewer has only scratched the surface in describing the comprehensive contents of this reference. It would require two QST pages to provide an indepth rundown of the themes the authors have covered. If you maintain an up-to-date technical library, you'll want this book in your collection. If you're merely a tinkerer, this book is probably not for you. — Doug DeMaw, WIFB

The "CHIP" (Cheap, Homemade lambic Paddle)



Paddles on a chip? No, but for a next-tonothing investment you can have a firstrate paddle for your keyer!

By Larry Wolfgang,* WA3VIL

Good, inexpensive keyer paddles are hard to come by. I tried several designs at friends' shacks and at hamfests but they cost too much; I have always felt that a good paddle could be made from scrap material if a little care is used. After taking some mental photographs of the construction methods used in the various designs, I concluded that the W8FYO design (such as the Bencher paddle) was about the best I had tried. When I decided to build a paddle to go with my Accu-Keyer, that one formed the basis for my project. Several ideas for variations were incorporated into my design.

I studied the mechanical details of the Bencher paddle by taking one apart to see what made it "tick." When I understood the principles that allow it to work as smoothly as it does, I drew some sketches of the parts I would have to make. My father provided an almost limitless supply of scrap Plexiglas*, so there was no question what material to work with!

The parts were cut and shaped in one weekend. Since the initial assembly, I have made several improvements in the mechanical details, and will probably continue to make changes as I become more familiar with the operation. The reaction

of some dedicated Bencher users has been that I have almost matched the smooth operation that paddle is known for.

Working With Plexiglas

When I started to build this paddle I decided to see if the job could be done using only hand tools. If you have a drill press, by all means use it! If you are using a hand drill, take extra care to drill the holes perpendicularly through the plastic. The best tool I have found for cutting Plexiglas is a bandsaw. The blade cools itself, and does not melt the material as you cut. A sabre saw with a thin, finetoothed blade can be used, but you may have to go through the cut a second or third time to clean out the fused material. A hacksaw works very well for straight cuts, but not on curves. A coping saw will do a nice job on fine curves, but is slow. Too much pressure will break the blade.

I like to round the edges and corners and smooth any rough spots after cutting. I clamp my electric hand drill in a vise and put the sanding disc in the chuck. With the drill running, I lightly touch the Plexiglas to the sandpaper until I'm satisfied with the edges.

Construction Details

The dimensions for the parts are not

very critical. You must be careful to maintain the symmetry of mating sections, however. The dimensions used on my paddle are given in Fig. 1.

Use a scribing compass to draw the circles for the armature and armature-support pieces, or choose a suitable round object and trace around it. If this method is used, it will be more difficult to mark the exact center for the hole in the middle. Cut out the two pieces, then clamp them together in a vise. Use a wood bit to drill both center holes at once. It may be helpful to drill a pilot hole for the center of the wood bit first. Complete the hole by drilling from the other side (so the bit doesn't break through and chip the Plexiglas).

Mark and center punch the holes for the stop screws (no. 8-32) and for the armature-retention screws (no. 6-32). Clamp both pieces together in a vise, and drill these holes. Next, they should be tapped for the thread sizes indicated. The holes in the armature (for the armature-retention screws) will have to be several sizes larger to allow free movement. Now, the holes for the armature-support pins will have to be marked and center punched in the armature-support piece. Cut the head off one of the nails that will be used for the support pins, and use it as

*Assistant Technical Editor

a drill bit to bore through the armature support. After these holes have been made, clamp the armature and armature-support pieces together and use the nail to start small holes in the armature. Drill all four holes to the same depth (about 1/32 inch).

Cut the base section to size, and mark the position of all holes, being careful to keep everything square. I made the slot for the tension-adjusting bolt by drilling a series of smaller holes close together in a straight line. When I enlarged these to size, the drill bit opened the space between holes. Then, by holding the drill in the top hole, with the base clamped in my vise, I slid the bit downward, cutting the slot to size. A small file was used to smooth the edges as I completed this part of the job.

Carefully center the armature support over the mounting holes in the base. Mark the position of these holes on the armature support, and drill the holes to be tapped for no. 4-40 hardware. Be careful when you drill these holes; if they are a little crooked, the support will not mount straight, or you may bore through the sides of the support. Drill to a depth of

'mm = in. x 25.4.

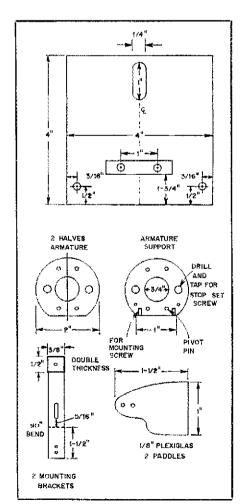


Fig. 1 — Drawings show the dimensions and shapes of the parts needed to build a CHIP.

about 3/8 inch, then tap the holes.

You are now ready to install the armature-support pins. Mine are made from small wire nails. No. 18 nails, 1 inch. or longer, should work fine. Cut the heads off four nails with a wire cutter. Force the pins through the holes in the armature support; the tighter the fit the better. To ensure that all four pins were even, I laid the armature support face down on my desk and put a small level across it. Check it two ways at a 90° angle to be sure it is even. When you are satisfied, apply a small drop of Super Glue® (or other acrylic cement) on each pin. Place the armature face down on the table and stand the armature support on top of it. The pins should line up perfectly with the holes in the armature. Again, check to be sure the system is level and solid; if not, note which holes need to be drilled a bit deeper in the armature. Work a little at a time until the pieces line up properly. Cut the armature in half, as shown in Fig. 1. I used a hacksaw, with the blade flat along the surface, to help ensure a straight cut. Use a sanding disc to smooth the cut and round the corners. You may have to sand a little extra, so the two pieces will move freely when mounted.

Use 1/8-inch Plexiglas for the paddles. The ones shown in the photo may seem too large; Fig. 1 shows a smaller pattern. Cut two identical pieces. The shape is a matter of personal choice.

To make the mounting brackets and contacts you will need some narrow strips of metal. I used pieces of scrap 1/16-inch aluminum chassis material, but thin steel might be better. The aluminum tends to give a little when the contacts are closed. The strips I used were 3/8 inch wide × 3-1/4 inches long. Make a 90° bend about 1 inch from the end of the strip. Drill two holes in the 1-inch section of each bracket,

then match these up and drill holes in the paddle pieces. The holes in the bracket should clear no. 6-32 bolts, and the Plexiglas should be drilled and tapped to accept these bolts. A slot must be cut in each bracket to allow for adjustment in mounting. This can be done in a fashion similar to cutting the slot in the base. A 1/2-inch section of the bracket must be bent back on itself and flattened. It then should be drilled and tapped to mount the contact points. I found some brass screws (no. 6-32) with a knurled head at a hamfest for 10 cents each. A nut and lockwasher, put on the screw before threading it through, will lock the contact point in place when set.

Assembly

Final assembly is relatively simple. Install the $1/4-\times 2$ -inch bolt and the two $6\text{-}32\times 1\text{-}1/2$ inch bolts on the base. These are held in place with a nut above the base. Use a star washer and a nut below. The no. 6-32 bolts have solder-lug star washers to simplify the electrical connections.

The paddles are bolted to the mounting brackets, and the brackets are bolted to the armature pieces. A piece of copper braid was used to make the common connection between the paddle mounting brackets and the keyer ground. This was attached by forming a hole in the braid and putting one of the paddle mounting screws through it. The photograph shows this wire.

A rubber band is used to hold the armature on the armature support. Your choice will determine the amount of tension on the paddles. I found a nice heavy one about 3 inches long. The ends are looped around the paddle mounting brackets before bolting them to the armature pieces. The middle of the rubber

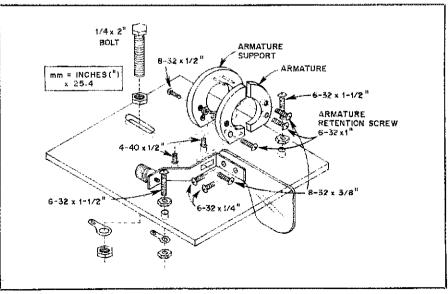


Fig. 2 — Exploded view of the CHIP assembly details.

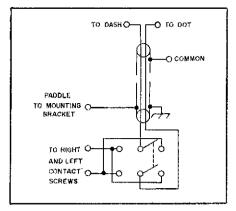


Fig. 3 — Electrical connections for the CHIP. A dpdt switch reverses the dot and dash lead to the keyer.

band is pulled through the center hole in the armature and armature support, then put around the tension-adjust bolt. Fig. 2 shows assembly details.

Final Adjustment

Position the armature-stop screws so that both sides of the armature are parallel to the armature support. Some bending of the paddle mounting brackets will position the contact screws in line with the heads of the no. 10 bolts. Adjust the spacing to suit your taste, and adjust the tension to give the "feel" you like.

I included a switch so I could reverse the leads for left- or right-hand operation (Fig. 3). I used a dpdt switch in a small box, which is mounted on the back corner of the base. You could attach a small piece of plastic on the back or side of your unit and mount the switch horizontally. I normally use the paddle with my left hand (I'm right handed), but I occasionally use my right hand. If another person wants to use the paddle, the switch can be set for his or her preference.

Operation

I am very pleased with the smooth operation of this paddle. The only problem is when my 2-year-old "harmonic" plays with it. He squeezes the paddles together hard, and this tends to bend the aluminum mounting brackets. Then I have to readjust the contact spacing. I will probably replace the aluminum with steel strap.

Rubber feet on the bottom of the base provide clearance for the mounting hardware. A couple of chunks of Plasti-Tak® under the front feet hold the paddle in place. This material prevents the paddle from sliding around, but allows it to be moved easily when necessary. It leaves no marks or residue on the desk.

One of the best features of the "CHIP" is its cost: 20 cents for the contact screws! Everything else came from material I had on hand.

New Products

ARCHER® VOLTAGE SPIKE PROTECTOR

☐ Radio Shack, a division of Tandy Corporation, has introduced the Archer® Voltage Spike Protector (61-2790). This device absorbs voltage transients associated with power-line surges. These surges are caused typically by load switching and lightning strikes. The surges usually last for only microseconds, but may produce peaks of 5000 V or more. Modern electronics equipment is especially vulnerable to these voltage spikes.



Delicate components in an amateur transceiver, a TV set, a stereo or a computer can be protected from most transients by the use of a Voltage Spike Protector. The VSP plugs into any 117-V outlet, and the equipment to be protected plugs into it. A metal-oxide varistor is wired across the ac line in the VSP. The GE MOV® used in the VSP can dissipate up to 10 joules of energy, and has a rated maximum clamping voltage of 435 for a 50-A surge of 8-µs rise time and 20-µs pulse duration. As an added safety feature, the VSP includes an 18-A thermal-cutout device that acts like a fuse should the MOV surface temperature exceed 75° C (167° F) because of excessive transient energy.

Although the VSP will not protect your expensive electronic equipment from a high-energy transient caused by a nearby direct lightning strike, it is a simple first step to take. You won't need an electri-

cian to install one, and it is very inexpensive compared to the cost of repairing your radio or computer. The Archer® Voltage Spike Protector is available at Radio Shack stores and participating dealers. Price is \$9.95. — Larry Wolfgang, WA3VIL.

TEN-TEC ENCLOSURES

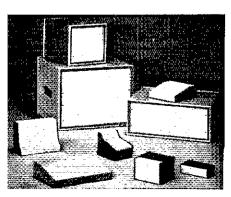
☐ Ten-Tec, Inc., has announced a newly expanded enclosure line. New models include high-style concepts in metal and metal/plastic combinations in larger bench and portable sizes.

The series 9 and 19 metal cabinets accept panel heights of 3.5 inches up to 17.5 inches, and widths of 9.5 and 19 inches.1 Cabinet depths are 14.4 and 18.4 inches. There are 13 standard sizes. Welded aluminum construction is used. Standard rack panel mounting rails are provided at both front and back with interior racks for guide rails. Recessed side handles are provided in larger cabinets; smaller sizes are equipped with collapsible top handles. The styling features extruded aluminum front- and rear-edge bezels with walnut or black trim inserts. Standard textured finishes include blue, orange, black and dark brown. Optional front panels are offered in a variety of sizes with custom finishes. Special sizes, finishes and panel punching are available.

The series S, H and V use both metal and metal/plastic combinations, featuring sloping front panels for keyboard and switch-cluster configurations. Series S has 3-inch heights and four widths from 6.5 to 14 inches, with depths of 9 inches. The all-aluminum cabinets are available in standard textured finishes of blue or black with satin-aluminum or beige panels. Series H and V have metal chassis and plastic sides in walnut or black textured finishes. All three in this group have sloped and upright front panels.

For more information, contact Ten-Tec, Inc., Highway 411 East, Sevierville, TN 37862, tel. 1-800-251-9350. — Paul K. Pagel, N1FB

'mm = in. x 25.4.



Product Review

Collins KWM-380 HF Transceiver

D For some amateurs, Collins radio equipment is a ham radio tradition. Over the years, the 75A series receivers, the S-line and the KWM-2 have helped establish Collins's reputation for high quality and performance. The latest Collins entry in the amateur market, the KWM-380, is in many ways different from the previous Collins products, but the Collins tradition is still present. It is a functional rig, incorporating the important operating features without a lot of "bells and whistles."

Receiver

One of the most prominent '380 features is the general-coverage receiver. An upconverting design, with the first i-f near 39 MHz, is used to provide continuous tuning from 1.6 to 30 MHz. There are provisions for five i-f crystal filters, any one of which can be selected independently of the operating mode. Two filters, an 8.0-kHz (a-m) and a 2.1-kHz (ssb) unit, are supplied as standard equipment. Our '380 review unit was equipped with 1.7-kHz, 360-Hz and 140-Hz filter options. There is also an optional 6.0-kHz filter for use in place of the standard 8.0-kHz a-m filter.

A feature most operators will find useful is the passband tuning. It allows the operator to move the receiver passband relative to the received signal (without changing the pitch of the signal). Passband-tuning operation in the '380 is similar to that found in other receivers, except that the passband tuning in the '380 also determines which sideband will be received. The MODE switch controls only the transmitter sideband selection.

Other receiver features include a hang type of age with selectable decay rate (slow/fast/off) and an optional noise blanker. A built-in front-panel speaker is provided, along with headphones and external-speaker connectors. A line output provides an audio take-off that is independent of the AF GAIN control setting. This output is not disabled when headphones are used. Located on the rear panel are connectors for a second receiver (ANT RLY) and a separate receive antenna (RCV IN). Receive modes are usb/lsb, a-m and cw. During cw reception, an active af low-pass filter is switched into the audio chain to limit high-frequency hiss.

An interesting receiver feature is the SPOT button. When this button is pressed, a tone, equal in frequency to the transmit/receive frequency offset, is heard in the headphones or speaker. Tuning the receiver so that a cw signal produces the same frequency as the spot tone produces the '380 transmit frequency within a few hertz of the received-signal frequency. The offset used in the '380 is 800 Hz.

Transmitter

The '380 transmitter section is all solid-state, has an output of 100 W (PEP), and provides 160- though 10-m band coverage. Additional frequency coverage is included for the MARS



operator. The only transmit modes included in the '380 are cw and ssb. Automatic power turndown protects the solid-state final amplifier from high SWR and excessive key-down time. During cw and RTTY operation, the output is teduced automatically to 50 W after a key-down time of 10 seconds. If the optional blower kit is installed, the full-power key-down time is extended up to one hour. A transmission-line SWR greater than 2:1 also causes an automatic power reduction.

The multifunction panel meter serves as an alc indicator, a forward and reflected power meter, and as a final amplifier de voltmeter. Other standard features are the front-panel VOX controls and the manual transmit switch. Separate cw and ssb VOX-delay controls eliminate the need to change VOX adjustments when switching modes. Included on the rear panel are connectors for amplifier control and alc lines, a transverter output and an audio line input. An optional speech processor, employing a unique type of audio processing, is available for the '380. In the processor, the audio signal is split into two channels of equal amplitude, but differing in phase by 180°. Each channel is full-wave rectified (without filtering), and then the amplitude of the rectified signals is squared. By summing the two squared signals and taking the square root of the result, a dc signal, equal in amplitude to the peak amplitude of the audio signal, is produced. This de signal is compared to the preset compression-threshold level to produce an age voltage. By using this age voltage to vary the gain of the audio amplifiers, an audio signal of constant peak amplitude is produced. The advantages of this patented approach are low harmonic distortion (because clipping is not used) and instantaneous response. All processing is done at af; therefore, mixers and rf filters are not needed.

A combination ac/dc power supply is contained in the '380. The supply can be connected to operate with input voltages ranging from 105- to 250-V ac. Dc operation requires 12 to 15 V at a current of approximately 20 A (3 A during receive). A large, aluminum heat sink is

used to cool the power-supply devices and the final amplifier transistors.

Frequency Control

A fully synthesized local oscillator and digital control system perform the tuning functions in the '380. Push-button switches, located directly above the tuning knob, are used to select the desired tuning rate (1 MHz, 1 kHz, 100 Hz or 10 Hz per step). The 1-MHz and 1-kHz per-step rates are used as a "band switch," while normal tuning is done with the 100-Hz and 10-Hz per-step rates. The tuning knob provides 200 steps per revolution in all except the 1-MHz per-step rate. This translates to tuning rates of 2, 20 and 200-kHz per revolution. The 1-MHz per-step rate yields a 10-MHz-per-revolution tuning speed. A LOCK button electrically disables the tuning knob, thus preventing accidental frequency changes. The remaining VFO push button, sync, is used in conjunction with the A and B VFO memories.

To provide the equivalent of dual VFOs, the 380 has two VFO memories, or registers, A VFO switch enables the operator to select register A or B to control the VFO frequency. The contents of the selected register are displayed on the seven-digit LED display. Split-frequency operation is also provided. Either register can be selected to control the receive frequency while the other register controls the transmit frequency. The transmit and receive frequencies don't have to be in the same band. It is necessary only that the transmit frequency is in an allowed range. The sync button mentioned earlier is used to load the frequency in the selected register (the displayed frequency) into the other register. This can be used to set up the '380 for split-frequency operation, or to use the second register as a frequency

For example, if you want to work a station that is operating "split," you simply tune in the station using, say, VFO A, and then press sync. Now the transmit frequency of the other station (your receive frequency) is stored in register B. All that is necessary now is to tune

to the listening frequency of the station, set the VFO switch to RB-TA (receive B, transmit A), and call the station.

The frequency control story doesn't end with dual VFOs - enter the AC-3803 Control Interface. This '380 option expands on the flexibility offered by the digital VFO. When used with a user-supplied 16-button (two-out-ofeight) keypad, the control interface provides the operator with 11 frequency memories. These memories can be loaded from the selected VFO register (by pressing the ENTer key), or a different frequency can be keyed in and stored without disturbing the current VFO frequency (by using the store key). Any stored frequency can be recalled simply by pressing the recall (RCL) key and the desired memory number. A step (STP) key enables the operator to scan the memories manually, automatically skipping any unprogrammed locations. The clear (CLR) key allows you to remove incorrectly entered digits,

Limited operating-frequency information (tens and ones of MHz) is also available at the control-interface connector. This output data is intended for automatic control of external hand-switched equipment, such as an amplifier or a Transmatch. The interface also allows the use of a home computer for transceiver frequency control. Although it is pointed out in Collins literature that specific computer programming information is not available, the necessary programs should be straightforward.

Receiver-Circuit Highlights

Amateurs with a curiosity about highperformance receivers will find the design used in the '380 interesting. Collins has applied proven techniques and devices carefully, rather than use radically new approaches to achieve a high level of receiver performance. In fact, the devices and circuits used in the receiver rf, i-f and audio sections will be familiar to most receiver enthusiasts.

Front-end filtering is provided by a combination of a broadcast-band rejection filter, a diode-switched high-pass filter and a 30-MHz low-pass filter. The correct high-pass filter is selected automatically as the operator tunes the receiver. After front-end filtering, the incoming signals are applied to a high-level (+17 dBm LO) diode-ring mixer. Following the mixer is the first i-f amplifier. A U322 JFET is used in the common-gate configuration in this stage. After this stage of amplification, the signals pass through a 4-pole crystal filter and then to a dual-gate MOSFET amplifier. Age is applied to this amplifier and also to a pin-diode attenuator that proceeds the first mixer.

The noise blanker (optional) is located between the MOSFET amplifier and the second mixer. This mixer is also a diode ring type (+ 7 dBm LO). In it, the signals are converted to the 455-kHz second i-f. A broadband bipolar amplifier follows the second mixer. Output signals from this amplifier are applied to the passband tuning (PBT) unit. Another pindiode ago attenuator is used between the PBT section and the last i-f amplifier.

The i-f crystal filters are contained in the PBT unit. Although this assembly is in the 455-kHz second i-f chain, the crystal-filter center frequencies are near 6 MHz. Received signals are heterodyned to the filter frequency, filtered and then converted back to 455 kHz. Use of the same variable oscillator for both conversions allows the passband to be shifted.

On-the-Air Performance

Operating the '380 was a pleasure. The front-panel controls are well-placed and easy to use. Becoming familiar with them took only a short time. Most of the controls are similar to those on other rigs, and their functions are straightforward. Selecting the receive sideband (using the PBT control) and changing bands with the selectable-rate tuning controls took some time to get used to. The control interface and key pad eliminated the latter problem. In fact, all of the control-interface features were very useful.

A "must have" option for dedicated cw ops is a narrow-bandwidth i-f filter. While narrower than the standard 600- or 500-Hz filters supplied for many transceivers, the 360-Hz filter in the '380 seemed optimum for general operating. Under certain conditions, having the option of switching to the very narrow 140-Hz filter greatly increased my operating enjoyment. The excellent frequency stability and the selectable slow-tuning rate of the '380 made using the narrow filter easy. Both cw filters have good skirt selectivity, and the '380 does not suffer from poor ultimate attenuation or "filter blowby."

I found the 1.7-kHz RTTY filter to be useful in fighting QRM during ssb operation. The extra selectivity can be a benefit, and the reduction in voice quality is minimal. Under better conditions, the 2.1-kHz filter provided good selectivity and excellent audio quality.

Having a general-coverage receiver in the shack opened the way to many hours of interesting SWLing and some broadcast-band DXing. While the '380 tuning range is specified as having a lower limit of 1.6 MHz, the receiver does tune to lower frequencies with reduced

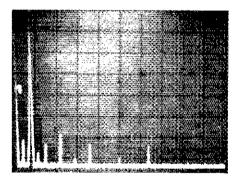


Fig. 1 - Worst-case spectral display of the KWM-380. Vertical divisions are each 10 dB; horizontal divisions are each 10 MHz. Output power is 100 W at 7 MHz. All spurious emissions are at least 58 dB below the fundamental output. The KWM-380 complies with current FCC specifications for spectral purity.

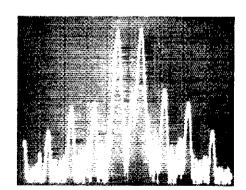


Fig. 2 -- Spectral display of the KWM-380 during transmitter two-tone IMD test. Thirdorder products are 33 dB below PEP output, and the fifth-order products are 40 dB down. Vertical divisions are each 10 dB; horizontal divisions are each 1 kHz. The transceiver was being operated at rated output power on the 20-m band.

Collins KWM-380 HF Transceiver, Serial No. 1600

Manufacturer's Claimed Specifications

Frequency coverage: Receive - 1.6-29.999 MHz in 10-Hz steps; transmit - 1.8-1.999, 3.25-4.25, 6.75-7.55, 10.1-10.149, 13.75-14.6, 18.068-18.169, 20.75-21.7, 24.64-25.239, 27.75-29.949 MHz in 10-Hz steps.

Modes of operation: Receive - a-m, ssb, cw; transmit - ssb. cw.

Readout: 7 digit.

kHz/turn of knob; Not specified. Frequency resolution: 10 Hz. Backlash: Not specified.

S-meter sensitivity (µV/S9 reading): Not specified.

Transmitter output: 100-W PEP. Harmonic suppression: Better than 40 dB. Third-order IMD: 31 dB below PEP. Spurious suppression: Better than 50 dB. Receiver sensitivity: Less than 0.5 µV for 10-dB S + N/N.

Measured in ARRL Lab

As specified.

As specified. 1/2 inch high, 7-digit red LED. 10 MHz/200/20/2. As specified. Nil.

160 m, 23; 80 m, 23; 40 m, 23; 30 m, 18; 20 m, 14; 17 m, 28; 15 m. 25; 12 m, 28; 10 m, 25.

As specified.

59 dB (see photo). 34 dB (see photo).

Better than 60 dB.

Blocking DR (dB):

Receiver dynamics measured with optional 360-Hz filter installed.

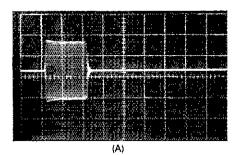
80 m 20 m Noise floor (MDS) dBm: - 131 -131noise limited

Two-tone 3rd-order IMD DR (dB): noise limited Third-order intercept: noise limited

As specified, As specified.

Size (HWD): 6-1/2 × 15-1/2 × 18 inches.† Weight: 48 lb.††

 † mm = in, × 25.4 † †kg = 1b × 0.454.



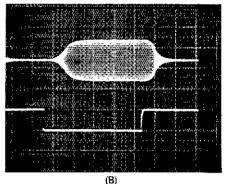


Fig. 3 — KWM-380 cw keying waveforms. First dot sent after VOX switching has a sharper rising edge because of alc setup time. It is also delayed approximately 20 ms, to allow external-amplifier changeover relays to switch and settle (A). The second, and all following dots, show normal rise and fall times of approximately 4 ms, and a delay of approximately 2 ms. This keying waveform should not cause key clicks (B). Horizontal divisions in A are each 20 ms; in B they are 5 ms.

sensitivity. The sensitivity reduction is a result of the broadcast-band roll-off filter used in the receiver front end. This filter is included to protect the receiver from overload by the strong broadcast-band signals found at some locations. It is possible to defeat this filter if a-m broadcast-band reception is desired. The high audio quality of the '380 was evident especially while listening to a-m broadcast stations.

I found the sensitivity of the '380 well suited to amateur-band operation, although some amateurs may prefer a slightly tower noise figure on the higher frequencies.

The weak point in the '380 receiver is the synthesized local oscillator. While it provides excellent frequency stability and tuning versatility, it also provides a relatively high level of LO sideband noise. This made it impossible to measure the IMD and blocking dynamic ranges using the current ARRL lab test methods. This is not a problem unique to the '380; LO noise problems of some degree are found in most synthesized transceivers. The '380 compares well with other synthesized receivers I have listened to. During routine operating, the LO noise is not readily apparent; only when a strong signal was within 10 or 20 kHz of the operating frequency did the effects of the LO noise become noticeable. The '380 LO also appears quite free of the spurs (removed from the LO frequency) found in some receivers.

Transmit performance was smooth and reliable. Reports on the cw and ssb signal quality were good, and the speech processor was effective. The only transmitter "glitch" was observed during cw operation. When the VOX circuit switched from receive to transmit, at the first key closure, an output transient could be seen on the station monitor scope. The transient could be seen on the station monitor scope.

sient lasted approximately 1 ms, and the peak amplitude was nearly equal to the normal full output power. It occurred just before the beginning of the normal output envelope. The people at Collins were advised of the problem, and we soon received a diode and instructions for installing it. Apparently, the diode had been omitted when a Service Bulletin modification was installed in the review unit. The keying waveforms shown in the photos were obtained after installation of the missing diode.

The owner's manual supplied with the '380 contains all the information necessary for transceiver operation. It also contains limited service information. The Collins service manual, a nearly 2-inch-thick volume, contains detailed information on how each transceiver section functions, complete parts specifications and numerous fold-out schematic diagrams. The modular construction used in many parts of the '380 should be a benefit if service is required. I was not surprised to find the overall component and construction quality to be high. In terms of reliability and good performance, the KWM-380 should continue the tradition established by the Collins equipment that preceded it. Price class: \$4500. - George Collins, KC1V

TEN-TEC ARGOSY HF TRANSCEIVER

El There is a trend in North America these days toward conservation and simplicity. Many Amateur Radio operators have discovered the joy and satisfaction of low-power (QRP) operation with simple equipment. Some grew tired or bored by the ease of establishing DX QSOs while running their super stations. Others never succumbed to the siren song of the "super snorter, signal-sender" syndrome. If you are one of that number, or if you are looking for a second or standby radio, consider the Ten-Tec Argosy.

Ten-Tec literally started a new era in the history of QRP when they introduced the Argonaut many years ago. This popular rig has ssb, as well as cw capability. Patience is a way of life for the QRPer (required to maintain one's sanity), but sometimes it is desirable to run a bit more power so that a contact can be made quickly and easily. While the Argonaut has only a 5-W input level, the 405 (a companion amplifier to the Argonaut) input level is 100 watts. The pair make a nice combination, but the FCC amplifier rules brought an end to production of the 405 in 1978. Grieve not: The Argosy has come, bringing the choice of low or medium power with it.

Features

A switch on the back panel selects either

10-or 100-W input. By adjusting the DRIVE control on the front panel, lower-power operation is possible. I found the power-select switch easy to operate; with my hand on the right rear of the top cover, my finger found and operated the switch easily.

The Argosy covers the current U.S. and Canadian amateur bands from 3.5 to 30 MHz. In addition, the 10-MHz WARC band is included, making a total of six hf bands in nine 500-kHz segments (four segments for 10 meters). Approximately 40 kHz of overrun is provided by the VFO on each band edge.

The analog frequency readout works quite well. The band-switch position tells the MHz increments. A linear scale with a lighted, red bar pointer (LED) indicates the hundreds of kHz. The kHz figures are read from the tuning-knob skirt; calibration is 1 kHz per division. Band changes are a dream with this all solid-state radio. There are no receiver front-end or final amplifier adjustments to make; just switch bands, change antennas, dial the desired frequency, and then transmit (after listening first, of course). Even the sideband selection is automatic.

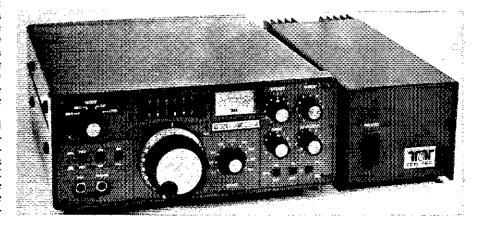
The front panel is clean and well laid out. The mode switch is located in the upper left corner; it has positions for sideband-normal (SB-N), reverse (SB-R), CW and LOCK. On the right side are the receiver OFFSET (RIT), the i-f NOTCH filter, the receiver AF-POWER and the transmitter DRIVE controls. Three push buttons are on the left panel switch: the wattmeter/SWR meter from FWD to REV, the optional noise blanker ON/OFF and the optional calibrator ON/OFF. Another set of three push buttons, these located in the lower right portion, control selectivity. One switches an optional i-f filter IN/OUT. (There are four optional crystal ladder filters available - 2.4- and 1.8-kHz 8-pole filters for SSB, and 500-Hz (8-pole) and 250-Hz (6-pole) for cw.) Two other switches are used for the optional audio cw filter -- one for in/out, the other for handwidth. Position ONE is 450-Hz bandwidth; position two is 150 Hz. Center frequency is 750 Hz. A pair of 1/4-in, phone jacks' are used for connecting a microphone and a pair of headphones.

On the rear panel, located below the High/Low power switch, is the SO-239 antenna connector. On the other side of the rear panel is the four-pin power connector and ground post. Above these there are six phono jacks; they are for: KEY, + 12-V dc, AUX and three SPARES.

Operation

Full break-in (QSK) cw and push-to-talk

 $mm = in. \times 25.4; kg = 1b \times 0.454,$



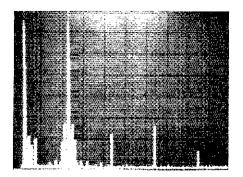


Fig. 4 — Spectral display of the Ten-Tec Argosy. Vertical divisions are each 10 dB; horizontal divisions are each 10 MHz. Output power Is approximately 5 watts at 15 meters. The worst-case spurious emission is approximately 53 dB down from the fundamental.

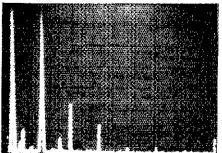


Fig. 5 — Spectral display of the Argosy, Vertical divisions are each 10 dB; horizontal divisions are each 10 MHz. Output power is approximately 40 watts at 20 meters. The worst-case spurious emission is approximately 48 dB down from the fundamental. The Argosy complies with current FCC specifications for spectral purity.

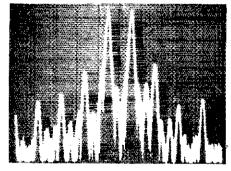


Fig. 6 — Spectral display of the Argosy during transmitter two-tone third-order IMD test. The third-order products are approximately 31 dB below PEP, and fifth-order products are about 46 dB down. Vertical divisions are each 10 dB; horizontal divisions are each 1 kHz. The transmitter was being operated at 100 watts of input power on the 20-meter band.

Ten-Tec Argosy HF Transceiver, Serial No. 00026

Manufacturer's Claimed Specifications
Frequency coverage: 3.5 to 30 MHz, including 10 MHz.

Modes of operation: Ssb, cw. Frequency display: Analog dial. Resolution: 1 kHz. kHz/turn of tuning knob: 18. Backlash: Not specified. RIT range: ±3 kHz.

Audio power output: 1 watt (8 ohms).

Power consumption; Transmit, 122 watts; receive, 6.75 watts. Transmitter rf-power output: 40-50 watts in high-power position; 4-5 watts in low-power position.

Spurious suppression: Better than 45 dB.

Harmonic suppression: Better than 45 dB. Carrier suppression: Better than 40 dB. Transmitter third-order IMD: Not specified. Frequency stability: Less than 20-Hz change

Frequency stability: Less than 20-Hz change per °F, averaged over a 40° change from 70° to 110° after a 30-minute warmup. Less than 15-Hz change from 105- to 125- V ac when using a Ten-Tec power supply.

S-meter sensitivity (µV/S9: Not specified.

Receiver sensitivity: 0.3 µV for 10 dB S + N/N typical.

Measured In ARRL Lab

As specified, plus a minimum of 40 kHz additional at each band edge. As specified. As specified.

As specified. 18. Nil.

mii. ±3 kHz.

As specified. Not measured.

As specified. 54 dB worst case (5 W out); 60 dB worst case (40 W out). 48 dB.

68 dB.

31 dB below PEP (see photo).

 620 Hz from cold start to one hour later.
 Ranging from 21 to 27 μV.
 Receiver dynamics mea-

sured with model 217 500-Hz i-f filter: 80 m MDS (dBm) - 133

MDS (dBm) -133 -133 Blocking DR (dB) 99 98 Two-tone third-order IMD DR (dB) 64 64

Size (HWD): $4 \times 9.5 \times 12$ in. Weight: 8 lb. Color: Gray.

(PTT) operation on ssb are standard features of the Argosy. The built-in cw sidetone can be adjusted in pitch and volume to suit individual preference. To operate high power (100-W input), set the HI/LO switch to HI, and the mode switch to LOCK. Increase drive until the red ALC LED lights fully. Return the mode switch to the desired position and you are ready to transmit.

One of my first QSOs using the Argosy was with HZ1AB on 7-MHz cw. Later, while running QRP on the higher bands, many countries were contacted, including 3B8 and 9K2. I have used it in several contests with satisfactory results. Only the agc disappointed me. When the background noise level is low and signal levels are high, the first code element or voice syllable comes through with a loud "pop." This is caused by a too-slow agc attack time—a result of audio-derived agc. Most of the time

this is no problem, but it can be particularly bothersome if one is wearing headphones. An rf gain control would help.

The second time the Argosy was turned on, the protective circuitry immediately shut it off. I turned the rig off and back on, and everything was fine. It still does that occasionally, but I find it no particular problem.

Output from the optional calibrator is pulsed. That makes it a lot easier to identify. I found that particularly useful amid the cacophony of the 40-meter band,

Clean audio characterizes the receive and transmit modes. Cw reception is enhanced by the addition of the 500-Hz i-f and audio cw filters. Yes, the Argosy has the stability to go with that kind of selectivity.

W1FB put the Argosy through its paces during a two-week "hamcation" on Barbados

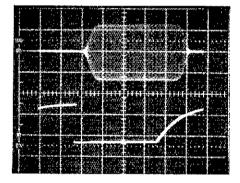


Fig. 7 — Cw keying waveform of the Argosy. Upper trace is the rf envelope; lower trace is the dc level at the key jack. Each horizontal division is 5 ms. The carrier level was adjusted until the alc indicator LED just showed full brilliance. Higher amounts of drive tend to sharpen the wavefront.

in April of 1982, operating 8P6EU. The transceiver performed admirably with sloping dipoles over the seashore. Worldwide DX contacts yielded reports ranging from RST 559 to 599.

Owing to the 85 to 95° F temperatures that prevailed during the daylight hours, and because of the 50-Hz line current on the island, the power transformer overheated. Operating with the top cover of the power-supply case removed solved the problem.

WICKK, operating as 8P6FJ, had good results while using the unit on ssb. Reports indicated that the phone and cw signals from the Argosy were very clean — excellent audio quality and nice cw-note shaping. Certainly the transceiver is sized ideally for travel by airplane, and the weight is light with respect to comparable ries.

You can buy the basic transceiver today and add the options later, if you desire. The optional features all mount easily inside the compact, metal cabinet. The Argosy is available from Ten-Tec, Inc., Sevierville, TN 37862. Price class: Argosy, \$549; 225 power supply, \$129; 226 calibrator. \$39; 217 500-Hz filter, \$55; 220 2.4-kHz filter, \$55; 223 noise blanker, \$34; 224 audio cw filter, \$34. — Chuck Hutchinson, K8CH

Technical Correspondence pennis J

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

Conducted By Dennis J. Lusis,* W1LJ

GAIN OF VERTICAL COLLINEAR ANTENNAS

 \Box My friend employs a vertical antenna commonly used for 2-m fm communications, which is comprised of two $\lambda/2$ dipoles in phase, side mounted and spaced $\lambda/4$ from the supporting mast. The vertical spacing "S" is $\lambda/2$, providing maximum gain (see Fig. 1A). His neighbor employs a homemade antenna — two $5/8-\lambda$ vertical elements in phase, placed end-to-end, fed and matched by means of a $\lambda/8$ stub. His antenna is also side mounted on a supporting mast (see Fig. 1B). Which antenna has the most gain? The $5/8-\lambda$ collinear array would appear to, but actually my friend's antenna has a bit more gain!

The gain of a collinear antenna depends on the individual element lengths, the spacing between the elements and, if side mounted, the spacing between the elements and the mast. The gain is also critically dependent on the current phase in the dipoles. For maximum gain on the horizon, all elements must be fed in phase, and the current in each dipole element must be equal and balanced (i.e., symmetrical and in phase on each side of center). The gain of two end-to-end, 5/8-1 elements (better described as 5/4-\(\lambda\) dipoles) is 3 dBd. Two \(\lambda/2\) dipoles spaced so that $S = \lambda/2$ provides 3.3 dBd of gain. Both antenna arrays are spaced $\lambda/4$ from the supporting mast, so the reflected wave from the mast combines with the direct wave from the dipole in the direction away

*Assistant Technical Editor

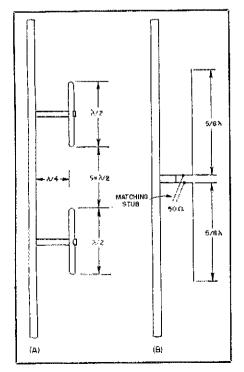


Fig. 1 — Collinear vertical antennas compared by author Belrose.

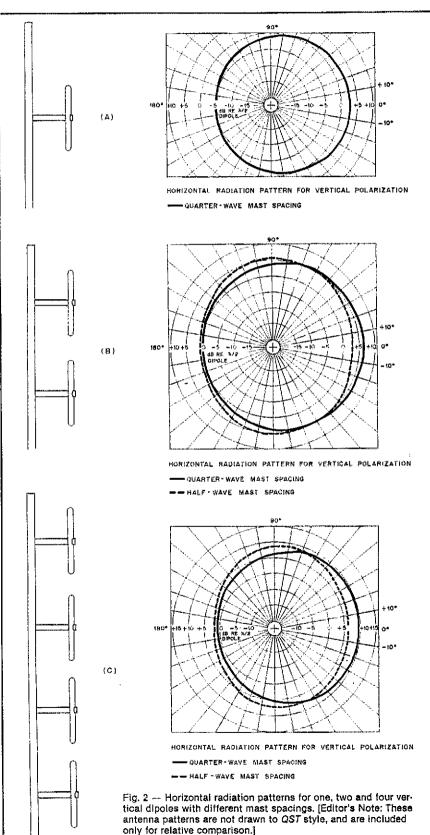


Table 1
Theoretical Gain When S = 0

Number of Elements										
Element Length	1	2	3	4	5	6	7	8		
λ/2		(dBd) 1.7		4.3	5.2	5.9	6.5	7.1		
5/4λ	Gain 3	(dBd) 5.1	6.5	7.6	8.5	9.2	9.9	10.4		

Table 2
Maximum Theoretical Gain

	Nun	iber of	f Elen	rents					
Element Length	1	2	3	4	5	6	7	8	
Gain (dBd)									
$\lambda/2$ (S = $\lambda/2$)	0			6.2	7.5	8.3	9.0	9.6	
	Gain	(dBd)							
$5/4\lambda \ (S = 5/8 \ \lambda)$	3	6.2	8.1	9.4	10.3	11.1	11.8	12.4	

from the mast. This increases gain by 3 dB. Hence the theoretical maximum gain for the two collinear arrays is 6 dBd and 6.3 dBd, respectively.

Table 1 shows the theoretical gains for stacked $\lambda/2$ dipoles, where spacings S=0 and $\lambda/2$, and for 5/4- λ dipoles, where S=0 and 5/8 λ . The spacings found in Table 2 are those that provide maximum gain. My calculations are rigorous, based on the assumption of cosinusoidal current in the elements. A computer program that performed a numerical integration over all radiation angles (0 to 90°) was employed.

It is clear that optimally spaced dipoles provide significantly more gain than dipoles that are closely spaced (end-to-end). A simple estimate of which antenna has the most gain can be made by comparing the total length of the collinear antenna arrays (measured in wavelengths from the bottom end of the lowest element to the top end of the highest element). The collinear antenna that is the *longest* has the most gain. There is nothing magical about the use of 5/8-\(\lambda\) elements, except that individual elements must not exceed this length; otherwise, gain on the horizon will be less than the maximum obtainable.

The shape of the radiation pattern and the gain of the antenna depend on the spacing of the element(s) from the supporting mast. With a mast spacing of $\lambda/4$, the antenna has maximum gain in the direction of the element(s). The increase in gain is 3 dB. If the element(s) are spaced $\lambda/2$ from the mast, the pattern becomes bidirectional, with maximum gain (about 2 dB additional) in the plane perpendicular to that containing the element(s) and the mast.

Fig. 2 shows the horizontal patterns for one, two and four $\lambda/2$ dipoles, where $S = \lambda/2$ for $\lambda/4$ and $\lambda/2$ mast spacings. These patterns are for antennas of commercial manufacture. If an omnidirectional azimuthal pattern is desired, $\lambda/4$ -mast spacing should be employed, with the elements arranged symmetrically around the mast. At least four elements are required to achieve an omnidirectional pattern.

There are almost as many methods of constructing and feeding collinear arrays as there are manufacturers of them. Many antennas made for amateur, as well as for commercial applications are end fed. In this arrangement, it is important that the antenna not be too long; otherwise, the upper dipoles will be fed with progressively smaller currents as compared to the bottom element. Also, careful design and construction is necessary to achieve in-phase currents in the elements. It is always necessary to choke off current flow on the braid of the coaxial feed line. When purchasing an end-fed

A less obvious way for video to be demodulated and amplified is through the earphone or speaker lead into an audio output stage. Such a stage is frequently configured as shown in Fig. 3, in which gain is provided by an IC or a discrete operational amplifier. When a TV signal is picked up by the speaker or earphone leads, it's coupled through C_F (which

collinear antenna, be sure that the manufacturer has measured the vertical radiation pattern, since the vertical patterns for some commercial (and homemade) antennas are tilted upward. The pattern maximum should be aimed toward the horizon. — John S. Belrose, VE2CV, ARRL TA, Aylmer, Quebec, Canada.

References

Belrose, J. S. "The 300-Ohm Ribbon J Antenna for 2 Meters: A Critical Analysis." *QST*, April 1982. O'Dell, P. "Decouple VHF Verticals." Technical Correspondence, *QST*, April 1982. Tilston, W. V. and A. H. Secord. "The Radiation

Patterns of Ground Rod Antennas." Electronics and Communications, Aug. 1967.

VIDEO "HUM" IN AUDIO AMPLIFIERS AND DIRECT-CONVERSION RECEIVERS

Have you been frustrated by a persistent, somewhat raw-sounding "hum" in an audio amplifier or a direct-conversion receiver? Do all your attempts to filter, decouple and shield fail to eliminate it? If so, you may be listening to the video being transmitted by your local TV station. Although TV video has a bandwidth of several megahertz, it contains strong components very close to the line frequency and its harmonics.

Video can be distinguished from power-line hum by its rather "buzzy" nature, and the fact that its sound characteristic changes with the TV picture. The latter characteristic can be particularly misleading, since it often seems to change just as you're jiggling components, adding a bypass, or moving the rig. You can positively identify detected video by listening to the offending noise while watching each local TV station in turn. If the sound changes when the picture does, you're hearing video. On an oscilloscope connected to the audio output of the amplifier or receiver, and triggered by the power-line frequency, ac hum won't move. But video will slowly drift horizontally, taking about 20 seconds for the pattern to repeat.

Some direct-conversion receivers are susceptible to envelope detection. These can detect video, which amplitude-modulates the TV carrier. After identifying the noise as detected video, remove the receiving antenna. If the noise disappears, envelope detection is probably the culprit. Curing the problem involves using a mixer that is less susceptible to envelope detection, adding a low-pass filter in front of the mixer, or modifying existing circuits between the antenna and mixer to provide good attenuation at vhf.

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Fig. 3 — Basic audio-amplifier configuration.

has a low impedance at vhf) and into the inverting (-) input of the amplifier. There it's detected, and the resulting video is amplified and delivered to the speaker or earphones as the hum described earlier. This source of pickup can generally be cured by bypassing the earphone or speaker jack with a 0.001-µF capacitor - larger values may cause amplifier instability. Stubborn cases might require using shielded cable to the speaker or earphones. It's also possible that other strong a-m signals can be detected this way too, but vhf sources such as TV are most likely to cause problems. This is because typical earphone or speaker leads make a relatively effective antenna at vhf. Rov W. Lewallen, W7EL, Beaverton, Oregon

Feedback

E Frank Noble, W3MT, informs us that there was an error on the schematic diagram for his L-C audio oscillator (Fig. 1, page 25, June 1982 QST). The capacitor at position B under S3 should be 0.1 μF. If you are building this oscillator and cannot find any of the scarce 44-mH toroids, Frank is redesigning the circuit to use all unpotted 88-mH units. He will send a revised schematic diagram to anyone who writes and includes an s.a.s.e. Frank Noble, W3MT, 10004 Belhaven Rd., Bethesda, MD 20817.

 \Box Please note this correction to the i-famplifier schematic diagram of the "Progressive Communications Receiver." Nov. 1981 QST, p. 17, Fig. 8. A 2.2-kΩ resistor should be placed in parallel with the primary (drain) winding of T4. Author Hayward notes that this resistor was omitted on the submitted diagram, and its absence could lead to severe i-f system oscillation.

☐ The colorful photo of the hot-air balloons on the cover of September *QST* was taken by Gerald Bowling of Visalia, California. Our apologies for inadvertently failing to give him credit in the issue.

The calculations were made employing a program available for the Hewlett-Packard model HP-41CV calculator.

Hints and Kinks

MOBILE MOUNT AND DESK

IJ I needed a secure mount for my mobile station. The plastic dashboard of my new car did not seem strong enough for a conventional under-the-dash_mount. An installation in a police cruiser gave me the idea for a desk-onthe-seat mount, as shown in Fig. 1. The front panel extends from the seat to the floor, and supports the box. A mobile mounting bracket fastened to the front piece places the rig in a convenient position. An extra bracket even allows two radios to be stacked piggy-back style. The box is used to store extra paper, pencils and other small items. A clipboard is attached to the top for writing.

Construction details are given in Fig. 2. You may have to vary the dimensions to fit your car and rig. My car has a bench seat in the front, and I use the center seat belt to hold the unit in place. This mounting method does not affect the comfort of the driver or one passenger. The rig does not block the heater vent, and with the radio mounted vertically the controls are easy to see and operate. — Albert Keyworth, KITKI, Mansfield, Massachusetts

*Assistant Technical Editor

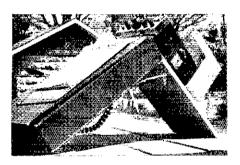


Fig. 1 — This photo shows the completed mount, with one radio attached. Note the extra mounting bracket for a second rig. You may have to shape the front piece to fit the transmission hump in your car.

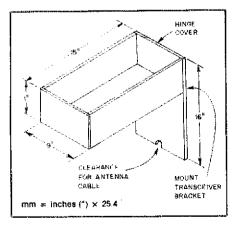


Fig. 2 — Construction details of the mobile desk. The dimensions should be adjusted to suit your car and rig.

EXPANDED RIT RANGE FOR THE ASTRO-150

U.A. drawback of the Swan Astro-150 transceiver is the limited RIT and FINE tuning ranges. Here's a simple "no-holes" mod to extend the range of these controls.

Remove the bottom cover and the five screws that secure the band switch and VCO board. Disconnect the ribbon cable at connector P114, three RG-174/U cable plugs and the voltage-regulator socket. The board now can be removed. Locate R110 and R127, two 18-kΩ resistors to the left of the ribbon-cable connector. On the underside of the board, solder a piece of wire to short each resistor.

I operate only on 10, 15 and 20 meters, so my objective was to increase the RIT/FINE range on these bands. There is no effect on 40 or 80 meters. You will find that the tuning range increases with the frequency band. On 10 meters, the range is just over ± 1 kHz.

If you want even more tuning range, and an increase in range on 40 and 80 meters, you might consider replacing R111 and R126, two 8.2-kΩ resistors, with lower-value units. Because there is no way to turn off the RIT-FINE controls, and no detent or other way to be sure the controls are exactly centered, you should be extra careful when working near the band edges. — Lance Holt, N9CDD, Biloxi, Mississippi

RF CHOKE AND FUSE FOR IGNITION-NOISE SUPPRESSION

☐ The standard in-line fuses used with most mobile radio equipment measure 1-1/4 inches long by 1/4 inch in diameter. By replacing this fuse with a smaller one (3/4 or 5/8 inch in length) having the same current rating, you will have room inside the fuse holder for an rf choke. One or two small ferrite beads and a piece of wire can be fashioned into an rf choke that will contact the bottom of the fuse holder and the fuse. Two Amidon3 FB73-101 (or one FB73-1801) beads with no. 18 wire should work fine. Simply pass the wire through the bead and bend it over to form a contact on the end. A loop in the wire and a solder blob may help fill out the space. You may also have to wrap the small beads in a strip of electrical tape to increase the diameter. -- Cliff Buttschardt, W6HDO, Los Osos, California

SWAN 45 MOBILE-ANTENNA REPAIRS

Use I have had good results with my Swan 45 Mobile Antenna. One problem has developed, however, after many miles of high-speed travel and hot temperatures. The plastic coil supports became brittle, then broke. This allowed the coil and whip assembly to bend from the lower mast, causing erratic operation while moving.

To repair the antenna, disassemble the whip

 'J. Pelham, "The Swan Astro-150 Transceiver, Product Review, July 1980 QST, p. 41.
 'mm = in. x 25.4.

²Amidon Associates, 12033 Otsego St., North Hollywood, CA 91607. and whip quick-disconnect piece from the coil. Remove the two Phillips-head screws located just above the tuning scale on the mast. Loosen the Allen screw in the ring below the bottom coil support. Unsolder the two wires found at the top of the mast, and pull gently. The coil assembly should separate. You may have to put a flat screwdriver blade in the slots in the top of the lower mast to help separate the pieces. Replace the plastic coil supports, and reassemble your antenna.

I purchased replacement pieces from Cubic Communications,* but an alternative would be to make coil-support pieces from the tops of a couple of spray-paint-can lids. Use a razor blade or hobby knife to cut holes for the mast and the quick-disconnect unit. Silicone sealant can be used to weatherproof the new assembly.

— John Webb, KO5D, Vernon, Texas

THE SNEAKY KNEE KEY FOR MOBILE CW

il I am as happy as a clam when I have keyer paddles between my fingers, but feel frustrated when I must use a mike instead. Therefore, I found mobile operation less and less delightful. I resolved to do something about it. My finely tuned Bencher paddles tended to lose the feather-like touch after bouncing off the firewall several times. None of the tie-down schemes I dreamed up seemed to protect my paddles and still keep them in a convenient operating position.

I decided to attack the problem from a different angle: to start from scratch, and to design a set of tamble keyer paddles that were inexpensive, rugged, convenient and easy to use. About this time, I happened across an old Army Signal Corps version of a mobile cw key at a swapfest. It consisted of a straight key fastened to a steel clamp that fit around the operator's thigh, just above the knee. It was only a straight key, and the big clamp was uncomfortable. The basic idea seemed like a good one, though.

My friend Tom Speed, K6WI, made a suggestion I liked. Instead of making a set of squeeze keys, why not build a pair of push keys? Rather than squeezing two switches toward a central point with my thumb and index finger, why not push two switches down with my index and middle fingers? I hooked up two microswitches and tried keying in this unorthodox style. To my surprise, it was very easy, and I was able to key reliably at around 30 wpm after a few minutes of practice.

Thus heartened, I built the model shown in Fig. 3. My wife suggested attaching it to my knee with a broad band of elastic and some Velcro® strips, and this has proven to be extremely comfortable. The whole thing cost me less than \$10, and went together in an evening. I got the two switches at Radio Shack, and mounted them on a piece of single-sided peboard material. Rather than etch the pattern onto the board, I gouged out the excess copper with a small hand drill. The placement of parts

'Gubic Communications, Inc., 304 Airport Rd., Oceanside, CA 92054.

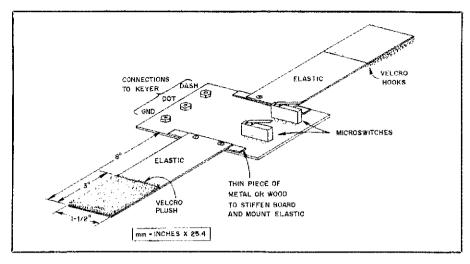
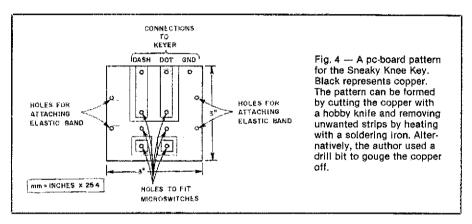


Fig. 3 — Sketch of the basic design of the Sneaky Knee Key. The two microswitches are spaced to be operated conveniently by your fingers.



in this project is not critical (Fig. 4). All of the components are inexpensive and easy to replace,

The paddles have been in almost constant use on my mobile cw expeditions, and have held up extremely well. My right hand is never far from the steering wheel or gear shift. When trouble arises on the road, I send a quick little AS, and the other station stands by until I am clear of danger. It helps to have full break-in at both ends of the conversation. I use a Ten-Tec Argonaut, which has this feature, as well as RIT. To help keep the amount of hardware flopping around on my front seat to a minimum, I built a CMOS version of the Accukeyer inside the base of my Argonaut.

A basic requirement of mobile cw is being able to copy in your head. If you have not mastered this skill, please don't operate mobile cw while driving. Try copying someone else's cw in your head, and you will gain the skill quickly. To me there is something extremely fascinating about a mobile cw OSO that makes the miles roll swiftly by. I always get a little lift when I hear the other station reply, "You're a mobile station?" - Mike Richardson, N5MR, Orangevale, California

EASY NO-HOLES BUMPER MOUNT FOR YOUR ANTENNA

☐ When I bought a Datsun B-210, I needed a way to attach an antenna mount without drilling holes in the car or bumper. My solution was to fabricate a steel plate that fastens to the car by means of two existing bolts on the hottom of the humper. The plate extends beyond the back of the car far enough to hold the ball mount. A right-angle connector is used on the bottom of the plate to connect the coaxial cable.

Depending on how the bumper is bolted to your car, you may have to bend the bracket to achieve the best position. If there is enough room it may be better to route the bracket over the top of the bumper in order to obtain more grounded clearance than I have. - Bill Gardner, W8WG, Athens, Ohio

IMPROVED CARRIER SUPPRESSION FOR THE HW-101

□ 1 improved the carrier suppression and rf output of my Heath HW-101 in the ssb mode. I replaced the diodes CR1, CR2, CR3 and CR4 in the balanced modulator with Schottky diodes. HPA-2800 devices should work well. The diodes must be matched for forward and reverse resistances.

After replacing the diodes, I connected a wattmeter and a dummy load to the transceiver and adjusted the carrier-balance potentiometer and the carrier-null capacitor for minimum output in both the upper and lower sideband positions. I injected a 1000-Hz signal at the mike input and keyed the transmitter on 3.700-MHz lsb. Then T1 was adjusted for maximum output. Finally, I adjusted both slugs in T102 for maximum output on lsb and usb. — John Dolan, KE4IK, Greenville, Tennessee

KENWOOD TR-2400 TONE-PAD INTERMITTENT

T While operating my Kenwood TR-2400, I had difficulty using the autopatch, and was getting reports of intermittent tones and audio. The problem was getting worse, but the solution was elusive. After removing the rear case half. I discovered that the screws that hold the circuit board in place were loose. I tightened them, and the problem disappeared. Installing lock washers under the heads of these screws has prevented the problem from recurring. -Charles Rabley, WA8RUO, Arcanum, Ohio

HINTS FROM ABROAD

Reluvenation of Nickel-Cadmium Batterles

It is sometimes possible to overcome the problem of NiCd cells that have developed short circuits; however, this is not the only problem that can arise with old cells. David Foster, G3KQR, carried out some rewarding experiments on a large batch of secondhand NiCds.

He writes: "The most important finding was that old cells had lost weight. For C cells, the loss was as much as 1.4 oz (40 g). This appeared to be caused by pressure venting and loss of fluid. I reasoned that the weight loss was most probably due to water loss, and not so much from loss of hydroxide. These 'sealed' cells have a pressure-relief vent, which seems to allow blow-off at a pressure of about 2 atmospheres.

"The vent is under the positive terminal, sometimes obscured by a brass soldering terminal. This terminal can be drilled by shallow penetration with, say, a no. 55 drill. Pressure venting is made possible by the syntheticrubber plug that is placed between the top of the positive terminal and the top disc during manufacture. The two metal pieces are spotwelded together.

"Access to the cell can be gained with a hypodermic needle and syringe thrust vertically through the hole in the top, through the rubber and into the cell. The needle track will heal itself when the needle is withdrawn. Top up the cell with distilled water. I found that old cells required about 3 ml (0.1 oz) of water.

"This procedure is simple and safe. There is no contact with the hydroxide. Hundreds of cells seem to have been given a new lease on life using this technique,'

David recognizes that the venting, which is the basic cause of the weight loss, probably results also in some hydroxide loss. There may be no practical way to replace this lost hydroxide (in Rad Com "technical topics," Jan. 1977, it was noted that any attempt to use potassium hydroxide, even on the large screwon-cap cells, could more easily result in a medical emergency than a revitalized battery).

For those wishing to use the G3KOR waterreplacement technique, there may be the problem of acquiring hypodermic needles and syringes. Your pharmacist may wonder whether it really is a NiCd you want to "fix"! But that should hardly deter a real Amateur Radio "addict." - Reprinted from Radio Communication, June/July 1980, "technical topics," Pat Hawker, G3VA, p. 636.

OLD TIMERS' NOTEBOOK

Wire Device Protects MOS Transistors from Damage

Destructive damage can be done to metal

oxide silicon (MOS) transistors when an electrostatic potential is applied even momentarily to the transistor leads. Sufficient electrostatic potential to be damaging can be generated by simple handling. Adequate protection during storage and shipping is provided by either soldering the leads together or by wrapping foil around the leads. Neither method is suitable, however, when the MOS transistor is to be placed in a circuit where the leads must be separated for assembly.

The solution is shown in Fig. 5. A loop of flexible, small-diameter, nickel wire, attached to a music-wire spring, can be slipped over the MOS transistor case and released, so that the music-wire spring tensions the loop of nickel wire around all the transistor leads, shorting them together. This permits the leads to be handled without damage to the transistor and makes it possible to safely connect the transistor in the circuit.

In constructing the device, a length of 0.033-inch diameter wire is bent to form a spring. A piece of 0.007-inch diameter nickel wire, long enough to form a single loop near the center of its length, is then fastened to the two outer loops of the music wire and soldered.

To attach the device to a MOS transistor, squeeze the spring so that the nickel-wire loop can be slipped over the transistor case. Once beyond the case, the spring can be released; all the leads of the transistor will be shorted together by the taut nickel wire. The protective means provided by the manufacturer, e.g., twisting the leads, wrapping foil around the leads, or soldering all the leads together, may then be removed without damage to the transistor. A transpad, which is a small disk having holes in it spaced to suit the transistor leads, can be slipped over the leads to serve as a retaining disk.

The nickel-wire protected transistor can be soldered into a printed circuit board or into circuits using other types of construction techniques. If the circuit configuration allows, the protective device may be removed without cutting the nickel wire and thus used over again. It can be employed on MOS transistors having any number of leads, since the leads always lie in a circle. Should it be necessary to take the MOS transistor out of the circuit, reattach the protective device to the transistor being removed. — NASA Tech Brief 66-10419 (Reprinted from Hints and Kinks for the Radio Amateur, 8th ed., 1968, p. 119)

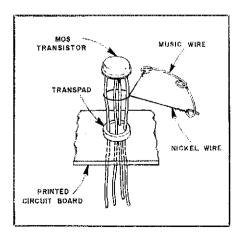
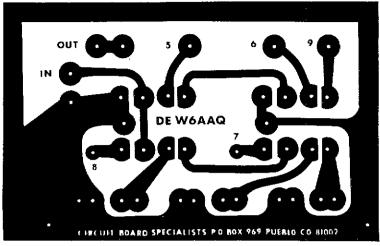
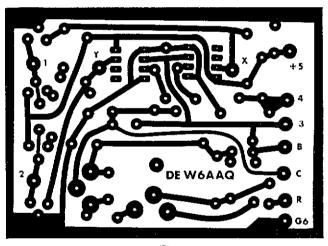


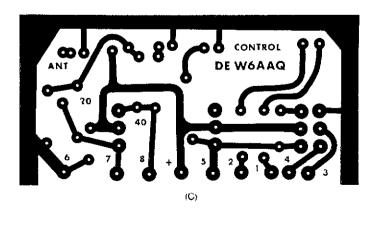
Fig. 5 — Metal oxide silicon (MOS) transistor protected from destructive static electricity during installation by wire device.



(A)



 (\mathbf{B})



Circuit-board etching patterns for the mobile antenna-matching network. Black represents copper. Patterns are shown full-size from the foil side of the boards. At A is the input network board; at B, the main board; at C, the control-head board. Parts placement guides appear on page 19.

Conducted By Peter R. O'Dell,* KB1N

orrespondence

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.

WHERE HAVE ALL THE ELMERS GONE?

I am a potential ham who has read of many "Elmers" who give a helping hand. I would like to know where they are. I have recently contacted three Advanced class hams with a request for a Novice exam. Here are the results:

1) Was sorry he could not be of any help he had dropped out and lost interest.

2) Was kind of begrudging about the idea. He was at the call of his employer. Might not be convenient to do what was necessary or be able to spare the short space of time.

3) Said he would do it for me. That was over six weeks ago. He has been reminded since then, but still no Novice test.

If all amateurs who are licensed extend a helping hand like this, then all I can say is "God help Amateur Radio!" Once I get to the point where I can be of assistance to an up-andcoming amateur, I will be willing to do whatever I can to advance his enthusiasm. --Peter Thomas, Ferndale, Washington

RTTY AND THE CONSIDERATE **OPERATOR**

The "Considerate Operator's Frequency Guide" (QST, Jan. 1982, p. 85) fails to recognize two RTTY frequencies that have great significance to the North American RTTY stations who regularly work DX with that mode on the 40- and 80-meter bands. Due to the limited allocations of these bands in other countries, particularly European nations, it is necessary for W/VE stations to work RTTY DX on these frequencies:

80 meters $\pm 3590 \text{ kHz}$ 40 meters ± 7040 kHz

Whether participating in contests or in casual OSOs with DX via RTTY, it is amazing to note the number of cw operators who either do not recognize RTTY as such, or who do not understand the necessity for use of these frequencies. Zero-beat carriers and cw obscenities do little to impede us, but they do say something about the "considerate operator" with whom we share the bands. - James C. Edgerton, W1XG (MIT Radio Society), Cambridge, Massachusetts

MORE GENTLEMEN'S AGREEMENTS

During the recent meeting of the IARU Region I HF Working Group in Copenhagen, the question of the future band planning of the 1.8-MHz band was discussed. Although the final allocations resulting from the WARC-1979 decisions are not yet known in many countries, one fact of importance did emerge. A number of countries - already known to include Sweden, Denmark, Greenland and the Faeroe Islands - have a lower band limit of 1830 kHz. This means, of course, that they are unable to transmit in the 1825- to 1830-kHz section, which has for many years been recognized as the "DX window."

*Public Information Officer, ARRL

On page 51 of Jan. 1982 OST, it is suggested that 1825 to 1830 kHz should continue to be set aside for non-USA signals. With this in mind, the Working Group asked me to write and to ask you to perhaps reconsider the position, and to move the "DX window" higher in the band to the 1830- to 1835-kHz slot. We would appreciate your consideration of this matter. -Dr., John Allaway, G3FKM, Chairman, IARU Region 1 HF Working Group

I'M OKAY, BUT WHO ARE YOU?

Tor a long time, a sizable segment of the ham community sought to get a relaxation of the call sign-identification rules. We finally got it, and what happened? Too many operators still insist on using the call signs of both stations in contact, both at the start and finish of a OSO. This practice is particularly wasteful of time on vhf/uhf repeaters, where everyone can hear all the stations in contact,

So many times we hear someone say to a new contact on 2 meters, "Well, I've forgotten your call, John . . ." And then a long exchange of apologies and repeats of call signs! Under the new rules it is so much simpler to say, "73, John, from KH6IO,"

If we don't start using the new rules intelligently, the FCC may begin to wonder why we ask for rule changes in the first place, - Richard C. Rhodes, KH61O, Dallas, Texas

GOLDWATER AND THE AVERAGE HAM

☐ The Goldwater interview in August QST made generally good reading. However, it might have been better still if the senator had further qualified or modified, or otherwise specified, what he means by "the average ham," as reported about halfway down column 3 on page 12: ", , , the average ham today never touches a key." There's just no way that phrase can be taken out of context. -Robert Smeltzer, W4NZR, Greenville, South Carolina

PRAISE

☐ I want to respond to W1BNN's letter in the August issue. I have recently returned to the ranks of licensed radio amateurs after an absence of more than 20 years. I find OST to be most helpful and informative in every area.

All hams don't think alike or operate the same; that is one of the great benefits of the Amateur Radio Service. We can all learn from each other. Mr. Murray should not forget that if we all thought alike, it would be a dull world, indeed! Accuracy is important, I agree; but who among us has not made any mistakes? So I say "thanks" to QST and to all hams striving to make ham radio better through positive contributions! - Jack L. Fisher, N9DEF, Wheaton, Illinois

PHONE-BAND EXPANSION

Please put me on record as favoring the ARRL-sponsored phone-band frequency changes. Though 99% of my operations are on cw, the ARRL proposals are the best of those

put forward, and take into consideration an expansion of 20-meter phone to Extras, an added incentive to upgrade. Though there are always dissenters, we are fortunate to have an organization as capable as the ARRL representing Amateur Radio. - Paul A. Zavislak, KQ8X, Martins Ferry, Ohio

☐ Most of the comments published in our media seem to ignore the rest of the world's amateur population. Indeed, the majority of U.S. operators have never been out of this country. Of those who have, very few have had the experience of operating from overseas. One comment was that there are very few stations operating in the 14.100- to 14.200-MHz section; this is absolute nonsense to any amateur who has operated from the "outside." Here it is often not possible to hear the stations using only a dipole and 50-W output power, and there are thousands active. U.S. stations with high power and beam antennas can only play havoc with those amateurs who cannot afford these luxuries. - Hugh Rylands, VE2AKQ/W6, Oakland, California

CODE WARS

I wish to go on record as being strongly opposed to any type of code-free amateur license, Cw is the common bond between all amateurs that sets us apart from other people. I am quite proud to be a ham, and love cw. My 13-yearold son is also a ham (Technician class). After being a ham only seven weeks, his code speed is up to 15 wpm, and he is waiting to take the cw

The 2-meter hand would be just another corn ball band with a code-free license. Any idiot can talk over a mike, e.g., TV, Broadcast radio, CB, Business Band, etc. Cw was not easy for me, but I did it. I think that real ham radio is cw. - Bill Diamond, WAOAOJ, Hannibal, Missouri

The Let those persons who want a "no code" license suffer. If they want into Amateur Radio, let 'em learn the code. Let those lazy people quit trying to take a free ride at the expense of those who worked for a license. No sir, don't give them anything. Let 'em earn the privilege of operating an amateur station. It's a good lesson. - Joe Keith, WB5NOU. Dougherty, Oklahoma

Amateurs who are operators with the capability of international contact must know cw. Amateurs who operate above 144 MHz are, for the most part, voice operators (minus EME and AMSAT ops). Amateurs who mainly experiment are using digital, computers and packet systems - not voice or cw. It seems to me, therefore, the possibility of a no-code license exists in the upper portion of the 440-MHz band, and above. My proposal is to keep all the license classifications as they are, and add the Experimenter Class on 440 MHz and up, with the theory test comparable to the General. Amateur Radio is alive, cw is alive and computer technology is alive. Now let's get it all together. - Charles H. Johansen, Jr., KB2KW (SEC, Eastern NY), Holmes, New York

ARRL Advisory Committees Embark On Dynamic Era

By Carol L. Smith,* AJ2I

RRL advisory committees have a new look. The change, a direct result of the Board's swift implementation of the Long-Range Planning Committee Phase II recommendations to overhaul the organizational volunteer structure of the League,1 reflects a new, more efficient and democratic framework for decision

Notes appear on page 47 *Membership Services Assistant making within the ARRL. Advisory Committee members are now, in fact, working within that new framework, charged with the immediate tasks of making studies. reviewing proposals, and sharing their advice, recommendations and expertise to the ARRL Board of Directors and the Headquarters staff.

Basis of Selection

There are six committees — the Contest

Advisory Committee, the DX Advisory Committee, the Emergency Communications Advisory Committee, the Public Relations Advisory Committee, the VHF Repeater Advisory Committee and the VHF/UHF Advisory Committee. Committee members, formerly appointed by the ARRL president on a call-area basis, are now selected by their division director on a one-member-per-division principle. Each committee thus has 18 qualified

Table 1

League Advisory Committees and Their Members

Contest Advisory Committee

Atlantic Division - Phil Koch, K3UA, 124 Lang Dr.,

Coraopolis, PA 15108 Canadian Division - Bob Nash, VE3KZ, 5260 Fourteen Sideroad, RR 6, Milton, ON L9T 2Y1

Central Division - Howard Huntington, K9KM, 65 So. Burr Oak Dr., Lake Zurich, IL 60047 Dakota Division - Ed Gray, WØSD, Rte. 2, Salem, SD

Delta Division - Richard B. Frey, K4XU, Rte. 3, Woodhaven Dr., Sevierville, TN 37862

Great Lakes Division — James Stahl, KBMR, 3592 Atherstone Rd., Cleveland Heights, OH 44121 Hudson Division — Lewis Tomkins, N2LT, RD 1, Box 246A, Stockton, NJ 08559

Midwest Division — John Shoultys, WDØBNC, 2157 Edward, Salina, KS 67401 New England Division — Bill Meyers, K1GQ,

Laurel Hill Rd., Hollis, NH 03049

Northwestern Division — Robert Turner, AG7M, 4502 178 Ave E., Sumner, WA 98390 Pacific Division — George Varvitsiotes, WB6DSV, 801 Inverness Way, Sunnyvale, CA 94087

Roanoke Division — Jeffrey W. Hartley, NSII, Rte. 1, Box 415, Bunker Hill, WV 25413 Rocky Mountain Division — George E. Schultz, W@UA,

14891 Randolph Pl., Denver, CO 80239

Southeastern Division — James A. White, K1ZX/4, 15440 Haynes Ln., Leisure City, FL 33033 Southwestern Division — Larry D. Tyree, N6TR, 1850 Stow St., Simi Valley, CA 93063

West Gult Division — Thomas Morrison, K5TM, P.O. Box 817, Round Rock, TX 78564 Board Liaison - Tod Olson, KØTO, 292 Heather La.,

Long Lake, MN 55356

Staff Llaison — Mark Wilson, AA2Z, ARRL Hq., 225 Main St., Newington, CT 06111

DX Advisory Committee

Atlantic Division - Edward J. Kuebert, K3KA, 3369 Tanterra Circle, Brookeville, MD 20823 Canadian Division - Harold E. Parsons, VE3QA, RR 3, Metcalfe, ON K0A 2P0

Central Division - Norman E. Myers, N9MM, RR 1, Box 490, Rossville, IN 46065 Dakota Division -- Robert G. Parlin, WØSFU, 1507 Kaltern La., Minneapolis, MN 55416

Delta Division - Sanford E. Hutson, K5YY, P.O. Box 5299, Little Rock, AR 72215 Great Lakes Division — Denny Burgess, KBDB.

495 Jeannette Dr., Richmond Heights, OH 44143 Hudson Division - David Beckwith, W2QM,

151 Whitney Ave., Pompton Lakes, NJ 07442 Midwest Division — TJames L. Spencer, WØSR, 3712 Tanager Dr., N.E., Cedar Rapids, IA 52402 New England Division — George Hitz, W1DA, 37 Easy

St., Sudbury, MA 61778 Northwestern Division — Robert W. Hudson, K7LAY, 29826 24th Place, S., Federal Way, WA 98003 Pacific Division — R. W. "Bob" Thompson, K6SSJ,

14703 Eastview Dr., Los Gatos, CA 95030 Roanoke Division — Cot. John Parrott, W4FRU, 4640 Ocean View Ave., Virginia Beach, VA 23455 Rocky Mountain Division - Ron Stockton, NØRR,

Bonanza Star Rte., Nederland, CO 80466 Southeastern Division - Robert R. Beatty, III, W4VO. 11 Heritage Cove Ct., Casselberry, FL 32707
Southwestern Division — James T. Rafferty, N6RJ,

178 Paseo Robies, Anaheim, CA 92807

West Gulf Division — John Shean, K5DB, 3302 Litchfield Dr., San Antonio, TX 78230 Board Liaison - John C. Kanode, N4MM, RFD 1. Box 73-A, Boyce, VA 22620

Staff Liaison - Don B. Search, W3AZD, ARRL Hq., 225 Main St., Newlington, CT 06111

Emergency Communications Advisory Committee

Atlantic Division -- Bob Josuweit, WA3PZO, 9 Derwen Dr., Havertown, PA 19083

Canadian Division - Jack Strangleman, VE3GV, 512 Pinetree Dr., London, ON N6H 3N1
Central Division — Bruce Woodward, W9UMH.

6208 Bramshaw Rd., Indianapolis, IN 46220 Dakota Division — Doug Wilkowske, KNØJ, 1010 West Trott Ave., Willmar, MN 56201

Delta Division - TRobert P. Schmidt, W5GHP, 5100 Press Dr., New Orleans, LA 70126

Great Lakes Division - Dale Williams, WASEFK, 291 Outer Dr., Dundee, MI 48131 Hudson Division - Michael Karp_AF2L, 62 Percival

Court, Old Bridge, NJ 08857 Midwest Division — W. D. Bemmels, WØKL. 40 Rockwood Dr., Ottawa, KS 66067

New England Division - John Carroll, AB1Z, 25 Evergreen Ave., Bedford, MA 01730

Northwestern Division — Bob Klepper, W7IEU, 7027 51st, N.E., Marysville, WA 78270 Pacific Division — Ron Menet, N6AUB, P.O. Box 244, Cedar Ridge, CA 95924

Roanoke Division - L. R. Allison, Jr., K4SUG. 5 Gaston Dr., Rte. 5, Box 15, Travelers Rest, SC

Rocky Mountain Division - Joe Knight, W5PDY, 10408 Snow Heights Blvd., N.E., Albuquerque, NM 87112

Southeastern Division - Carl E. Weaks, N4DMA, 1341 W. Navajo Dr., Alabaster, AL 35007

Southwestern Division — James R. Varner, AE6N, P.O. Box 1452, Wrightwood, CA 92397
West Gulf Division — Roger Coday, N5FN,
213 Avenue G, RFD 4, Brazoria, TX 77422
Board Liaison — John Sullivan, W1HHR, Whitney Rd.,

Columbia, CT 06237

Staff Liaison - Robert Halprin, K1XA, ARRL Hq., 225 Main St., Newington, CT 06111

Public Relations Advisory Committee

Atlantic Division - John House, KA3DBN, 2703 Bartlett La., Bowie, MD 20715 Canadian Division - John Gowron, VE4ADS, 229 Kisil

Bay, Winnipeg, MB R2K 3E7 Central Division - James Romelfanger, K9ZZ,

Central Division — James Homelianger, 1922, 901 Moore St., RFD 4-Lot 28, Baraboo, Wi 53913 Dakota Division — George D. Johnson, WØMD, 821 Dickerman Ave., Duluth, MN 55807 Delta Division — Jim Buffington, NT4A, P.O. Drawer

1240, Aberdeen, MS 39730

Great Lakes Division — Jack T. Shepherd, W8OMY, 376 Danhurst Rd., Columbus, OH 43228 Hudson Division — Stephen Mendelsohn, WA2DHF,

64 Maiden La., Little Ferry, NJ 07643 Midwest Division - Reynold B. Davis, KØGND, 3437

Anaheim Dr., Lincoln, NE 68506 New England Division -- Phil Temples, K9HI,

New England Division — Print Temples, Nerth, 50 Catherine St., Roslindale, MA 02131 Northwestern Division — TJohn H. Brown, W7CKZ, 725 88th Ave., S.W., Olympia, WA 98502 Pacific Division — Norman Brooks, K6FO, 5901 Adana

Circle, Carmichael, CA 95608 Roanoke Division — Jim Davis, KUSR, 3913 Kanawha

Ave., S.E., Charleston, WV 25304

members — one from each division (including one from Canada), a nonvoting Board liaison member and a Headquarters liaison. (See Table 1 for a listing of present Committees and their members.) This broad base of representation and structured interface between the committees and the Board and Headquarters facilitates communication, and makes your input more accessible and vital than ever before.

Responsibilities of committee members depend on their committee's assigned area of concern. Accordingly, ARRL directors chose committee members on the basis of their expertise and demonstrated interest in serving on an advisory committee. They serve at the pleasure of their director, and are directly responsible to him or her for the performance of their duties. Furthermore, their term of office is concurrent with that of their director. Committee members are therefore active and necessary participants in issues affecting Amateur Radio on two levels: national and divisional (local). Committee members automatically influence matters of nationwide scope on the national Committee, as before. Changes in the structure

of division-level input, however, are new.

Local Input to Decision Making

Advisory committee members are now part of a Division Cabinet, formed, as its name implies, to advise the Director on matters of division concern and importance, and to plan implementation of Board-directed actions.2 This group is composed of the division director, the vice director, section managers, assistant directors and advisory committee members. Through access to Division Cabinet members, League members now have greater opportunities to make their voices heard.

To take advantage of this newly opened avenue of communication, contact your division representatives with questions or opinions that fall within the scope of their committees. Help chart the direction of your League and of Amateur Radio — get involved.

Notes

¹D. Sumner, "Long-Range Planning — Phase II Report Accepted by Board," QST, Dec. 1981, pp. 56-60, "Moved and Seconded, QST, May 1982, pp. 45-50, and Sept. 1982, p. 48.

Board Liaison - Frank Butler, W4RH, 323 Elliott Rd.,

Atlantic Division - Robert Bennett, W3WCQ, 626 Lake

Staff Liaison - Peter O'Dell, KB1N, ARRL Hg.,

Canadian Division — J. Leslie Weir, VE3AIB, 42 Cobham Crescent, Toronto, ON M4A 1V6

Central Division - Joseph J. Schroeder, W9JUV,

Dakota Division — Terry Van Benschoten, WØVB, 2326 11th Ave., N.W., Rochester, MN 55901 Delta Division — R. A. "Bob" Taylor, WB5LBT,

10715 Waverland, Baton Rouge, LA 70815

316 Vanderbilt Pkwy., Dix Hills, NY 11746

Midwest Division — Richard G. Tucker, WØRT, Box 671, Parson, KS 67357

Northwestern Division - Hal Goodell, N7NW, 35916

Pacific Division - H. Paul Shuch, N6TX, 14908 Sandy

Rocky Mountain Division — Russ Michaelson, N7SM 1727 E. 3015 South, Salt Lake City, UT 84106

WD4FAB, 1130 Willowbrook Trail, Maitland, FL

WB6NMT, 3175 Cauby St., No. 43, San Diego, CA

Board Liaison - Jay Holladay, W6FJJ, 5128 Jessen

ARRL Hq., 225 Main St., Newington, CT 06111

New England Division — Joe Reisert, W1JR, 17 Mansfield Dr., Chelmsford, MA 01824

11th Ave., S.W., Federal Way, WA 98003

Roanoke Division - Ted Mathewson, W4FJ.

Southeastern Division - Richard M. Jansson

Southwestern Division — TLouis N. Anciaux,

West Gulf Division — Roy L. Albright, N5RA, 107 Rosemary Dr., San Antonio, TX 78209

Staff Liaison - Bernie Glassmeyer, W9KDR,

1525 Sunset La., Richmond, VA 23221

Ła., San Jose, CA 95124

Dr., La Canada, CA 91011

Great Lakes Division — David Smith, W8YZ.

530 Hollywood Dr., Monroe, MI 48161 Hudson Division — Richard T. Knadle, Jr., K2RIW,

S.E., Fort Walton Beach, FL 32548

225 Main St., Newington, CT 06111

VHF/UHF Advisory Committee

Box 406, Glenview, IL 60025

Dr., Towson, MD 21204

Rocky Mountain Division — Wilson F. Sellner, WB7RRZ, 930 Western Hills Blvd., Cheyenne, WY 82001

Southeastern Division — John G. Bolton, Jr., WA4PNY, 1025 Hammond Dr., N.E., Atlanta, GA 30328 Southwestern Division — Joseph D. Moeil, K\$\phi\$OV, Box 20-GJ, Fullerton, CA 92633 West Gulf Division — Frederick O. Maia, W5YI,

west Guir Division — Frederick O. Maia, WSYI, P.O. Box 10101, Dallas, TX 75207 Board Llaison — Stan Zak, K2SJO, 13 Jennifer La., Port Chester, NY 10573

Staff Liaison — Peter O'Dell, KB1N, ARRL Hq., 225 Main St., Newington, CT 06111

VHF Repeater Advisory Committee

Atlantic Division — William Van Aller, K3CZ, 9623 Old Washington Rd., Woodbine, MD 21797 Canadian Division — Ronald F. MacKay, VE1AIC, 80x 188, Cornwall, PEI C0A 1H0 Central Division — Bob Heil, K9EID, P.O. Box 68,

Marissa, IL 62257 Dakota Division — Eric Foss, KDØZ, 6926 Indiana Ave.,

N., Brooklyn Center, MN 55429
Delta Division — Lionel A. "Al" Oubre, K5DPG, Star Rte. A, Box 185-E, New Iberia, LA 70560
Great Lakes Division — John R. Weeks, Jr., K8RT, 777

773 Andover Rd., Mansfield, OH 44907 Hudson Division — Charles Harrison, K2MZ, MR 179, Oyster Bay, NY 11771

Midwest Division — Joe Eisenberg, WAØWRI, 6627 Colby, Lincoln, NE 68505 New England Division — Lewis D. Collins, W1GXT,

10 Marshall Terr., Wayland, MA 01778 Northwestern Division — Clay Frienwald, K7CR, 8516 Idelwood Dr., S.W. Taccoma, WA 98498 Pacific Division — Dan Miller, W6GCB, 234 Lyell St.,

Los Altos, CA 94022

Roanoke Division — Wayne C. Williams, K4MOB, 600 Lakedale Rd., Colfax, NC 27235

Rocky Mountain Division — Twhitman E. Brown, WB@CJX. 14418 W. Ellsworth Pl., Golden, CO 80401

Southeastern Division — Jani Kusmulyana, KO4J,

P.O. Box 17317, Tampa, FL 33682 Southwestern Division — Ray Von Neumann, K6PUW, 20941-B Gresham St., Canoga Park, CA 91304 West Gult Division — Eilene G Spiegel, WA5WDW, 2842 Prichett, Irving, TX 75061

†Chairman

92138

Strays *** HAM RADIO ABOARD GRAF

HAM RADIO ABOARD GRAF ZEPPELIN ON HISTORIC FLIGHT AROUND WORLD

□ In 1929, Germany invited Sir Hubert Wilkins, the noted Australian polar explorer of the '20s and '30s, to ride along on the proposed around-the-world flight of the German airship *Graf Zeppelin*. The "Graf" was a rigid dirigible, 800 feet long and 100 feet in diameter, that carried its passengers in ocean-liner-like luxury.

Wilkins, a careful planner, wanted his own independently powered and highly portable emergency transmitter to take along in case of a crash in some isolated area, such as Siberia. He placed an order for the transmitter with Heintz & Kaufman, and the late Ralph Heintz, W6RH, assigned the job to Bill Eitel, W6UF, and this writer. The rig was a UX-210 in a self-excited TPTG oscillator circuit in a metal box mounted on and powered by a 400-cycle hand-cranked generator (one of the early uses, by the way, of 400-cycle ac in aircraft). The unit was designed to be clamped to a tree or post to prevent its flopping around while being cranked. Transmitter output included the 40-meter band, and, during the test, hams were worked in daylight up and down the Pacific coast from the San Francisco peninsula,

The flight was a successful trip around the world, and, as far as is known, the equipment was never used. W6UF, W6VX (who took the accompanying photo) and I are still active on the air.

— O. H. Brown, W6HB, Los Osos, California



Hank Brown, W6HB (left), pounds brass and Bill Eitel, W6UF, labors with the hand-cranked generator while testing the "40 meter" transmitter carried by the German airship Graf Zeppelin on its world-circling flight in 1929. (photo by David Atkins, W6VX)

WARC Resolution Calls for Amateur, Non-Amateur Cooperation in Disaster Communications

Amateur Radio's gains at WARC-79 are well known. Lesser known is resolution 640: the international agreement on the emergency use of amateur bands by nonamateur stations.

By Bob Eldridge,* VE7BS

esolution No. 640, part of the 1982 International Radio Regulations, outlines the conditions for use of Amateur Service frequencies by nonamateur stations during natural disasters. Amateurs need to know the terms of the arrangement (or at least be well aware of its existence!), or there may be trouble when apparent intruders appear on our bands to cope with an emergency. Most of the bands concerned are capable of worldwide propagation; in fact, one of the purposes of the agreement is communication between the disaster area and the headquarters of emergency organizations, which may be thousands of miles away.

The routine communication links used by relief agencies are on frequencies assigned to the Fixed Service. It is impossible to find new frequencies quickly to cope with an urgent situation, and it is impractical to leave frequencies idle, just waiting for a disaster to happen. Finding a new frequency in the hf bands these days takes a very long time; there are over a million entries in the Master Register of the International Frequency Registration Board, and they receive an average of about 300 notices a day asking for changes and additions.

Within the amateur bands there is much greater flexibility, and stations can make immediate frequency changes to cope with a new situation. This was the reason for the proposals put forward at the 1979

WARC, asking for the allocation of a few kilohertz just inside the lower end of each amateur band for emergency communications.'

Agreement at the 1979 WARC

After a discussion with the Amateur Service representatives in the frequency-

"It is impossible to find new frequencies quickly [in the Fixed Service]
... Within the amateur bands there is much greater flexibility."

allocations working group, it was agreed that this would create difficulties (for example, telephony operation in a cw segment of the band) and would sacrifice some of the flexibility being sought.

A new approach was worked out, allowing for operation in any part of certain bands and including cooperation between amateur and nonamateur stations. Except for a few changes stressing the rights and responsibilities of administra-

IR. Baldwin and D. Sumner, "The Geneva Story," Feb. 1980 QST, pp. 52-61. Note especially the discussion under Disaster Communications in Amateur Bands, p. 60. tions, the wording (proposed by a small specialist group, all well aware of the way amateurs operate within their bands and of the Amateur Service's record in dealing with emergencies themselves) was accepted without reservation by the Conference.

The Radio Regulations

Footnote 510 of the new Radio Regulations reads:

For the use of the bands allocated to the amateur service at 3.5 MHz, 7.0 MHz, 10.1 MHz, 14.0 MHz, 18.068 MHz, 21.0 MHz, 24.89 MHz and 144 MHz in the event of natural disasters, see Resolution 640.

Resolution No. 640 reads:

RESOLUTION NO. 640

Relating to the International Use of Radiocommunications, in the Event of Natural Disasters, in Frequency Bands Allocated to the Amateur Service

The World Administrative Radio Conference, Geneva, 1979,

considering

 a) that in the event of natural disaster normal communication systems are frequently overloaded, damaged, or completely disrupted;

b) that rapid establishment of communication is essential to facilitate worldwide relief actions; c) that the amateur bands are not bound by international plans or notification procedures, and are therefore well adapted for short-term use in

emergency cases;

d) that international disaster communications would be facilitated by temporary use of certain frequency bands allocated to the amateur service; e) that under those circumstances the stations of the amateur service, because of their widespread distribution and their demonstrated capacity in such cases, can assist in meeting essential communication needs;

f) the existence of national and regional amateur emergency networks using frequencies throughout the bands allocated to the amateur service; g) that, in the event of a natural disaster, direct

*Erickson Rd., Pemberton, BC VØN 2LØ, Canada

communication between amateur stations and other stations might enable vital communications to be carried out until normal communications are restored:

recognizing

that the rights and responsibilities for communications in the event of a natural disaster rest with the administrations involved:

resolves

1) that the bands allocated to the amateur service which are specified in No. 510 may be used by ad-

"The amateur bands are well adapted for use in emergency cases."

ministrations to meet the needs of international disaster communications;

2) that such use of these bands shall be only for communications in relation to relief operations in connection with natural disasters;

3) that the use of specified hands allocated to the amateur service by non-amateur stations for disaster communications shall be limited to the duration of the emergency and to the specific geographical areas as defined by the responsible authority of the affected country;
4) that disaster communications shall take place

 that disaster communications shall take place within the disaster area and between the disaster area and the permanent headquarters of the organization providing relief;

5) that such communications shall be carried out

only with the consent of the administration of the country in which the disaster has occurred;

6) that relief communications provided from outside the country in which the disaster has occurred shall not replace existing national or international amateur emergency networks;

7) that close cooperation is desirable between amateur stations and the stations of other radio services which may find it necessary to use amateur frequencies in disaster communications; 8) that such international relief communications shall avoid, as far as practicable, interference to the amateur service networks;

invites administrations

1) to provide for the needs of international disaster communications;

2) to provide for the needs of emergency communications within their national regulations.

Note that the new bands, including the shared band at 10.1-10.15 MHz, are included. Note, also, that the whole thing relates only to communications during a natural disaster.

Some Points of Interest

- d) makes it clear that the use is temporary only. It does not include routine communications of the relief organizations.
- e) and (f) recognize the efforts of amateurs during disasters and the existence of amateur emergency networks.
- g) recognizes the possibility of joint operation between amateur and non-amateur stations.
 - "recognizing that the rights . . . " is a

reminder that each country is responsible for regulating any communications within its own territory (5 and 6 also cover this).

(2) (3) and (4) restrict the use of amateur bands by nonamateur stations to very specific cases.

"Rapid establishment of communication is essential to worldwide relief actions."

7) is one reason for this article, Amateurs can only cooperate fully when they are aware of the background and the purpose of the Resolution.

8) recognizes the existence and the worth of Amateur Radio Service networks. It is interesting that the Amateur Radio operator's reputation for having common sense and good operating practice made it unnecessary to write in a "reverse clause" protecting the nonamateur relief communications from the amateurs on the band.

Let's all see that the confidence is justified, if the occasion should arise.

Strays 🗽

INDIANA HAM WINS BATTLE OF GETTYSBURG

☐ When FCC stopped renewing secondary station licenses a few years ago, the Commission let the licensees switch call signs between their secondary and primary stations so they could keep the ones they liked best. This was especially important to Extra Class hams who had been given the opportunity to pick any available call sign, but who had held onto their original primary station call and had added the new one as a secondary.

Unfortunately, while the FCC rules permit an amateur to renew a station license (and its call sign) up to one year after the license expires, the Commission did not follow this practice in the case of lapsed secondary station call signs, because the license itself was not renewable. A number of amateurs lost the call they preferred as a result, either because they renewed late or because of Postal Service or other problems.

One who lost his hard-earned one-by-

two call was Michael J. Wetzel, WA9BWY/W9RE, of Indianapolis, Mike believed he had followed the letter of the law in applying to switch W9RE to his primary station license, and was outraged when Gettysburg refused to do it. Thus began a months-long, one-man battle with the bureaucracy, which reached a happy ending earlier this year: Not only did Mike regain W9RE, but largely because of his case the Commission changed its policy so as to extend the one-year grace period to lapsed secondary calls! This new policy was announced in June QST, page 62. Thus, a number of hams have benefited from Mike's persistence.

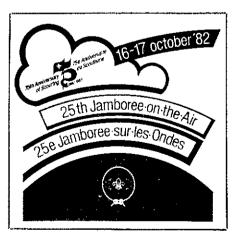
Mike incurred several hundred dollars of legal expenses during his lonely battle with Gettysburg, and would appreciate assistance in meeting them from anyone who may have been helped by his actions. Write to Michael J. Wetzel, W9RE, 7880 Shelbyville Rd., Indianapolis, IN 46259.

I would like to get in touch with . . .

☐ anyone interested in attending the Motor City (Detroit) Radio Club 50-year anniversary dinner on December 4, 1982; MCRC, P.O. Box 337, Wyandotte, MI 48192-0337.

OST congratulates . . .

☐ Kalaya Martin, N4GPG, who became an American citizen on May 20, 1982.



The Jamboree-on-the-Air gets in full swing on October 16 and 17, commemorating Scouting's 75th anniversary. During the event, radio amateurs are asked to invite Girl and Boy Scouts Into their ham shacks for a first-hand look at Amateur Radio. It's a fantastic opportunity for scouts to talk with other scouts around the world. For more information, see Special Events, this issue, or contact your local Scout office.

Happenings

Amateur Radio Bill Passes Final Hurdle in Congress

August 19, 1982 marked an historic day for U.S. Amateur Radio operators. On that day, the U.S. Congress gave its final approval to pro-Amateur Radio legislation S.929 and H.R. 5008. Surprisingly, however, final action did not come as approval of S.929 and H.R. 5008, bill designations familiar to and watched by radio amateurs for nearly two years. Rather, the final vote came as approval of H.R. 3239, an appropriations bill to which S.929 and H.R. 5008 had been attached. (The complete text of H.R. 3239 appears in the August 19, 1982 Congressional Record, page H6529.)

The bottom line, nevertheless, is that the "Goldwater Amateur Radio legislation" has received final approval by both Houses of Congress, and, as this is written, President Reagan was expected to sign the measure into law. What had begun as ARRL's "wish list" submitted to the Senate Subcommittee on Communications in November of 1980 has finally become an accomplished goal.

The new law will play an important role in the future of Amateur Radio. For example, it provides a means of dealing with the inevitable prospect of severe cutbacks of FCCadministered amateur examinations. At the heart of H.R. 3239 is a provision entitled, "Use of Amateur Volunteers for Certain Purposes." This section amends Section 4(f) of the Communications Act of 1934 by providing for the use of volunteers for preparing and administering Amateur Radio operator license examinations. Another part of the bill will add a new section that would authorize the Commission. "for the purposes of monitoring violations of any provision of the Act (and of any regulation prescribed by the Commission under this Act) relating to the amateur radio service, ... " to:

"(1) recruit and train any individual licensed by the Commission to operate an amateur station; and

"(II) accept and employ the voluntary and uncompensated services of such individual." The same section of the legislation also provides the following:

"(ii) The Commission, for purposes of recruiting and training individuals under clause (i) and for purposes of screening, annotating, and summarizing violation reports referred under clause (i), may accept and employ the voluntary and uncompensated services of any amateur station operator organization.

"(iii) The functions of individuals recruited and trained under this subparagraph shall be limited to — -

"(1) the detection of improper amateur radio transmissions;"

"(II) the conveyance to Commission personnel of information which is essential to the enforcement of this Act (or regulations pre-

scribed by the Commission under this Act) relating to the amateur radio service; and

"(III) issuing advisory notices, under the general direction of the Commission, to persons who apparently have violated any provision of this Act (or regulations prescribed by the Commission under this Act) relating to the amateur radio service.

"Nothing in this clause shall be construed to grant individuals recruited and trained under this subparagraph any authority to issue sanctions to violators or to take any enforcement action other than any action which the Commission may prescribe by rule." The legislation also provides a parallel section for employing volunteers in the Citizens Band Radio Service to achieve the same purposes.

H.R. 3239 also amends Section 301 of the Communications Act to recognize existing case law holding all radiocommunication to be, by its very nature, interstate. Recently, some FCC enforcement activities have been bogged down by defendants' claims that their radio signals had not crossed state lines, thereby laving the foundation for an argument that the FCC had no jurisdiction to prosecute them. This defense has required the FCC to produce experts to prove the interstate nature of radiocommunication. An H.R. 3239 ammendment will take care of such challenges to FCC jurisdiction and save the Commission the expense of producing an expert to overcome this kind of jurisdictional challenge.

One of the most significant amendments represents years of effort by radio amateurs to combat the hobby's old nemesis, radio frequency interference (RFI). The bill amends Section 302(a) of the Communications Act to read as follows:

"(a) The Commission may, consistent with the public interest, convenience, and necessity, make reasonable regulations (1) governing the interference potential of devices which in their operation are capable of emitting radio frequency energy . . .; and (2) establishing minimum performance standards for home electronic equipment and systems to reduce their susceptibility to interference from radio frequency energy" (emphasis added).

In spite of the heavy lobbying effort mounted against this provision by a group of manufacturers of consumer electronic devices, Amateur Radio interests prevailed. The new law will put within FCC's power the means to place responsibility for consumer device rf interference susceptibility where it belongs — on the manufacturers of such devices. It will also establish in undeniably clear terms the federal government's preemption of matters involving radiocommunication interference, giving

amateurs an important tool for fighting local and state government attempts to regulate RF1.

The legislation also gives FCC the statutory authority to issue licenses for a term of 10 years, instead of the present five-year maximum term. Finally, of particular interest to radio amateurs is the amendment of Section 605 of the Communications Act, the Secrecy Provisions. Section 605 has been changed to read as follows:

". . . no person receiving, assisting in receiving, transmitting or assisting in transmitting, any interstate or foreign communication by wire or radio shall divulge or publish the existence, contents, substance, purport, effect, or meaning thereof, except through authorized channels of transmission or reception, (1) to any person other than the addressee, his agent, or attorney, . . . This section shall not apply to the receiving, divulging, publishing, or utilizing the contents of any radio communication which is transmitted by any station for the use of the general public, which relates to ships, aircraft, vehicles, or persons in distress, or which is transmitted by an amateur radio station operator or by a citizens band radio operator" (emphasis added). The purpose of this particular amendment is to facilitate the use of volunteers by the Commission to monitor for violations of the Commission's rules.

H.R. 3239 also amends other sections of the Communications Act that may be of passing interest to radio amateurs. For example, Section 510, which provides for the forfeiture of communications devices as a penalty for rules violations, has been strengthened, and Section 503(b)(5) has been amended by the insertion of, "or is a cable television system operator" so that the Act's forfeiture requirements are applied specifically to cable television system operators. Another amendment adds the following to Section 307 of the Communications Act:

"(e)(1) Notwithstanding any licensing requirements established in this Act, the Commission may by rule authorize the operation of radio stations without individual licenses in the radio control service and the citizens band radio service if the Commission determines that such authorization serves the public interest, convenience, and necessity."

H.R. 3239 also amends the Communications Act to affect other areas of the communications industry and the FCC. However, those amendments, which first came into being in S.929 (Senator Goldwater's Amateur Radio and Land Mobile Bill), are those that will see Amateur Radio through the challenges of the next several decades. August 19, 1982 is indeed an important date in Amateur Radio's history.

DR. JAMES L. LAWSON, W2PV

Dr. James L. Lawson, W2PV, noted QST

*Deputy Manager, Membership Services, ARRL

author and DX and contest operator, died May 25 after a brief illness. He was 66.

Jim was born in southern India of missionary parents, and was first licensed as W9SSO in 1934 while attending Kansas Univer-

sity. He went on to obtain his PhD in Physics from the University of Michigan, where he held the call sign W8QIU. From 1940 to 1945, he worked at the MIT Radiation Laboratory, where he made important contributions to the development of radar. Following WW II, he joined the General Electric Research Laboratory (now the Research and Development Center), where he managed a number of key programs before his retirement in 1981. His technical specialties included nuclear and thermonuclear physics, particle acceleration, computers and information systems.

Dr. Lawson became WA2SFP in 1961, and W2PV in 1968. An active member of the Schenectady Amateur Radio Association, he authored a number of landmark articles on antenna design for QST and other publications, including a notable series on Yagi antenna design published in Ham Radio, His station was a consistent leader in DX contests; as a member of the W2PV multi-operator crew in the mid-1970s, the editor remembers weekends when Jim would climb the 180-foot tower repeatedly under blizzard conditions to effect an antenna or rotator repair. He kept himself in superb condition, as evidenced by his accomplishments as a mountain climber and skier. His knowledge of ways to optimize station performance was encyclopedic. His succumbing to cancer at the start of a well-earned retirement is a tragic loss to the Amateur Radio community. -- David Sumner, K1ZZ

ARRL COMMENTS ON HF TELEPHONY SUBBAND EXPANSION

The ARRL has filed comments in response to a Notice of Inquiry and Proposed Rulemaking (Docket 82-83), issued by the FCC in February 1982, regarding expansion of the highfrequency amateur telephony subbands, specifically at 80, 40, 20, 15 and 10 meters. (A Notice of Proposed Rulemaking, as a next step, may produce new rules. A Notice of Inquiry, at best, will produce a Notice of Proposed Rulemaking as the next step, giving amateurs the opportunity to comment on specific proposals. Thus, changes on the 20-meter band are more imminent than are changes on the other hf bands.) Recognizing that existing phone subbands are seriously overcrowded, the Commission asked commenters to weigh that against specific, relevant issues. League comments in response to the Notice of Proposed Rulemaking for the 20-meter band reiterate ARRL's petition, RM-3860. April 1981 QST, page 67, reported this petition. ARRL also filed a separate response to the Notice of Inquiry dealing with possible phone expansion on the other hf bands. League comments, based on extensive membership input solicited in OST for April and May 1982, gave serious consideration to FCC questions.

1) Will the telephony subband expansion have a negative effect on domestic telegraphy operations? With the exception of the 7-MHz band, League members generally felt that modest expansion would not have a detrimental impact. In the ARRL plan, the only frequencies proposed for telephony that see significant use in domestic telegraphy operations are at 3.75 to 3.775 MHz, where some traffic nets in the southcentral portions of the country meet. These nets probably would have to relocate to lower frequencies in the band, but there is room to accommodate them. Possible detrimental effect from foreign telephony stations relocating to portions of the bands previously used for telegraphy only was also

Table 1 ARRL Proposed Band Plan

3.5-4.0 MHz, 80 Meters

3.850-4.000 General, Advanced and Extra 3.775-3.850 Advanced and Extra 3.750-3.775 Extra

7.0-7.3 MHz, 40 Meters

No change

14.000-14.350 MHz, 20 Meters

14.225-14.350 General, Advanced and Extra 14.175-14.225 Advanced and Extra 14.150-14.175 Extra

21.0-21.45 MHz, 15 Meters

21.300-21.450 General, Advanced and Extra 21.225-21.300 Advanced and Extra 21.200-21.225 Extra

28.0-29.7 MHz, 10 Meters

28.300-29.700 General, Advanced and Extra

considered. If the League's proposal is adopted, this is likely to occur only in the case of the 75-meter band in Canada, where the DOC would probably be under pressure to move their telephony subband lower, possibly affecting U.S. Novice operation and telegraphy nets. When weighed against the benefits, however, it would be an overstatement to characterize the impact as "major."

2) Do non-U.S. stations still have a legitimate requirement to be protected on some frequencies from U.S. telephony operations? U.S. amateurs are almost unanimous in maintaining that the need does not exist. In addressing this issue last year in RM-3860, the League stated, "Occasionally the comment is heard that U.S. amateurs use higher power and larger antennas than their counterparts in other countries, and that U.S. amateurs must be restricted to smaller band segments to give lowpower stations in other countries a place to operate. While this may have had some validity in the past, it is no longer the case. The Amateur Radio equipment market is an international market, and there are many amateur stations overseas which are every bit as well equipped as the finest stations in this country. The hypothetical low-power stations overseas must compete with these well-equipped stations in their own back yards, without the latter being hobbled by frequency restrictions. Indeed, if the argument were valid it would apply equally to the exclusive telegraphy bands, where U.S. amateurs operate on an equal basis. but the argument is never advanced for telegraphy. It is simply a device to defend the status quo - a status quo which . . . no longer is adequate to serve the interests of Commission licensees."

In all the world, the U.S. is unique in the degree to which it restricts frequencies available for amateur telephony. Noting that the basis for these restrictions is primarily historical and that it is understandable that overseas amateurs want to have portions of the bands free from the interference of U.S. signals, the League supports the principle of equity in worldwide amateur allocations. The ARRL proposals, however, accommodate even those overseas amateurs who feel a need for protection from, without unduly limiting, U.S. telephony operation.

3) Has the trend toward transceivers made the reservation of frequencies for "split operation" unnecessary or undesirable? League members were divided on this question, but the slight majority favored provisions for "split operation." The League's proposal accommodates this requirement.

- 4) Should new telephony subbands be contiguous with existing subbands? League members responded overwhelmingly that subbands should be contiguous. This would mean fewer band edges to worry about and, consequently, fewer Rules violations. The League's plan reflects these sentiments.
- 5) Should the Novice bands be relocated? League members reacted favorably to this Commission inquiry. The Board, however, adopted a plan that requires no Novice band relocation.
- 6) Would the goals of incentive licensing be met if all expanded telephony frequencies were available to General class licensees? A majority of League members responding felt that such a plan would hurt the incentive licensing program. Based on several considerations, the Board concluded that any expansion in the size of a telephony subband should also be reflected in the size of the General class segment of the band.

7) Should the recent expansion of the Canadian telephony subband in the 7-MHz band influence U.S. proposals for telephony expansion in the same band? Almost without exception, respondents saw no reason for U.S. decisions to be influenced by that Canadian action.

These ARRL proposals are the product of extended study, discussion and input from the amateur community, and they democratically represent as closely as possible a consensus opinion of U.S. amateurs. The League urged early FCC issuance of a Notice of Proposed Rulemaking on these proposals. — Carol L. Smith, AJ21

ARRL SUGGESTS ITS PLAN STILL BEST FOR 20-METER PHONE-BAND EXPANSION

In a separate filing, ARRL has submitted comments on the FCC proposed 20-meter telephony subband expansion (the Rulemaking portion of the Notice of Inquiry and Proposed Rulemaking). In general, the Commission's proposal to expand the 14-MHz telephony subband from 14.200-14.350 to 14.150-14,350 MHz received favorable comment from the League and its members, Specifically, FCC proposed to make the additional phone frequencies available to General, Advanced and Extra Class operators, For General class licensees, however, FCC's proposal would split the frequencies available. 14.150-14.200 and 14.275-14.350 MHz, thus creating two sets of band edges. The Commission invited comments on the merits of this plan versus one making the General class frequencies contiguous. Everyone, in general, hopes that the serious overcrowding on 20 meters will be alleviated by expansion.

Taking into consideration competing and conflicting interests, the League early on realized that a compromise plan would be the best method of frequency apportionment. In its Petition for Rulemaking, RM-3860, ARRL proposed the following scheme:

14.225-14.350 MHz

General, Advanced and Extra Advanced and Extra

14,175-14,225 MHz 14,150-14,175 MHz

Extra

After reviewing FCC's later proposal and considering sizable membership input, the League determined that its original proposal still best met the needs of amateurs.

should the Commission's proposal to establish two telephony subbands at 14 MHz available to General class licensees be im-plemented, General class licensees will have two sets of sub-band edges to be concerned with, instead of one, which unnecessarily doubles the licensees and unnecessarily increases the monitoring burden upon enforcement personnel. Second, and perhaps more important, the Commission's proposal would result in an influx of a large number of United States amateurs into frequencies previously used only by non-U.S. amateurs. the League agrees with the Commission that no significant detrimental impact on international operations should result from expansion of the 14-MHz telegraphy subband. However, the League's proposal was designed to minimize any perceived impact on foreign amateurs. The seg-ment 14.150-14.175 MHz would be available for use only by Amateur extra Class licensees of which there were, as of May 28, 1982, only 30,121
approximately 7% of the U.S. amateur population. The segment 14.175-14.200 MHz would be available for use only by Extra and Advanced class licensees constituting 30% of the U.S. amateur population, or 123,199 licensees. The League's proposal thus reduces perceived impact? and provides a contiguous 125-kHz-wide telephony subband available to General class licensees - the same amount of spectrum available to General class licensees under the Commission's proposal. Finally, the League's allocation proposal provides an incentive for amateurs to upgrade their license class. The popularity of the 14-MHz band among amateurs makes reservation of the small portions of the telephony subband for Extra and Advanced class licensees beneficial as an incentive to increase technical knowledge.

For these reasons, the League requested that the FCC promptly implement the ARRL proposal to expand the 14-MHz telephony subband and to allocate that subband as proposed in the League's Petition of Rulemaking, RM-3860. — Carol L. Smith, AJ2I

NON-GOVERNMENT RADIOLOCATION EXPANDED — WITH CONDITIONS — ON 450-MHz BAND

League cautions and suggestions to avoid potential interference to amateur operations on the 450-MHz band were incorporated in a Report and Order in General Docket 80-135, issued in July. The amendment to the Commission's rules now allows nongovernment radiolocation stations to operate in inland areas on a secondary, noninterference basis to the Government Radiolocation Service and the the Amateur Radio Service.

In its comments to the FCC,³ the League suggested that only spread spectrum be allowed in inland areas, with the further limitation that only the 420-430 MHz segment of the band be used. The ARRL further proposed that a fixed power limit be adopted and that some means of identification be provided to help determine sources of interference.

These League proposals were taken to heart. FCC's final version of its revisions to Part 90 of the Commission's Rules and Regulations to permit inland operation of nongovernment radiolocation in the 450-MHz band included changes that will (1) provide for spread-spectrum technology only to be used in the 420- to 435-MHz portion of the band, (2) allow

a maximum power output of 50 W for users and mandate compliance with applicable Part 90 technical standards, and (3) require that these stations transmit a manufacturer's indentifier, to be sent at the beginning and ending of transmission and at 15-minute intervals during continuous operation. Authority to operate will be granted on a case-by-case basis. Shoreline nongovernment radiolocation operations using pulse-ranging systems will continue to be permitted. — Carol L. Smith, AJ21

FCC TAKES FURTHER ACTION ON GRIZZLY PEAK REPEATER CASES

Kerr. ex-WA6JIY

On August 12, 1982, the FCC Review Board affirmed an earlier judicial decision to deny the license renewal of Gary Kerr, ex-WA6JIY, of Stockton, California. The Board concurred that Kerr's "calculated and deliberate conduct in repeatedly and for long periods interfering with legitimate communications on the Grizzly Peak repeater required denial of his renewal application."

Kerr contended that he was running tests and that the Rules permit tests of the sort he claimed to be running. The Board found that "nothing in Sections 97.89 or 97.91, which permit certain one-way communications for experimental and other purposes, appears to contemplate anything like Kerr's repetitious and lengthy transmissions." In fact, Kerr was overheard to say during one of his monitored transmissions that, "... if you want to jam, the thing to do is say, 'this is a ... test.'" That and other statements made by Kerr discredited his explanation.

The Board noted that, "... even a single instance of jamming may result in removal of a license because of the seriousness of the offense and harm to the public interest. Kerr's record of aggravated interference warrants no lesser remedy." Accordingly, Gary Kerr's application for renewal of his Amateur Radio station license, WA6JIY, and his General class Amateur Radio operator license was denied.

Gilbeau, ex-N6OZ

In another action on the same date, the FCC Review Board again affirmed a judicial decision, this time one involving the revocation of the station license and the suspension of the operator license of Donald Gilbeau, ex-N6OZ, also of Stockton, California.'

The Board was in accord with earlier findings that clearly established that on May 28, 1980, Gilbeau willfully jammed the Grizzly Peak repeater frequency. Commission monitors heard signals causing interference consisting of random Morse code words and letters, series of dots, and some unintelligible sounds, and traced the signals to Gilbeau's residence. Gilbeau later admitted that he had operated on that frequency and that ". . . it was a foolish thing for me to do . . . to get back at some of the jammers." Two days later, Gilbeau wrote to the Commission and apologized for his "senseless action on the evening of May 28th." He explained that he had been frustrated in attempting to use the Grizzly Peak repeater by the actions of "jam-

*See Happenings, May 1981 QST, p. 61, for details. */bld., p. 60.

mers" and, at a moment of weakness, decided to give them "a dose of their own medicine" by transmitting unidentified signals. Gilbeau also wrote the FCC that his failure to identify his station was an "ill-conceived oversight," and that he had "foolishly" transmitted the Morse code communications, and that some of the other transmissions may have been inadvertent. These exceptions of Gilbeau were found to be without merit.

The FCC Review Board therefore concluded that revocation of Gilbeau's station and operator license was warranted. In light of Gilbeau's prior record of good service and his contrition, however, the Board revoked his station and operator's license without prejudice. After the required one-year waiting period following revocation, the Bureau could grant Gilbeau's reapplication for a license, if it is determined that no recurrence of misconduct is likely. — Carol L. Smith, AJ21

SECTION MANAGER ELECTION NOTICE

To all ARRL members in the Montana, Mississippi, Iowa, Arizona, Ontario, Orange, Northern Texas, Arkansas, Kentucky, Wyoming and West Indies sections: You are hereby solicited for nominating petitions pursuant to an election for Section Manager. In accordance with the restructuring of the ARRL Field Organization, the position of Section Manager will supersede the position of Section Communications Manager in each section. Incumbent SCMs are listed on page 8 of this issue.

A petition, to be valid, must contain the signatures of five or more full ARRL members residing in the section concerned. Photocopied signatures are not acceptable. No petition is valid without at least five signatures on that petition. No member may sign more than one petition. It is advisable to have a few more than five signatures on each petition.

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

(Place and date)

General Manager, ARRL

225 Main St., Newington, CT 06111

We, the undersigned full members of the . . . ARRL Section of the . . . Division, hereby nominate . . . as candidate for Section Manager for this Section for the next two-year term of office.

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

An SM candidate must have been a member of the League for a continuous term of at least two years and a licensed amateur of General class or higher (Canadian Advanced Amateur Certificate) immediately prior to receipt of petition at Headquarters.

Petitions must be received at Headquarters on or before 5:30 P.M. Eastern Local Time, December 10, 1982.

Whenever more than one member is nominated in a single section, ballots will be mailed from Headquarters on December 31, 1982. Returns will be counted February 22, 1983. SMs elected as a result of the above procedure will take office April 1, 1983.

If only one valid petition is received for a section, that nominee shall be declared elected without opposition for a two-year term beginning April 1, 1983.

If no petitions are received for a section by the specified closing date, such section will be resolicited in April QST and an SM elected

'50 kHz would still be reserved for non-domestic telephony use.

See Happenings, Dec. 1981 QST, p. 72.

52

through the resolicitation will serve a term of 18 months.

Vacancies in any SM office between elections are filled by appointment by the General Manager.

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

David Sumner, K1ZZ General Manager

ARRL COMMENTS ON THE BIOLOGICAL EFFECTS OF RF ENERGY

In comments filed in General Docket 79-144, the ARRL has urged the FCC to adopt the American National Standards Institute's (AN-SI) latest Radio Protection Guide, with an exemption for Amateur Radio, as a practical means of meeting its obligation to protect the public from the possible harmful effects of radio frequency (rf) energy. On February 18, 1982, the Commission released a Notice of Proposed Rulemaking (NPRM) in General Docket 79-144. These proposals, if adopted, would affect FCC licensees not in compliance with federal standards regarding human exposure to rf energy. (See April 1982 OST, page 57.) Applied to radio amateurs, the proposed regulations would require ham operators (or prospective harn operators) to consider an additional factor before answering Question 10 on the FCC license application Form 610. Question 10 asks, "Would a Commission grant of your application be a major action as defined by Section 1.1305 of the Commission's Rules?" The Commission's proposal would require an applicant to answer "yes" to Question 10 and file an environmental impact statement when:

"(ii) the proposed operation would result in exposure of the general public to levels of radiofrequency or microwave radiation in excess of those established by an agency of the federal government having jurisdiction thereover, such as the U.S. Environmental Protection Agency, for exposure of the general public or, in the absence of a federal standard for exposure of the general public to radiofrequency or microwave radiation in excess of those established by the federal government for exposure of workers."

The League's response to the proposal, written by the select ARRL Committee on the Biological Effects of RF Energy, stated that there would be no effect on the Amateur Radio Service should the Commission adopt its proposal and if the last standard of the Occupational Safety and Health Administration (OSHA) of 10 milliwatts/cm² applied. According to the League, nearly all radio amateurs would doubtless continue to answer "no" to Question 10 on FCC Form 610 because the Amateur Radio Service in general, given the intermittent nature of its operation and the relatively low levels of rf energy use, would not exceed this standard.

However, the League found a serious flaw in the FCC's proposal. The OSHA 10 milliwatt/cm² standard is now being phased out as an accepted U.S. maximum permissible level (MPL) for sustained exposure to rf energy. Recently, OSHA itself proposed to revoke its 10 milliwatt/cm² advisory standard from Section 1910.95 of its regulations. (See the Federal Register, May 28, 1982, p. 23477.) According to the League, OSHA's decision to

revoke its standard would "effectively knock the underpinnings out of the FCC's proposed Section 1.1305(d)." Since the Environmental Protection Agency has not set a federal standard for exposure of the general public, "the Commission's proposed Section 1.1305(d) is a hollow shell."

ARRL sees an urgent need for the FCC to adopt on its own the 1982 ANSI Radio Protection Guide, with an exemption for Amateur Radio. "Unless some action is taken soon by the FCC and other federal agencies, local and state governments, usually without sufficient resources to evaluate e-m bioeffects evidence, dosimetry, and regulatory implications, will enact 'standards' that are (1) too stringent, (2) punitive, (3) internally inconsistent (e.g. a large jump in maximum permissible levels for a very small change in radio frequency), (4) unenforceable, or (5) will be so widely violated by their own essential services (fire, police, taxis, etc.), that they will have no meaning. The end result, too, will be nonuniform, multiple emission exposure standards leading to a possible paralysis in legitimate, safe radiowave use." The League's comments then listed several instances of attempts by state and local governments to regulate radiocommunication energy emissions.

After giving its technical reasons for supporting the 1982 ANSI Radio Protection Guide, ARRL noted that "radio amateurs should be able to continue their normal operations without causing concern for undue rf exposure." It also stated that it hoped the Commission would understand the concerns of the Amateur Service, "especially if further actions by state and local governments in this area come into conflict with or markedly restrict the Amateur Radio Service's ability to achieve the goals set forth in §97.1 of the Commission's Rules."

ARRL members wishing to receive a copy of the League's comments filed in this proceeding are invited to send a 9" × 12", self-addressed, stamped envelope with 88 cents postage to ARRL Bio-Effects Comments, 225 Main St., Newington, CT 06111.

MORE PROGRESS ON THE 10-MHz FRONT

We are pleased to report continuing progress on the League's efforts to gain access for U.S. amateurs to the 10.1-10.15 MHz band. Last month we reported that Senators Barry Goldwater and Harrison Schmitt joined the fight by urging FCC Chairman Mark Fowler that U.S. amateurs be granted interim authority to operate on the 10-MHz band prior to ratification of the Final Acts of the World Administrative Radio Conference. (See September 1982 QST, p. 58). It has been the League's position all along that such ratification was not needed to allow amateurs to operate on that band on a secondary, non-interference basis. Indeed, over 40 countries have already allowed their radio amateurs to operate on 10 MHz. The FCC, however, took the contrary view that prior ratification was necessary. That impasse has apparently been laid to rest, as evidenced by the following letter from Chairman Fowler:

Dear Senator Goldwater:

This refers to your letter of August 3, 1982 jointly signed by Senator Harrison Schmitt. I appreciate the information concerning the Treaty ratification process and your suggestion about immediate action. We have not taken action on the ARRL application for review regarding authoriza-

tion of the 30 meter band (10.1-10.15 MHz) for the amateur radio service because we were assuming prompt ratification of the Final Acts of the 1979 World Administrative Radio Conference, and we did not intend to initiate the implementation process until after ratification of the Treaty

In light of your information that the ratification may be delayed and consistent with your view that immediate interim access to the 30 meter band by United States amateurs would be appropriate, I have instructed the staff to revise our approach. Accordingly, in early fall, I anticipate Commission consideration of two related matters. The first will be a Notice of Proposed Rulemaking proposing the implementation of the Final Acts. The second matter will be whether the Commission should authorize early temporary access to the 30 meter band by amateurs, under Section 115 of the Radio Regulations as you suggest. If the Commission were to act affirmatively on both matters, ARRL's concerns would be satisfied.

I appreciate your apprising me of your interest in this matter and I fully support early access by United States amateurs to the 30 meter band. The Commission is anxious to begin the implementation of the Final Acts and I look forward to ratification of the Treaty at the earliest possible date.

Sincerely,

Mark S. Fowler Chairman

If there are no further hitches, U.S. amateurs could have access to the new band by early fall. When it happens, the news will be transmitted immediately over W1AW. — Hal Steinman, KIFHN

ARRL FOUNDATION NEWS

Jesse Bieberman Memorial Fund

Contributions continue to roll into the Foundation in memory of Jesse Bicberman, W3KT, former Atlantic Division Director and Third Call Area QSL Bureau Manager. The Jesse Bieberman Memorial Fund has been established to provide ARRL memberships for deserving disabled and elderly radio amateurs and prospective amateurs who otherwise would be unable to afford to join or reapply for membership in the League. The financial problems facing many disabled were of concern to Jesse, who carried his concerns to the ARRL Board of Directors. It is thus particularly appropriate to honor Jesse's memory in this way.

Phil Haller, W9HPG

The ARRL Foundation has recently received contributions in memory of Philip E. Haller, W9HPG, former Central Division Director. Phil was a beloved member of the Chicago amateur community and will be very much missed as a dedicated amateur and loyal friend.

Edgar T. Howes, W6BJR

The Foundation has also received a great number of contributions to the Scholarship program in memory of Ted Howes, W6BJR. From the flood of donations from individuals, it is apparent that Ted was respected and befriended by many of his fellow amateur and non-amateur friends alike. These contributions will enable the Foundation to award scholarships to deserving young persons interested in pursuing a career in the electronics and engineering fields.

The ARRL Foundation is devoted to the enhancement, protection and promotion of Amateur Radio through a number of worthwhile programs. The funds described above are only a few of these programs. For more information about the ARRL Foundation, write ARRL Foundation, 225 Main St., Newington, CT 06111.

Conducted By Harry MacLean,* VE3GRO

Canadian NewsFronts



CRRL Officers and Directors

President: A. Mitch Powell, VE3OT Honorary Vice President: Noel B. Eaton, VE3CJ Secretary: Thomas B. J. Atkins, VE3CDM Directors: Albert G. Daemen, VE2IJ Raymond W. Perrin, VE3FN A. George Spencer, VE6AW Counsel: B. Robert Benson, Q.C., VE2VW

CRRL, Box 2009, Station E. London, ON N5Y 4J9

Midwest Convention Roundup

As we said last month, it was a great convention. Here are some photos of the goings-on,

Top row (I-r): Federal MP Ray Hnatyshyn (P.C., Saskatoon West) was among the many dignitaries who opened the convention; Convention Chairman Percy Crosthwaite, VE5RP, presents a plaque to former VE5QSL Bureau Manager Lloyd Jones, VE5JI, in recognition of Lloyd's many years of service; At the CRRL Forum, Counsel Bob Benson, VE2VW, outlines CRRL action in tower ordinance cases in Edmonton and Laval; CRRL President

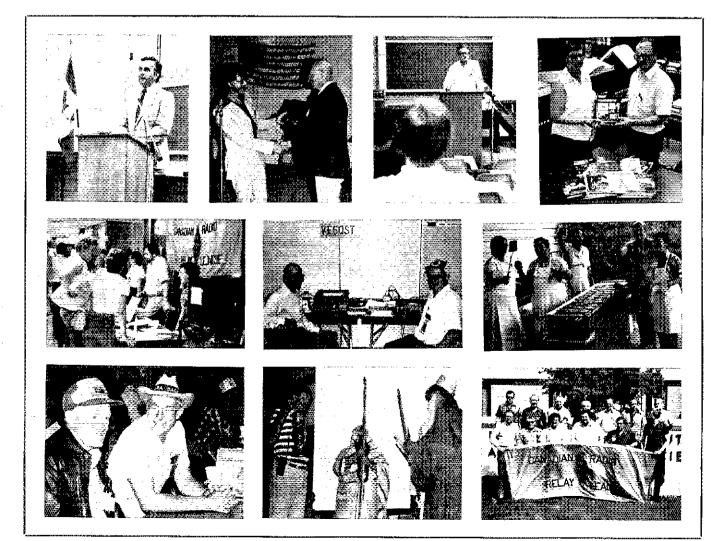
*163 Meridene Cr. W., London, ON N5X 1G3

Mitch Powell, VE3OT, presents a complete set of ARRL publications to the Kelsey Institute, where the convention was held.

Middle row (l-r): The CRRL booth was a busy place throughout the convention — that blur is ARRL Club and Training Manager Steve Place, WB1EYI, from League Headquarters; Two tired operators take a break at talk-in station VE5QST; There's no question about it: Hams make good hamburgers. Bruce Ratteray, VE5RC, and his hard-working chefs at the Friday night barbecue.

Bottom row (I-r): VE5EO and VE6XF line up for some good Calgary Ale; This picture,

which arrived at Box 7009, London, in an unmarked envelope, appears to be a scene at the midnight Wouff Hong ceremony. We don't know how it was taken. All our attempts to photograph the ceremony resulted in fogged pictures, no doubt the result of powerful supernatural forces present in the room at the time. Honest; All the CRRL reps and workers we could round up at closing time. In the back row (l-r) are VE3GRO, VE3CDM, VE6AW, VE6AMM, VE3OT, VE6XC and VE6ABC. In the front row (l-r) are VE2VW, VE5WM, VEICER/AK4L, WB1EYI, VE4ADS and VE3FN. (VE3GRO photo)



International News

Region 2 Executive Committee Meets

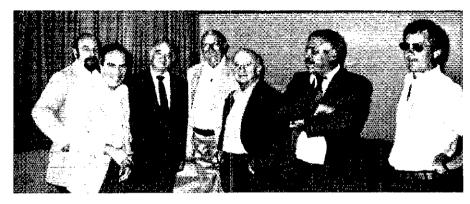
The Liga de Amadores Brasileiros de Radio Emissao (LABRE) was the host society for the meeting of the IARU Region 2 Executive Committee in Brasilia, the capital city of Brazil, June 18-20, 1982. President Remy F. Toscano, PT2VE, with other officers and members of LABRE, met the arriving committee members at the airport, provided transportation while in Brasilia, and conducted guided tours of the city, the impressive LABRE headquarters offices and the club station, PT2AAA.

On Friday, June 18, a meeting with the officers of LABRE was held for the purpose of reviewing special matters of importance to the Amateur Service in Brazil, followed by a courtesy visit to the Minister of Communications and the Directors and officials of the National Telecommunications Department. Gustavo Reusens, OA4AV, president of Region 2, thanked them on behalf of IARU for the effective support of Amateur Radio received from the Brazilian Delegation during WARC '79.

The Executive Committee meeting opened on Friday afternoon to cover an agenda of 18 subjects. Following a break for dinner, the meeting continued until midnight and was recessed for an early start on Saturday morning. Those attending were Gustavo OA4AV; Reusens. Pedro Seidemann, YV5BPG; Peter Parker, VP9GO; Caamano, HI8LC; Fabian Zarrabe, HT1Fl; Alberto Shaio, HK3DEU; Hugo Coscio, CP5EC; and Carlos Kaufman, LU9CN, Also present as an invited observer was IARU Vice President Carl Smith, WØBWJ. Region 2 Vice President Victor C. Clark, W4KFC, was ill and unable to attend.

The meeting opened with reports from each Area Director of Region 2. Extensive discussion was devoted to the review and implementation of the three new WARC bands - 10, 18 and 24 MHz. Several, but not all, of the countries in Region 2 have already implemented the 10.1-10.15 MHz amateur band. Those currently operating this new hand were cautioned to take special precautions to observe the amateur secondary status and to prevent inadvertent interference, which might jeopardize current negotiations in those countries where the band is not yet opened. It was reported that several of the South American countries do not use the portions of 18 and 24 MHz allocated for future amateur hands. It was recommended that this should be confirmed to the IFRB in an effort to shorten the transfer period required by the WARC agreement. It is recommended that Region 2 societies coordinate the strategy to be employed in the request for the 902-928 MHz band, as well as the interpretation and implementation of the more than 900 footnotes to the international Table of Frequency Allocations that might have an impact on amateur

YV5BPG and HK3DEU reported on their observations at the Region 3 Triennial Con-



Arriving delegates were met at the Brasilla airport by members of LABRE, the host society for the meeting. Left to right are HK3DEU, YV5BPG, OA4AV, PT2VE, CP5EC, PT2JB and VP9GO, PT2VE is president of LABRE. (WØBWJ photo)



The Region 2 EC members at work during the three-day meeting. Left to right are VP9GO, CP5EC, HK3DEU, HT1FI and HI8LC. (W\$BWJ photo)

ference held in Manila. All three regions have common problems of administration; to facilitate the best solutions, it is emphasized that inter-regional coordination is most important. The subject of IARU "restructuring" is of primary concern. All three regions have agreed in principle to the concept of an Administrative Council, and all member societies are urged to expedite the approval of the necessary amendment(s) to the Constitution so that first meetings of the Council can be scheduled. The Region 2 representatives to the Council will be YV5BPG and HK3DEU, with OA4AV as alternate. Support was reaffirmed for the Intruder Watch Program, and attention was called to the existence of an "IW Net" formed through the initiative of Canadian Coordinator VE3AUI; the net meets every Tuesday at 0130 UTC on 14.145 MHz.

Other subjects discussed were the vhf locator system, with referral to the next Region 2 Triennial Conference, scheduled for June 6-11, 1983 in Cali, Colombia, with LCRA as the host society; standardization of QSL cards; the value of liaison to CITEL for the Amateur Service in Region 2; recognition of the 60th Anniversary of the Radio Club de Chile; a request

to ARRL that all changes in DXCC country status in the Americas be reviewed first with the concerned IARU member society before final action is taken; operation of Canadian Loran A in the 160-meter band, with the recommendation that complaints should be filed by member societies with their respective administrations; and a review of the growing problem of CATVI and its effect on the 2-meter band.

On Saturday evening, the officers and members of LABRE were hosts at a dinner during which time recognition of hospitality and souvenir mementos were exchanged. The meeting was concluded on Sunday with a review of the financial status of the Region 2 treasury. The budget for the coming year was carefully considered in order to maintain solvency and a necessary reserve for extra expenses. George Dawson, HPIGD, was again commended for his service as IARU Region 2 Net Coordinator. The net meets each Monday at 2300 UTC on 14.265 MHz; all interested amateurs are invited to participate. The next scheduled EC meeting will be held in Cali, Colombia, just prior to the Triennial Conference in June 1983. - WOBWJ 7.0

*President, International Amateur Radio Union

Washington Mailbox

A Space Cadet's Guide to the ASAT Rules

In 1971, member nations of the International Telecommunication Union sat down at the conference table to fashion regulations for the burgeoning commercial and noncommercial satellite technologies. Rules were needed for international coordination of satellite frequencies, locations and purposes, given the proliferation of hardware floating virtually over every nation on earth. The 1971 Space WARC (World Administrative Radio Conference) delegates arrived at a number of agreements and requirements, and the FCC was obligated to carry them out. Accordingly, the Amateur Radio Service witnessed the introduction of a new subpart in Part 97: the Amateur-Satellite Service (ASAT).

So, if you're a satellite fan thinking about getting more involved with this state-of-the-art technology, you'll want to take the following crash course on the new ASAT rules.

Q. First things first — why is there a separate Amateur-Satellite Service?

A. The Amateur-Satellite Service was created by the Commission in response to the 1971 Space WARC. It provides for procedures of notification so FCC can meet its obligations to the international telecommunications community for advance publication of new satellites, international coordination and the general maintenance of records. In the event of an interference problem, the Commission can check its records quickly - determining which satellite is where, and who operates it - to effect a termination of the satellite's transmissions until the problem is resolved. The rules found in Subpart H are based largely on the agreements reached at the 1971 Space WARC. and on the experience the Commission has had with the OSCAR satellites (OSCAR stands for Orbiting Satellite Carrying Amateur Radio).

Q. How does the FCC define this service?

A. The FCC rules define the purpose of the Amateur-Satellite Service as a "radiocommunication service using stations on earth satellites for the same purpose as those of the Amateur Radio Service" (97.401). In plain language, amateur satellite communications are authorized for the same bases and purposes as the parent Amateur Radio Service.

Q. What is meant by space operation?

A. Space operation is space-to-earth and space-to-space transmission by an Amateur Radio station that is, or is on, an earth satellite. An earth satellite is a body that revolves around (or with, in the case of geostationary satellites) the planet earth. A satellite's motion is determined by the force of the earth's gravity (97.403[a]).

Q. How about earth operation?

A. This type of operation is much more downto-earth! It is earth-to-space transmission by an amateur station of communications intended to be retransmitted space-to-earth by an amateur station in space operation (an OSCAR satellite, for example). Earth operation is a fancy term for "working the bird" (97.403[b]).

Q. What is telecommand operation?

A. Telecommand operation is earth-to-space transmissions of control commands intended to turn on, change or turn off the functions of a satellite transponder (station in space operation) (97.403[c]). Just as any amateur station must be controlled properly, so too must an amateur station in space be told what to do so that it operates within the rules. Control of a station in space operation is called telecommand operation.

A station in telecommand operation may transmit one-way control messages to a station in space operation using special codes intended to obscure the meaning of the messages (97.421[a]). This special provision aids satellite owners and telecommand operators in guarding against unauthorized tampering and sabotage. An improper command could result in the destruction of a satellite!

Stations in telecommand operation are exempt from the station i-d rules. They don't have to be identified (97.421[b]).

Q. Are there any frequency limitations for ASAT operation?

A. Yes. First, of course, you're limited to operation on frequencies prescribed by the class of your license. Furthermore, ASAT operation is restricted to the following bands: 7000-7100 kHz, 14,000-14,250 21.00-21.45 MHz, 28.00-29.7 MHz, 144-146 MHz, 435-438 MHz and 24.00-24.05 GHz. These ASAT subbands apply to all space, earth and telecommand operation. [Note: ASAT stations must not interfere with other stations operating in other services between 435 and 438 MHz (97.415)]. Additionally, once the WARC-79 agreements have been ratified by the Senate, FCC will look toward implementing new ASAT frequencies above 30 MHz allocated to amateurs by the ITU.

Q. How does OSCAR operate in space?

A. The transponder aboard an OSCAR is an Amateur Radio station in space operation. Accordingly, it may transmit from anywhere beyond the major portion of the earth's atmosphere for sending telemetry, retransmitting signals of stations in earth operation live or delayed, and retransmitting communications of other stations in space operation live or delayed (97.417).

Stations in space operation are exempt from station i-d, log and control operator requirements (97.417) — but the FCC must be notified formally of pre-space, space and post-space operation with detailed information (97.423).

In addition, a sufficient number of telecommand stations must be in place to turn off the space station if the FCC says so (97.413). This is a very important provision in that, if the ITU says a satellite is causing interference, the FCC can quickly stop the satellite from transmitting by ordering the owner and/or the telecommand operator to effect termination. The FCC has an obligation to the international satellite com-

munications community, and the ASAT rules help it meet this obligation.

Q. What do the notification requirements in-

A. The licensee of every station in space operation must notify the FCC in writing of such operation as noted above. The FCC must be notified prior to space operation of (1) the expected date that space operations will start, along with a prediction of the duration of the operation; (2) the name of the satellite (OSCAR, for example); (3) the service area that will be covered by the satellite; (4) the orbital parameters (where in space the satellite will travel); and (5) the technical parameters (frequencies, emissions, powers and so forth) (97.423). This information serves to assist the FCC in coordinating space activities with its international counterparts.

Q. Are other notifications required?

A. Yes, An *in-space* notification is required after space operation is initiated to update the information contained in the *pre-space* notification. (97.423[c]). And, a *post-space* notification is required no later than three months after termination is complete; 24 hours if the termination is ordered by the Commission (97.423[d]).

Q. What are telemetry messages?

A. Telemetry messages are space-to-earth transmissions from a station in space operation that contain technical information about the condition of the satellite and the station. The measurements transmitted must be restricted to those of an electrical and mechanical nature (97.403[d]).

Telemetry messages may be encoded to simplify their transmission and reception (97.419[a]). Information often transmitted includes satellite temperature, solar cell current, battery temperature and voltage, and other parameters that describe the electrical and mechanical condition of the space vehicle and station.

Q. Who is eligible to be the licensee of a station in space operation?

A. Extra Class licensees only are eligible to place their stations in space operation. However, the licensee may permit any Amateur Radio operator to be the control operator, subject to the privileges of the control operator's license class (97.407).

Any amateur station may conduct earth operation, subject to the limitations of the control operator's license class (97.409).

Any amateur station designated by a space station licensee may conduct telecommand operation with the station in space operation, subject to the limitations of the control operator's license class privileges (97.411).

[Note: Questions appearing in this column are typical of those frequently asked of the FCC and other agencies. Answers, prepared at ARRL, have been reviewed by the FCC's Personal Radio Branch for agreement with current FCC interpretations and policy. Numbers in parentheses refer to specific sections of the FCC rules.]



Computers and Contests

Dick Sanders, K5QY, wrote the following piece describing contest operating with a computer doing the paperwork. He provides some guidance to others who want to write their own logging and duping programs.

In the future, "On Line" will present program routines that can be used within such programs. If you have any tips to offer logging and duping program writers, send them to WAILOU, and I will pass them on to everyone who tunes in here.

All contests require that duplications be removed from the log. During my early contesting days, I didn't maintain a dupe sheet while operating; I waited until after the contest to dupe the logs. As my scores improved, the duping became more burdensome. I finally gave in and began duping as I contested. This required extra effort during the contest, but afterward all I had to do was total my score.

It seemed I could operate faster if I duped later; if I could only alleviate the pain of postcontest duping. My solution was to use a computer after the contest. Now, I could scream like crazy during the contest and coast through the duping afterwards.

In the past, manual duping was easy, especially during a contest like Sweepstakes when all of the prefixes were either W, K, WA or WB, plus one through zero. Now, with the new call signs, manual duping requires more concentration and more complex dupe sheets. But, those new call sign combinations don't make any difference to a computer; it can search and report a dupe nearly instantly. In addition to a visual indication, it can give an audible indication - a beep - and provide a legible printout of the check sheet.

On Line During Contest

So far, I've discussed the computer as a postcontest duper. The real challenge is computer duping during the contest. Two approaches can be taken: a program that only dupes, or a program that dupes and logs. For a DX contest, I use the Apple II Six-band Contest Program written by Dave Medley, WB5YXA (6621 Duffield Dr., Dallas, TX 75248), which permits me to enter the calls into the computer for duping as I work the contest and log the exchange by hand. When the contest is over, the computer prints my check sheet, and I total the score. This method is not particularly competitive, but it certainly makes contesting more

The Apple II Sweepstakes Contest Program written by Johnny Graham, WB5TRY (2014 Bamboo, Mesquite, TX 75150), both dupes

and logs. To dupe and log while on the air, you need a computer that does not radiate rf and is not susceptible to the station's transmissions. The program you use should frequently write data to disk to prevent loss of data during a power interrupt. The program language should be efficient so that the duping is quick. BASIC is too slow. Machine language routines are a must. The computer itself must have enough random-access memory (RAM) and disk storage for an entire contest. Also, when operating, be sure to place the computer in the most comfortable operating position possible; operator fatigue comes very fast when contesting, especially when you are doing a lot of typing.

Versatile Cursor

A typical CRT display for a Sweepstakes contest program is shown in Fig. 1. The duping/logging program first dupes the call sign. If the call sign is not a dupe, the program displays the time and a sequential number. The cursor moves to the third block, which is the other station's sequential number. After entering his number, the cursor moves to the precedence block. Enter either A or B; other-

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Fig. 1 — Video display of Sweepstakes logging and duping program clearly presents all of the data for the current contact, as well as

wise the computer will beep at you. The cursor then moves to the call sign block so you can correct the call if necessary. The next move is to the check block, and then the section block.

Before permanently entering a contact into memory, you may back up one character or one block, or start over. With the ability to move the cursor rapidly, editing is quick and easy. If everything is correct, you may log the exchange permanently. If you corrected the call sign, the computer performs a second dupe.

Additional program features include: a data write to disk after every third contact, dupe search routines written in machine language, the ability to hold at least 1950 entries using an Apple II Plus with 48k of RAM and a single disk drive, and automatic logging of the time of day of each contact. Best of all, after the contest, the printer provides a clean and legible log that includes the date, time, band, number and complete exchange. Scoring is easier because you can read the data very clearly. I completed my summary sheet for the 1981 Sweepstakes in 40 minutes.

Can a computerized station compete with top contest stations? Absolutely, However, the computerized station must have competitive radio equipment. It isn't sensible to expect a medium-equipped computerized sation to butt heads with the top contest stations. But if the equipment and operator experience are similar. the computerized station should be extremely

The 1981 Sweepstakes taught me a great deal; it took nearly the entire contest to become proficient at keying in the data. The gain, however, is analogous to a cw operator using a typewriter; he can record data more quickly than an operator using a pencil. The same applies to logging. However, a learning curve must be experienced before the computer reduces logging time. Once the computerized contester masters the knack of keying in data, the result is a more competitive contesting system; the computer, under the control of a good program, never slows down. - Dick Sanders, K5OY

UNIVERSAL PROGRAM EXCHANGE

Last September, shortwave listeners tuning to the weekly Media Network program broadcast from Radio Netherlands (RN) were able to record a computer program off the air for loading into a personal computer. The program was transmitted in three formats for compatibility with the cassette interfaces of three popular computers. The experiment was con-tinued in January, when a second program was transmitted.

Among the listeners who successfully recorded the programs, 76% lived within one hop of RN's three transmitters (located in the Netherlands, Madagascar and the Netherland Antilles). Successful copy did not depend on signal strength, but rather on how many times the signal was reflected by the ionosphere.

Simply, the ionosphere acts like a mirror reflecting

signals sent from the ground. If a portion of the signal

is reflected by the bottom of the ionosphere while another portion is reflected by the middle of the ionosphere, the two parts of the signal may arrive out of phase at the receiving antenna. This destroys the digital information being received, and many computers, upon detecting an error, will abort their loading cycle and refuse to read any more data. Since 1979, Hobbyscoop (pronounced

scope"), a program broadcast on the Dutch domestic service, has been transmitting computer programs in machine-readable form on medium wave and vhf. Because digital information is of no interest to noncomputer listeners, a system was sought to reduce the time to transmit the programs.
In late 1981, the *Hobbyscoop* BASIC-Code (HBC)

was developed. The user first loads a translation program, Esperanto, into his computer, and then he can compile programs in HBC. The translation program is different for each computer, but, once loaded, it makes all computers compatible in that they can all load and use the same HBC program. Instead of broadcasting programs in different digital formats for different computer models, one broadcast in HBC is usable with 13 different computers that have their own versions of Esperanto

HBC is designed so that the computer will read the entire program without aborting, should it fail to read a portion of the data being fed in. Usually, the error will result in the printing of an incorrect character in the program listing, which can be fixed by the user. The frequencies of the tones used are ideal for shortwave, thus making HBC a good candidate for RN's shortwave experiments,

RN plans new on-the-air experiments that include the use of HBC. If you are interested in the experi-ment, tune to RN's Media Network Program, which is broadcast Thursday evenings (Fridays UTC at 0250 and 0550). As this is written, the frequencies for RN's North American broadcasts are 6.165, 9,590 and 9.715 MHz. If these don't work, tune around; RN's transmissions out of Bonaire are very loud very

YL News and Views

SANDRA's Joan

The San Diego Radio Association (SANDRA) is fortunate to list Joan Samuels, KM6S, as one of its members. When their newsletter, Squelch Tales, is put together, Joan is always on hand to assist with the last minute gathering and mailing of its pages. Anyone who has ever edited a newsletter knows the importance of this. Joan's involvement in Amateur Radio, however, far exceeds her time spent in this regard.

Joan has been a radio amateur for a comparatively short time. It was hearing cw and wishing that she knew what was being said that first attracted her attention. The more she heard, the more interested she became. First licensed as WD6EGR, her immediate goal became passing the General class license. Any old-timer will tell you that the secret to proficiency as a ew operator is to stay away from the phone bands for at least a year. Joan spent a year and a half using cw exclusively. This valuable experience allowed her to consider and pass the Advanced and Extra Class exams. She demonstrated her code proficiency by receiving the Department of Defense Certificate of Merit for the past two years. This involves solid copy of a 10-minute message sent at 25 words per minute.

More Than Having a Good Time

When all exams were behind her, Joan purchased her first 2-meter rig. It was on this band that she first discovered the Amateur Radio Emergency Service (ARES), which has become a big part of her life. For the first time since



Mary McCarthy, WA8WZF, of Ludington, Michigan, was the recipient of the Michigan Amateur Radio Operator Lady of the Year Award at the recent ARRL convention held in Muskegon, Michigan. Jim Seeley,

*Country Club Dr., Monson, MA 01057



Mary McCarthy, WA8WZF



Joan Samuels, KM6S (San Diego Union/Tribune photo)

becoming an amateur. Joan felt that she was doing something useful with her license rather than just having a good time. Among her ARES assignments is support of the Californian Department of Forestry's Red Flag Patrol through its Volunteers in Prevention program. The patrol is activated when weather conditions produce extremely high fire hazards. It operates in fire-prone areas to act as a deterrent to arsonists, to report hazardous conditions and to report fires in their early stages. During the rainy season, Joan assists the city of San Diego by patrolling flood-prone areas and working with the Flood Information Center. As a member of the city's Emergency Management Volunteers (Civil Defense), she attends training classes and participates in their drills. She takes part in simulated mass-casualty drills, working in conjunction with the city's Emergency Medical Plan.

Call Joan, KM6S

Her service to others does not stop there. Any question asked locally about Novice training or upgrading is most often answered with "Call Joan, KM6S." Joan instructs Novice classes for the Convair Amateur Radio Club, which she also serves as President, and is now teaching her sixth class. She shares in technical instruction, and shoulders the whole load for code practice. She specializes in assistance to those handicapped persons who are aspiring to become hams. She assists as a communicator for officials who conduct the Special Olympics. This event tests the mettle and challenges the abilities of the handicapped.

Who managed the successful banquet at the 1982 ARRL Southwestern Division convention held in San Diego? Who serves as representative to the San Diego Amateur Council (SANDARC), a council of 14 Amateur Radio clubs in San Diego County? In both cases, the answer is Joan.

Joan and her OM, Jack, KM6R, live in San Diego. Readers can find her most often rag chewing on 20-meter ew, usually late in the evening. She has earned WAS (cw) and WAC (cw), and admits that if she'd quit rag chewing (her first award), she could earn DXCC. Her feeling regarding Amateur Radio since becoming licensed is: "How could we ever get along without it?" SANDRA is fortunate to have her as a member. Joan is an asset to the entire amateur community.

WB8MTD, Section Communications Manager, made the presentation.

Mary has been active in ham radio for the past 15 years. Her activities are mainly assisting with messages from and to service personnel throughout the world. She has served as Emergency Coordinator for Mason and Lake Counties, and has served as president of her local radio club. Active with the Navy-Marine Corps Military Affiliate Radio System (MARS) for the past 14 years, she has held the positions of Emergency Communications Coordinator, and Training Officer for Michigan. She has served as Region Emergency Communications Coordinator for the Fourth Naval Region, consisting of 13 states, and, at present, is the Region Training Officer, Training Officers from 12 states are under her leadership. As Regional Training Officer, it is her responsibility to prepare Training Manuals and material for all new members in the Navy MARS program. She provides Instructor's Manuals for State Training Officers as well. These instructions provide training for correct operating procedures for voice, Morse code and radioteletype on the Military circuits, and instructions on message handling and net

Mary is Assistant Manager and Treasurer for the Michigan Amateur Communications System (MACS), and has served as editor of the newsletter for MACS for the past 15 years. She is Certificate Custodian for the Auto State Young Ladies (TASYL) and a member of YLISSB. She holds numerous BPL Awards, the BPL Medallion, several Operator of the Month Awards and the Meritorious Award, issued by the Chief of the Navy-Marine Corps MARS, Washington, DC.

SENIOR CITIZEN NOVICE AT AGE 81

Someone once said that you can't teach an old dog new tricks, but Marie Garrison, now KA50IZ, of McAllen, Texas, put the lie to that old saw. At age 81, this young-at-heart ham earned her Novice license. Diligence, patience and the help of two dedicated instructors were responsible for this achievement. Whether or not this sets a new record is perhaps open to question, but it would be of interest to have this claim challenged.

It all came about when, during a visit to her daughter last Christmas, Marie expressed an interest in her son-in-law's ham equipment. She listened to some of his ARRL code practice tapes and started to use his key and oscillator.

Upon her return to McAllen, she got in touch with Lee Brandom, KASHBS, and attended his code classes. John Toppe, WBSOYT, was the group's theory instructor. They revived an interest that had lain dormant in Marie since the early 1900s when she used to wind her own coils for making crystal sets. Now she and her son-in-law keep in touch by radio instead of telephone. — Sandy Franzblau, M.D., KA9BBV, and Marie's son-in-law.



Left to right are John Toppe, WB5OYT; Marie Garrison, KA5OIZ; and Lee Brandom, KA5HBS

How's DX?

DXCC Revisited — to date!

Playing "catch up" with history has proven to be an intriguing adventure, following the ebb and flow of DXCC itself post-WW II, and through the end of the last calendar year. With this issue we hope to become reasonably current and keep our records thusly so on an annual basis. But now, back to our historical overview, picking up with our country's 200th anniversary year, 1976.

1976: Communications Manager W1NJM wrote a very readable February Operating News lead titled "Countries" Criteria and How Applied" - one of the best pieces of the time dealing with the process of handling DXCC items at Hg. April noted the adopted DXAC recommendation eliminating the "no crossmode requirement" for 5BDXCC. Our May journal dropped what proved to be a rather long-lasting bonbshell on the DX fraternity, adding Okino Torishima to the DXCC List. Even though it did not "quite" meet the specified mileage, an exception was made for it as part of the year-long celebration of the Japan Amateur Radio League's 50th anniversary. The superbly managed DXpedition of 7J1RL commenced May 30 that year, and would "stay on the books" until December I, 1980, when JDI/7J1 became deleted. (Contacts after that date became creditable toward Ogasawara, JD1.) The burgeoning CW DXCC Award led to a CW Honor Roll, as announced in May. In the fall, the new "Top Band" DXCC and RTTY DXCC awards were inaugurated as 100-country-only awards. In November, we note the announcement deleting Portuguese Timor, CR8, which became the 27th province of the Republic of Indonesia. Other notes in the November issue clarified topics the DX Advisory Committee had been studying: The Finnish and Swedish Sovereignty Islets would not be added to the list; nor would any of the Israeli-occupied areas in Jordan, Syria or the Sinai. The Pribilofs would not be returned to the list. The DXAC also recommended that no further additions be made to the list under Rule One (government) until the DXAC conducted a survey. At year-end, use of ARRL DX Competition Logs for DXCC credits became a relic of the past; the cost of the procedure became an impossible burden, Thus, effective January 1, ARRL DX Competition logs were no longer utilized in lieu of QSLs for credits. At the end of our country's bicentennial year, W1CW relinquished the DXCC helm after furnishing steady direction and fair rules application for 24 years. Bob would soon get the brand-new ARRL Outgoing

QSL Bureau off to a fine start.

1977: A New Year's present to our peripatetic DXers appeared in January, changing DXCC Rule 9 to permit accumulation of credits when you changed location within your country - the new "countrywide" Rule 9. In April, note was made of the new Satellite DXCC (a non-endorsable award) and that the Pelagic Islands should not be given special consideration for country status. Additionally, the DXAC's recommendations were that any country not meeting Rule 4 should be deleted (unadministered areas). Details on the implementation of the new Rule 9 appeared in September - heralding renewed interest in DXCC in card collecting. What with new calls appearing right and left it was necessary to spell out details on new certificates, etc. -resolved in the December issue. At about this time a favorite topic of discussion on the air when hearing a new one-by-two call (for example), was, "Who did you used to be?" The July 1977 masthead reveals W3AZD at the DXCC desk, following an interim term by WA1VCG.

1978: The year started off with the deletion of Geyser Reef, in accordance with the new Rule 4 (unadministered areas are not eligible for consideration as a separate entity). At that point in time, the ARRL DXCC List total was 363 - 318 current and 45 deleted. In midsummer, Spain relinquished control of Rio de Oro, which was absorbed by Morocco and Mauritania, effectively deleting it (the country count then became 317 current, 46 deleted). In October, announcement was made of two new additions: 4UIUN, United Nations Hg. in New York (for contacts made on or after February 4, 1978); and Southern Sudan, STØ, on or after May 7, 1972. The grand total had now shifted to 365 - 319 current, 46 deleted. Perhaps one of the biggest happenings in the year, though, took place in March of 1978 when Rod Newkirk, W9BRD, relinquished writing How's DX? - after an incomparable 30-year period of reportorial excellence. For a brief period the column would be handled by WIVV.

1979: As announced in August, the island of Desecheo was accepted for country status. The action preceded the changes in DXCC rules concerning separate administrations and entities. Some housekeeping notes appeared, further indicating the expanding workload at the DXCC desk by noting that the Honor Roll would be listed just once a year. New application forms for DXCC were developed, permitting the applicant to help out with

the initial paperwork.

1980: The country status of what was known formerly as the Gilbert and Ocean Islands (VR1), British Phoenix Islands (VR1) and the Line Islands (VR3) was unchanged, although both governmental and prefix changes occurred. By a majority vote of the DX Advisory Committee, adopted by the ARRL Communications Manager, Gilbert and Ocean would now appear as W. Kiribati (T3K), British Phoenix as Central Kiribati (T3P), and the Line Islands as E. Kiribati (T3L); this was announced in the February issue. A satellite award rule modification was noted in the June issue, what with both AMSAT and the DXAC recommending modification in the DXCC Satellite award for Phase III satellite contacts: the adjustment made would not allow Phase III contacts for the award, since the DXCC is available only for contacts made through polar-sun synchronous satellites of altitudes less than 1500 miles. As noted in the 1976 recap, September '80 affirmed the deletion of Okino Torishima as a separate "country." That issue also noted the rejection of country status for all the South African "homelands" (Transkei, Boputhatswana and Venda.) The DXAC again rejected granting contact credit to a participant of a DXpedition for that expedition when an actual contact had not taken place. (Some "have your cake and eat it too" philosophy must have entered into a request for that onel)

1981: In February we see that, in response to considerable membership input regarding "forced donations" for QSLs, and upon unanimous recommendation of the DXAC, Rule 12 (Operating Ethics) was modified to note that "operating" includes confirmation procedures. A lively issue surfaced in the August issue with some language anent the intent/spirit of the single-mode awards being that contacts be two-way. There was considerable debate on both sides of this issue, leading to a Board Minute in September (covered in the November issue) prohibiting mixed-mode contacts for the CW, Phone and RTTY DXCC awards. The windup issue of 1981 made some changes in the 5-Band plaque in that all qualifiers after July 1, 1982 would be charged \$20 for the plaque, but all who earned the award would receive a handsome certificate without charge.

And that's the way it was, DXCC post-WW II (January 1946) through the December 1981 issue of QST, reflecting our absorbing hobby and an ever-changing world.

THE CIRCUIT

☐ 5W1: Four W6 ops will be there for the CQWW cw; W7CB, W6OUL, WA6OET and K6JG for 10-80 meter operations +25 kHz — possible 160-meter operation. At this writing, the group was attempting to snag a 5W7 prefix. All cards via W6OUL plus a

*19620 SW 234 St., Homestead, FL 33031

pronto request for cw/ssb sked before the test via W6OUL.

T) Oct. 16-17: DXPO 82 will be held at the Marriott Hotel in Gaithersburg, Maryland, with confirmed speakers including N4XX, N2OO, W8LRL, W3AZD, K5VT, W4BPD and your scribe — additional speakers pending. Full information available from Henry Herman, W3UJ, at 11803 Enid Dr., Potomac, MD 20854. C) Conditions: W1HDQ, who furnishes the timely propagation info via W1AW, notes that there is some evidence from past solar cycles that flares (and parevidence flares)

ticularly the disturbed magnetic field conditions that they produce) are more frequent in the years after the peak of the solar cycle. Ed notes that it certainly has been this way in Cycle 21, and especially so during July. The WWV K Indices (readings of geomagnetic activity taken at Boulder) averaged higher in July than in any month in the nearly 20 years of his daily record keeping. There was also one of the highest peaks in his record on July 14, with WWV inaudible most of the day. Most logbooks reveal slim pickings with frequent peering out of windows to ascertain if the antenna was

still up! W1HDQ's crystal ball act leads him to expect solar activity high enough to provide at least a few shots of 6-meter DX in late October and through most of November. For the rest of us low-frequency types, conditions may be somewhat better than the past couple of years during the fall months. W1HDQ hits the southerly latitudes during winter months, and is a most charismatic speaker - club program chairmen take note!

○ KV4AA, the venerable Dick Spenceley (ex-K4AAN) pre-WW III, passed to the land of Silent Keys the end of July — having established numerous milestones in his ham radio life. Dick's activity and operating exper-

tise may never again be duplicated.

1.1 W5GO, ex-W5BRR, etc., passed away on June 17.
George DelaMatryr of Beaumont, Texas, was a leading DXer as well as a great supporter of Amateur Radio, contributing his help and encouragement to countless other amateurs. He contributed outstanding service during WW II at NSS in Washington and, later, in the Pacific, he supervised and participated in the construction of the U.S. Naval radio station and antennas following the retaking of Guam. In civilian life, he had a 42-year career as an engineer for Gulf States Utilities Company, W5GO's call in the DX and contest pileups will be deeply missed by his many

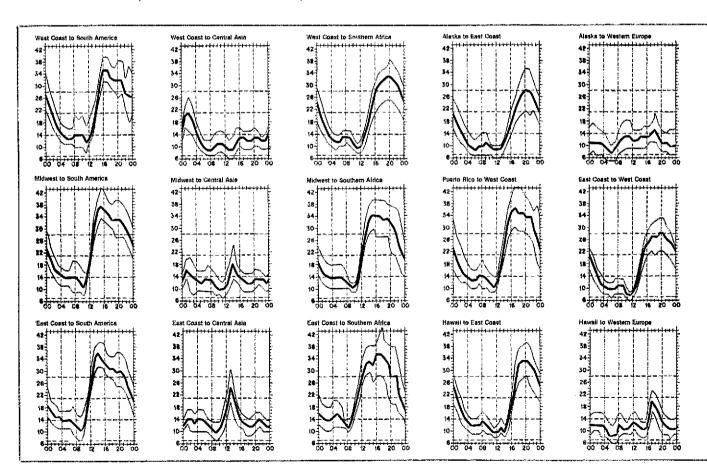
☐ 5Y4ITU will operate at the ITU Conference commemorating the Plenipotentiary Conference of the ITU, to be held in Nairobi from September 28 to November 5. The Radio Society of Kenya (RSK) plans to set up and operate a special event station in the Jomo Kenyatta Conference Centre, Nairobi, First-day covers that will be issued by the Kenya Posts and Telecommunications Corporation to commemorate this event, will be sent to the first 50 stations making a QSO with 5Y41TU.

The O'Briens, W6GO and K6HHD, will leave for Tahiti on October 21, spending three days at Bora Bora and the remainder at Moorea. Jay, FOØOJ, will make a major effort in the CQWW phone; before and after concentrating on ew Jan. FOØJO, will be most active on ssb. QSL to their home calls.

13 J28 Award: the Amateur Radio Association of Dilbouti amounces the A.R.A.D. award for contacts made after June 27, 1977. All contacts with J28 stations are valid, as well as the special call J27RDD and



International Friendship was the theme of the 9th YLRL International Convention held in June in Washington, DC. Other information likely will appear in the YL News and Views section of QST, but this column editor got first dibs on photos of some of the visiting DX gals: Clockwise from lower left: DJ1TE, VE7BIP, VU2UGI, PA3ABR, G3HCQ, JG3FAR/JG3SQN, Somehow SMØHNV and VP9IX escaped W1YL's camera!



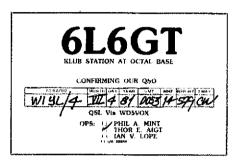
When are the bands open? These charts predict this month's average propagation conditions for high-frequency circuits between the U.S. and various overseas points. One chart for East Coast to West Coast is also included. On 10 percent of the days of the month, the highest frequency propagated will be at least as high as the uppermost curve (highest possible frequency, or hpf). On 50 percent of the days of the month, it will be at least as high as the middle curve (maximum usable frequency, or muf). On 90 percent of the days of the month, it will be at least as high as the

the DXpedition call J28A-J20Z-J20D. Also valid are provisional calls J20—. The first class award is earned provisional calls J20—. The first class award is earned with 8 contacts — all modes but 2 bands minimum, second class 15 contacts — all modes, two bands minimum and 5 contacts on cw. The same station may be worked on several bands, To apply send a list of the contacts, photocopies of the cards and 8 IRCs to Awards Mgr. J28DM, Box 1076, Dibjouti, Djibouti Parphilic Ent. A free Republic, East Africa.

The venerable RSGB DX News Sheet editor, Geoff Watts, is unable to continue as DXNS Editor as a result of serious family health conditions. All loyal devotees of Geoff's consistently fine reporting wish him and his wife only the best in the months and years

ahead.

[] The first 10-meter beacon in Brazil, located in Americana City, about 80 miles from Sao Paulo City, has been operational since mid-May. The beacon, whose call is PY2AMI, exhibits the following characteristics: 10 watts, 28.399 MHz; the code is



August QST, with tongue-in-cheek, made note of a 6L6 as one of the myriad of confusing number-letter-number combinations that abound today. Much to your editor's surprise, however, the above was received in mid-August from a source choosing to remain anonymous.

PROM-based and repeated each 20 seconds. The system was designed and assembled by PY2VRX and PY2FUZ, who welcome comments directed to the PY2AMI Beacon Project, Box 31, 13470 Americana,

Sao Paulo, Brazil.

The CS5SRL call you may have run across in early August denoted a senior scouts camping event in Lisbon. Cards should go via Carlos Moreira, Box 2763, 1119 Lisboa Codex, Portugal. 2763, 1119 Lisboa Codex, Portugal.

QSL Corner

Administered by Joan Becker, KA1IFO

Here is some information for those of you who would like to QSL direct to the station location. It is passed along as we receive it and, therefore, may not be accurate. The call sign in parentheses is the QSL

manager. AM3AOS (EA3BNX) A35WM (DJ1WM) C31HD (F6BII) C53CC (WA4VDE) DK2GZ/5Z4 (DK2GZ) DK3GI/HKI (DL2MY) EL2AG (WA4VDE) FB8XY P.O.B. 8, 72420 Vass, France FM7CF (WB3AKI) HRIJSH (WB6WOD)
JWSVAA (LA7JO)
OX3GH (WA2TTI)
OX3FT (WA2TTI)
TA2KS (G3SCP)
VP2MO (KA4BOT) XPIAB (1982 only) (WA2TTI) ZK2KH (DJ9KH) ZK2WM (DJ1WM) 3D2DX (SM3CXS) 5Z4CL (W5BCB) Z4CM (W5BCB) 9M8WP (G4DXC)

OSL MANAGER VOLUNTEERS

KA2GMT KC9JT K8LEN WIIVG

SPECIAL NOTES

The Montserrat Amateur Radio Society does not have a QSL bureau. Anyone wanting their cards should send their requests to The Monserrat Amateur Radio Society, P.O. Box 448, Plymouth, Montserrat, West Indies (Leewards), with arrangements they wish to make as to required amounts of postage fees and addresses to send them to.

The stations listed here have operated from Mont-

serrat in past years. This is just a partial list. VP2MAI, VP2MAJ, VP2MAK, VP2MAP, VP2MBA, VP2MDB, VP2MAY, VP2MCW. VP2MBU, VP2MCK, VP2MDG, VP2MFM. VP2MDK, VP2MFW. VP2MEV. VP2MFL. VP2MGO. VP2MGS. VP2MH. VP2MGT. VP2MJW VP2MKV VP2ML. VP2MMP. VP2MMR. VP2MNQ VP2MP, VP2MPB, VP2MPV, VP2MSG, VP2MSW.

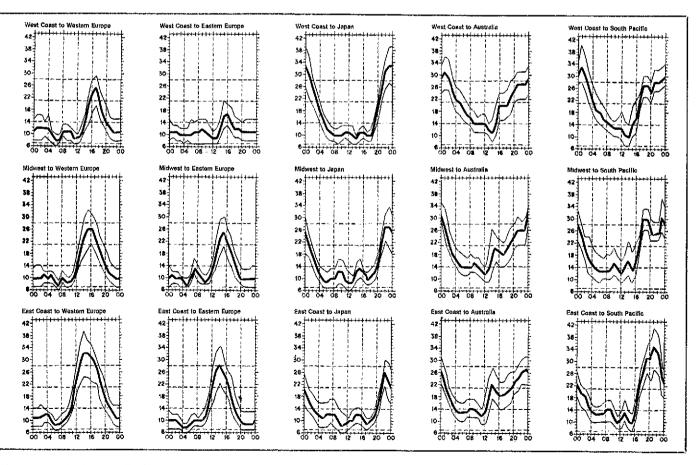
© Effective immediately, new address for the 8R QSL Bureau: Syd. C. H. D'Ornellas, 8RIB, 110 Barrack St., Georgetown, Guyana, South America.

E AD1B says he is not the manager for TA2BM, and he is becoming increasingly concerned about the number of blank pasteboards sent to him by stations who think he is that QSL manager. We quite agree with Tom that there is never any reason to send a blank QSL. — WIYL

blank QSL.—WILL

VO9WB cards will be handled by WD9GIG until feb. 28, 1983. DX stations wanting a card should enclose a self-addressed envelope and two IRCs; stateside stations should forward an s.a.s.e.

September 1982 QSL Corner, page 65, contains information on using the ARRL Overseas Membership QSL Service. June 1982 QSL Corner, page 73, contains information and addresses for the Incoming Bureaus. For information on bureau operations (In-Bureaus, For information on our car operation coming and Outgoing), send a self-addressed, stamped envelope to ARRI. QSL Bureau, 225 Main St., New-instan CT 06111.



lowest curve (optimum traffic frequency, or fot). See January 1977 QST, page 58, September 1977 QST, page 35 and January 1979 QST, page 11 for a complete explanation. The horizontal axis shows Coordinated Universal Time (UTC); the vertical axis, frequency in MHz. Data are provided by the institute for Telecommunication Sciences, Boulder, Colorado. These predictions, for October 15 to November 15, 1982, assume a sunspot number of 89, which corresponds to a 2800-MHz solar flux of 138.

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 June 1 through June 30, 1982. An s.a.s.e. will bring you the full rules for participation in the DXCC, the DXCC list and application forms.

New Members

New Members								
Mixed DJ@QE/112 DJ@UJ/318 DK3KD/301 DL4FW/131 D68AM/105 EA1NZ/161 EA9AM/107 G3BFR/112 GM4KGJ/111 HB9BWE/108 HB9CCL/155 HB9CID/101 HB9CIR/111 12VUJ/107 12ZCE/103 I4JBJ/274 Radiotelephone	HC2BW/104 12YWR/106 JA 1BZM/106 JH 1BZM/109 JH 1STP/105 JH 1YJH/145 JF2VVO/185 JA3GAK/184 JR3AKG/110 JA6HUG/146 JH6SAK/138 JA7OJW/206 JH7FWA/135 JA9GLT/118 KH6OTL/104 KL7IU/104	KLTY/256 OA4FW/124 OH1AB/102 ON7DB/112 ON7HH/100 OZ7GI/268 PASADR/104 PASADV/104 PABADC/171 PABGSN/108 V2AO/108 VEZC/108 VEZC/108 VEZC/108 VEZC/108 VEZC/108 VEZC/108	Y54ZA/115 YO3LM/204 YO3LM/204 YO3LM/204 YU3TDP/128 YU31A/121 ZP5GLS/150 AE5X/100 K1JKA/103 KA1GDV/102 KA1ZV/100 N1BMV/114 N1BMK/109 AA2A/283 K2EYJ/286 K2LQ/317 K2PA/237	KA2FHA/105 KJ2S/105 KJ2A/106 KJ2AWP/158 KJ2CFN/107 WJ3WFF/108 W20W/102 WA2AWX/105 WA2AWX/105 WA2KZF/104 WB2CFV/106 AD3/283 KA3EAO/102 KA3UBM/105 WB3DTS/105 WB3TS/105 WB3FUE/104 WB3KPS/151	K4VHC/100 KB4HF/167 KD4BI/126 KD4LB/114 KD4RR/139 KD4TF/109 KD4VN/100 N4CHB/103 N4DPU/109 N4EG/179 N4EG/179 N4EG/179 N4EG/179 W4CPZ/324 W4DW/255 WA4LHO/101 W44REF/105	WB4AFP/102 WD4HR0/160 AA5W/107 AI5R/206 KA5CRZ/100 KB5MM/103 KB5MM/100 WB5DAW/122 WD5BIV/104 KGLRN/104 KA6CPL/100 KD6GC/105 KE6JG/103 KS6S/105	KT6T/204 N6AUK/109 N6OF102 N5OF102 N50E/105 W6EFB/107 W6XY/101 WB8HTC/106 K7ET/166 N7BNW/100 WB7UL/1202 KABCAJ/105 KABCAJ/100 N8CKP/105	WBRJL/103 K9GDF/110 K9GDF/110 K9GDF/110 N9US/242 WD9BEU/115 KØDJ/101 KØGFM/109 KAØCPY/205 KAØCPY/205 WØJUN/134 WØPIGI108 WAØUIR/112 WB9BJ/P100 WDØCNR/103
DJ2JL1104 DJ3RP/136 DK3K0/127 DL2KAR/113 EA9AM/107 G3BFR/103 G4CYB/102 G4JQO/111 GM3MQQ/1136 HC2BW/100 I2EOW/106	I4JBJ/274 I0FNB/116 I0JTV/217 I19XTU/202 J73SP0122 JH1YJH/126 JA3GAK/182 JA6HUG/110 JA7OJW/154 KL7Y/252	LA3NO/261 LX1RK/133 OK3YCA/201 ON7DB/103 PA3ADR/104 PA3ALG/107 VE20V/136 VE3BTO/116 VE3GPP/113 YO3LM/184	9M8PW/101 9G5RK/109 AE10/102 KA1CDC/162 W1DFD/105 AAZA/265 K2PA/201 KA2A/W/125 KF2X/236 W2CQR/132	W2EKO/233 WA2AWX/1104 N3CQM/112 AJ4D/100 K4QMU/164 KB4DG/102 KD4B/1118 KD4LB/107 KD4NZ/115 KD4RR/138	KD4UO/103 KS4X/104 N4EGY/118 N4EGY/118 NG4E/210 W4DMV/221 W4LOF/101 WA4JAI/143 WA4REF/105 WA4YED/132	KB5VB/110 KC5WJ/103 N5DIL/103 W6IJE/102 WA5OHJ/235 WB5NSO/104 WD5BEP/102 WB5HXK/101 K6INK/110 KE6JG/102	ND6U/102 W6RRF/100 AK7K/102 KC/CO/101 KC/ET/180 W7GBU/106 KB8XT/103 WD8SDL/103 KC9GL/107 KC9GP/110	N9US/110 KØFKJ/11D KØFKJ/107 KØJRG/107 KØCOZ/101 WØCOZ/101 WØHKL/109 WØJIE/141 WBØYZR/116 WDØCXG/106
CW DF5UT/111 DK3KD/127 DL 6BAQ/109 EA1NZ/142 GM4KGJ/103	JA1NTK/110 JR11NE/204 JA3CMD/118 JA6HUG/108 JA7OJW/133	LA3XI/202 OH2BSA/115 OK3YGA/212 ON4FD/132 OZ7GI/209	VE3JNC/106 K1KOB/101 W1AIQ/110 WB1GOO/101 AA2A/144	W2JWF/101 KA3CRC/130 W3BH/102 W3ZQN/103	K4QMU/128 KA4NXI/102 KC4FX/110 KE4O/109	KW4V/100 W4GLS/110 WD4ENQ/103 AK5B/106	N5CID/199 K6GXO/111 AI8D/103 WB8ENA/104	N9US/222 W9DDX/102 KB#TL/109 N9CNK/100
5BDXCC W2XQ DL8UI K1VHS K2NT JA1MRM JA3CSZ	YU1AM SM5CST K1UO LA3NO ON7EM N6IC	DK5WS G3XTT OZ7GI OK3YCA AD8I	AA4AR IN3DYG K1AR SM3CWE SM7FIG	SMBEOC DL1LD UK5WBG Y22HC OZ9UU	HI8MFP JA1MIN KB8O K9PPY EA9IE	WBILC KE2C W9LNQ IØRIZ K2EYJ	W2LPE LZ2OG W4VQ DJ4PT DL4YAH	JA3MNP N9US G4FAM W6DN K2LS
Endorsements								
Mixed CT4BD/304 DF2HL/274 DF5DP/209 DK2XX/274 DJ2YE/200 DJ3AS/211 DJ4XX/314 DJ8HI/293 DL1DA/300 DL6QW/316 DL6UH/254 DL7MG/301 DL7NS/307 DL8QP/200 EA9IE/281 F2GL/300 F3GL/281 F2GL/300 F3GL/301 F6DYG/273 F8QB/254 FY7AN/308 G3CWW/124 G3S/H/316 G3X/TI/281 G3XX/TI/281 G3XX/TI/281 H89BMR/1167 H89BMR/1167 H89BMR/1167 H89BWZ/191 H89G/251 H89BVZ/191 H89BVZ/191 H89G/251 H89BVZ/191 H89BVZ/191 H89BVZ/191 H89BVZ/191 H89G/251 H89BVZ/191	JA2IIG/260 JA2OZI/204 JH6HPL/308 JR6CWC/3016 JA7COE/215 JH7BDS/262 JA9FAI/271 JA9NLE/278 LA1ND/270 LA4YW/193 LA5U/1/283 LA5U/1/283 COE/Z/268 PTZ/E/265 OZ6ZZ/268 PTZ/E/242 PY6TM/295 SM4EMO/296 SM6CMU/316 SM6HTC/256 SM7BOL/296 SM7BOL/296 SM7BOL/296 SM7BOL/298 VE2QV/277 VE3CWE/274 VE3CWE/	YU7NZRI236 YV5AE/329 ZL4AW/314 ZS13D/168 4Z4AB/228 4Z4AB/314 K1KOB/231 K1VHS/293 K1ZZ310 KA1CDC/163 KA1CDC/163 KA1CDC/163 KA1CBC/163 KA1EI/200 KA1JV/228 W1EWDI/325 W1EWDI/325 W1HEO/284 W11HS/345 W1NH//323 W1OPJ/175 W1PNR/237 W1REDI/315 W1WN/321 W1WF/280 W1HD/200 WB1GOO/212 K2SFA/165 KZTV/304 KB2NU/303 KF2G//227	KG2O/280 N2ATD/287 N2CO/234 N2HS/137 N2RR/280 W2FTY/271 W2GOF/301 W2HN/300 W2K1/253 W2PSU/318 W2PSU/318 W2PSU/318 W2RSO/202 W2TA/310 W3FUE/269 WA2O/52/25 WA2URD/189 K3HBP/250 K3ILI/280 K3ZUF/292 K3ZUF/299 K3LI/260	W3BH/126 W3DO/280 W3EKN/325 W3GL/306 W3KFG/325 W3FN/340 W3SOH/280 WA3GJZ/300	KA4S/311 KB4FQ/290 KB4RV/133 KB4SA/275 KC4FX/250 KC4GFX/250 KC4GF/129 KE4E/290 KG4F/273 KS4Q/150 KS4P/290 N4AH/300 N4AXT/279 N4DSS/172 N4DVW/246 N4HH/305 N4IA/311 N4OL/319 N4TZ/234 N4VZ/311 NAD/280 NA4L/175 NI4Y/230 W4CEB/265 W4DHZ/340 W4FEX/269 W4FL/232 W4FL/232 W4FL/234 W4FL/2369	WA4EAV/202 WA4FVT/295 WA4FVT/295 WA4GBX/318 WB4GNT/292 WB4KSO/201 WB4PPW/185 WD4FK/217 K5EOA/292 K5EOA/292 K5EOA/292 K5EOA/292 K5EOA/292 K5EOA/292 K5EOA/292 K5EOA/292 K5EOA/292 K5EOA/292 K5EJ/200 K75T/126 W5FGO/225 W5JP/280 W5YJP/280 W5YJP/280 W5YJP/280 W5YJP/280 W5YJP/280 W5YJP/280 W5YJP/280 W5YJP/280 K6JR/320 K6JR/326 K6JR/325 K6JR/325 K6JR/325 K6JR/325 K6JR/325 K6JR/325 K6JR/325 K6JR/325 K6JR/325 K6JR/325	N6CR/308 N6F1/252 WSNLG/274 WSD/255 WSOKX/302 WSTEX/264 WSYQ/286 WASTLA/310 WB6RSE/300 AJ7V/290 K7LAY/308 K7LAY/308 K7LAY/308 K7LAY/308 K7LAY/308 K7LAY/308 WATIN/251 W7HRD/251 W7HRD/251 W7HRD/251 W7HRD/308 WATIN/6150 WB/7RU/271 K8EV/2763 K8	WD8KZS/203 K9GX/298 K9KK/220 K9KB/297 K9ZO/300 KC9FS/206 KE9A/280 KE9A/281 W91NO/327 W91NO/327 W91NO/321 K90/311 WH91EBO/320 AB9/X300 AF9Q/219 K9CS/300 W9BS/255 W91DC/300 W9BX/265 W91DC/300 WB9LXM/253 WD9CNQ/137
Radiotelephone CP6EL/259 DF2HL/269 DF2HL/269 DF5DP/207 DJ3AR/187 DJ4XA/290 DJ5LR/290 DJ5LR/294 DJ6LR/294 DJ6LR/294 DJ6LR/294 DJ6LR/297 DJ6R/270 DK9KD/301 DL6GW/277 EA3BOX/151 EA3CO/266 EA5BCX/202 EA7AGO/280 EA7BLD/213 EA7EL/277 EA3BOX/151 EA3CO/286 EA5BCX/202 EA7AGO/280 EA7BLD/213 EA7EL/277 EA3BOX/151 EA3CO/286 EA5BCX/202 EA7AGO/280 EA7BLD/213 EA7EL/277 EA3BOX/151 EA3CO/280 EA7BLD/213 EA7EL/277 EA3BIE/281 G3CCX/128 G3SJH/318	HI8GGL/253 HI8MFP/298 HIAG/306 HIZEF/262 LIWZX/215 HIGGO/225 HIGGO	PY4VX/280 PY6TM/295 SMBCMU/297 SM/7BOL/294 VE2WA/310 VE3KGK/250 VE3KS/200 VK6LK/321 XE1MDX/229 XE10Z/123 XE10Z/123 XE1VY/232 ZL1ARY/324 ZL1SZ/225 ZS1JD/167 4Z4AB/200 K1DFC/303 K1KOB/206 K1VHS/281 K1MS/281 K1MS/281 K1MS/281 W1PN/273 W1NG/318 W1PNR/237 W1YRC/330 WA1LOU/239	WA10UB/165 K2BK/135 K2EYJ/286 K2TV/288 KB2EF/101 KC2JA/224 KG2U/275 KO20/225 N2ADT/126 N2ATM/126 N2ATM/124 W2GDF/297 W2GT/301 W210Z/303 W2PSU/308 WA2PHAI217 WA2VEE/292 K3BY/201 K3E/208 K3SGE/321 K3ZUF/284 W3FZE/94 W3FZE/94	W3JPT/175 W3KJ/277 W3PN/284 WA3KSA/228 AA4K1/292 AA4M/280 K4BYK/270 K4CXY/289 K4DL/1/94 K4LX/151 K4KYJ/178 K4LEF/1/25 K4ANEC/192 K34NEC/192 K34	W4AXR/630 W4CYJ/250 W4HR/286 W4KN/277 W4LEX/251 W4MOY/186 W4OWY/263 W4RX/260 W4WKQ)150 W4EAV/202 WA4FY1/281 WA4HNL/257 WA4PPS/236 WA4QPS/332 WA4QPS/332 WA4QRX/302 WA	K5OR/310 KA5ELC/158 KB5EK/20D KB5EK/120D KC5KL/150 N5AWS/264 W5AL/279 W5AC/318 W5GVP/255 W5LL/251 W5MUG/294 W5TK/280 W5VJP/270 W5YH/261 W5VJP/270 W5YH/261 WA5REU/305 AA6BA/305 AA6BA/305 AA6BA/305 K6GM/234 K6PU/319 KA6V/230 K6GM/234 K76T/203 N6AUU/134 N6BAK/225	N6BFQ/290 N6CR/305 N86F/250 W6JD/179 W6JQ/1/179 W6JQ/1/316 W6NLG/271 W6JY/316 W4GQE/1/307 WB6RSE/232 WD6GFF/127 AJ7V/239 K6F/DY/239 K8F/DY/239 K8F/DY/239 K8F/DY/239 K8F/DY/239 K8F/DY/239 K8F/DY/239 K8F/DY/235 W7/W7/295 W7/W7/295 W7/W7/295 W7/W7/255 K8E/V1/56 K8E/V1/56 K8E/V1/56 K8E/V1/56 K8E/V1/56 K8E/V1/56 K8E/V1/56 K8E/V1/56 K8E/V1/56 K8E/V1/56 K8E/V1/56 K8E/V1/56 K8E/V1/56 K8E/V1/56 K8E/V1/56 K8E/V1/56 K8E/V1/56 K8E/V1/56	K8ZZU/251 KB8GO/161 KB8IO/200 WB0BA/280 WB8ZE7/396 WB8ZE7/396 WD81DE/201 WD81PI/262 WD81ML/395 K9GX/294 K9KK/218 N9GHN/152 W9ITT/217 W9LW/252 W9ZTD/306 W9SED/377 WD9ADB/288 K0FL/300 KN0L/161 N9GM/280 K0FL/301 K0FL/301 KN0L/161 N9GM/280 K0FL/301 KN0L/161 N9GM/280 W0CD/314 W0BX/137

cw DF2HL/173 DL1ES/232 DJ4XA/260 D.(5DA/22) DJ5DA/227 DJ5JH/236 F6DCQ/280 G3XTT/181 GM3YTS/230 HB9ALO/270 JA1AAT/125 JA1BN/275

JA1MCU/294 JH1FS/281 JJ1DWT/156 JA2IIG/151 JA3GM/277 JA7JT/199 JA9FAI/227 LA1ND/176 LA4YW/139 UA5HE/236 OH2VD/174

OZ1EOE/183 OZ6ZZ/221 PAØLOU/235 PY2DRF/221 SM5DQC/229 SM6CMU/265 SM6EOC/196 SM6HTC/216 VE2CU/148 VE3CWE/155

K1VKO/186 KA1CB/196 KA1DOS/179 W1AB/2/20 W1FZ/285 W1RED/147 W1WA/202 K2TV/217 W2FP/296 W2FT/207 WA2ORX/263

KA3R/200 W3EVW/286 W3GL/207 W3PN/206 K3IE/270 WA3GJZ/184 AA4K1/281 AA4W/271 K4CXY/249 K4JC/279 K4KUZ/250

K40AH/255 KB4JS/178 KE4E/227 KE4E/227 KE4I/298 KG4F/177 N4BPP/270 N4TZ/189 N4VZ/264 NA4J/154 NI4Y/139 NN4B/125 W4KN/272 W4MOY/159 WA4FYT/134 K5AS/273 K5EOA/252 K5OR/272 K5UR/300 W5AL/225 W5AO/136 W5UR/278 W5YH/189

AD6D/236 K6JG/287 W6BJH/225 W6JD/259 W6JI/270 W6OKX/252 W6TEX/185 W6UY/266 W6YQ/40 WB6RSE/296 K7LAY/131

WA70BH/125 WA7VZI/17! KC8JH/175 W8FN/133 W8UVZ/289 W8UVZ)289 K9AB/278 K9GX/177 KC9T/203 W9RKP/151 WØBW/292 WØSR/297

Honor Roll

The DXCC Honor Roll is comprised of those call signs which have been credited with at least 309 countries of the 318 current countries on the DXCC list.

Mixed

312 DL1HH/350 DL1HH/350 DL1KB/361 DL3RK/358 DL6EN/356 DL7AA/362 DL7AP/354 DL9OH/352 G3FXB/358 GW3AHN/360 HR9MG/358 H89MQ/358
H89PL/350
(IØAMU/359
JA1BK/348
JA4ZA/342
LU6DJX/365
OE1ER/363
OK1ER/363
OK1ADM/346
OK1FF/359
ON4WC/361
ON4QJ/343
OZ3Y/355
PY2CK/363
SMØAJU/353
4X4DK/359
4X4JU/356
W1AFF/347
W1BIH/364
W10GJ/344
W1DK/359
W1FZ/359
W1GKK/367
W1HY/352
W1HX/361
W1HZ/359
W1FZ/359
W1GK/367
W1HY/352
W1HX/361
W1HZ/359
W1FZ/359
W1GK/367
W1HX/361
W1HZ/359
W1FZ/359
W1GK/367
W1HX/361
W1HZ/359
W1FZ/359
W1FZ/359
W1GK/367
W1HX/361
W1HX/361 W2GK/342 W2JVU/362 W2LPE/358 W2OKM/359 W2QHH/361 W2QM/356 W2QM/356 W25SC/357 W21QC/354 W2UE/356 W2YY/349 WA2DIG/354 W3AFM/354 W3CWG/357 W3DJZ/347 W3MD/363 W3NWM/358

W3MP/363 W3NKM/358 K4EZ/346 K4LC/346 K4LKQ/359 K4LNM/355 K4PDV/358 K4YR/357 W4XL/341 W4AAV/362 W4BQY/363 W4EX/365 W4OM/362 W4QM/348

W4QM/348 W4UG/343 W4WV/352

W5AQ/352

W510/359 W5KC/364 W5PQA/359 K6KII/353 K6WR/346 K6YR/346 K6YR/346 K6YR/346 W6EL/346 W6EL/346 W6EL/343 W6EUF/343 W6EUF/343 W6EUF/347 W6RGG/341 W6RT/358 W6EUF/343 W6EUF/348 W6KTE/343 W6EUF/348 W6KTE/343 W6FE/353 W6EUF/348 W6RT/358 W6RJ/357 W7GN/357 W7GN/357 W7GN/357 W7GN/357 W7GN/357 W8DMD/365 W8AH/357 W8DMD/365 W8AH/357 W8DMD/365 W8AH/359 W8JII/358 W9CH/353 W9CH/353 W9CH/353 W9CH/353 W9CH/353 W9CH/353 W9CH/353 W9CH/353 W9CH/353 WØDU/363 WØELA/364 WØMLY/362 WØPGI/357 W0 QG1/357

317

DJ2BW/357 DJ7ZG/341 DL1BO/356 DL1JW/352 DL3EN/356 DL7FN/356 DL7FN/356 DL7HU/349 DL7HU/349 GZFSP/351 G3AAE/359 G3FKM/357 12KMG/340 12KMG/340 179ZGY/355 JA1BN/345 JA1MCU/336 JA1MIN/337 JA2JW/350 JA8ADQ/338 LA1KI/339 LU4DMG/355 LU5AG/354 OH2NB/361 OH20V/345 OH2QV/345 OH4NS/340 ON4DM/356

PAULOU/352

PY1HX/353 PY2BK/341 PY2PE/341 SM3BIZ/357 SM3CXS/335 SM5BHW/337 VE2NV/357 VE2MV/357 VE2MV/353 VY5ANF/345 VY5ANF/346 VZ5ANF/353 X512W/338 W1AA/353 X512W/338 W1MI/347 W1SD/346 K2FB/347 W1SD/346 K2FB/347 W1SD/346 K2PXX/344 K2PXX/344 K2PXX/344 K2PXX/355 W2AX/355 W2AX/355 W2AX/355 W2AX/356 W2AX/356 W2AX/356 W2AX/356 W2DY/342 W2DY/342 W2DY/342 W2DY/342 W3EVW/356 W2DY/343 W3EVW/356 W2DY/342 W3EVW/356 W2DY/343 W3EVW/356 W2DY/342 W3EVW/363 W3EVW/364 W4EVW/364 W4EVW/36 K6JG/340 K6LGF/352 K6GJ/361 K6RF/348 K6RN/348 W6BZE/369 W6CHV/369 W6CHV/369 W6EE/361 W6F W/344 W6KG/351 W6KNH/335 W6KNL/356 W6ONZ/351 W6QNM/349 W6RJ/343 W6RKP/355 W6TZD/360 WA6GFE/339 W7ADS/357 W7DX/348 W7JYZ/348 W7JYZ/348 W7LDC/358 W7LDC/358 W7PHO/358 K8DYZ/339 K8FL/341 K8ONV/348 W8PR/342 W9HB/354 W9HB/354 W9TKD/349 W9TKD/349 W9TKD/349 W9ZDD/346 WØZUD/346

316

DJI XP/334
DL1CF/3443
DL1CF/3443
DL1CF/3443
DL7F1/340
F8RU/333
G2BVC/356
G3HCT/350
GM3ITN/347
H89DX/346
H89TL/355
IIZL/351
I8KD8/352
IIJS51
I8KD8/352
IIJS51
I8KD8/352
IIJS51
I8KD8/352
IIJS51
I8KD8/352
IIJS51
I8KD8/353
JAIBRK/349
LA9CE/334
OH3QR/347
KP4RK/349
CA9CH/335
CA10H/333
PY1HQ/354
ON4IZ/344
OX6H/333
PY1HQ/354
PT/YS/349
SM7ANB/349
VE3WW/336
VK4QM/362
XE1AE/348
VSIQ/353
KA1QY/355
WINV/356
WINV/356
WINV/356
WINV/356
WINV/357
KA1IGY/335
KA1GY/335
KA1GY/335
KA1GY/335
KA1GY/355
WINV/356
WINV/356
WINV/356
WINV/356
WINV/357
WHAN/360
WHYRC/333
K4HQG/343
K4HQG/343
W44D/3356
W4MGC/349
W4TM/360
W4WYD/356
W4MG/349
W4TM/360
W4YD/359
W4TM/360
W4YJ/359
W4TM/369
W4YD/359

W5LC1/349 W5UN/353 K6GA/347

K6KA/334

W/AQB/352

K6RQ/459 N6AR/343 N6CW/336 N6GM/342 NGGM/336 WGBS//356 WGBSY/356 WGBSY/356 WGFF/352 WGFF/356 WGFF/351 WGMUR/351 WGYA/344 WGYB/340 WGYB/340 WGYB/340 WGYB/340 WGYB/340 WGYB/334 W7CB/334 W8CFL/356 W9DC/336 W9FKC/358 W9GKL/350

K6PU/341

315 DJ5DA/339 DJØKQ/339 G3JAG/333 G5VT/357 ĞI3IVJ/352 HB9KB/351 HB9MN/331 HB9MN/348 IV3PRK/332 JAIADN/344 JAILDD/337 JAILUQP/331 JABZO/334 KH6CD/360 KV4F Z/332 ON4UN/334 OZILO/335 PYIAPS/334 PY3CB/333 SM6AEK/333 SM6AEK/333 SM6CKS/334 SM6CKS/334 SM6CKS/335 VE3WE/335 VE3WE/335 VE3WE/335 VE3WE/335 VE3WE/335 VE3WE/335 VE3WE/335 KIDRN/333 KIDRN/336 KIDRN/336 KIDRN/336 KIDRN/337 KIDRN/337 KIDRN/336 KIDRN/337 KIDRN/337 KIDRN/338 KIDRN/338

W4BAA/354

W48BP/344

W4JVU/336 W84OS\$/331 K5AAD/341 K5LIL/335 W5FFW/353 W5GJ/345 W5MMD/357 W5OB/348 W5SJ/333 K6CH/356 N6UC/331 W6CAE/356 W6ID/357 W6SQP/354 W6YO/336 WA6QET/337 W6YO/336 WA60ET/337 W7AO/353 W7CMO/348 W7DY/337 W7CG/354 K8IFF/332 W8DCH/335 W8JQ/338 W8YGR/342 K9BGM/338 K9KA/332 K9BGM/338 W9BW/342 W9DA/337 W9ZRX/330 W9ZRX/331 W9ZRX/331

314

DJ6RX/332 DJ7CX/338 DL3OH/333 G2FYT/348 F9IE/333 G3JEC/334 HB9AHA/333 I5ARS/342 JA1BWA/337
JA1JRK/330
JA1OCA/330
JA2AAQ/332
JA4BJO/338
JA8JL/333
LA5HE/348
OE2EGL/333
OH2BC/338
OH2BC/338
PY2CPFR/331
PY2SO/338
PY2CPFR/331
PY2SO/338
SM5FC/330
SM6CVX/330
SM6CVX/330
SM6CVX/336
VB5WF/350
VE75V/336
VUBSWF/350
VE75V/336
VUBSUF/330
YV5BBU/334
YL1AJU/343
ZL1AV/338
ZL4BO/344
Z56IW/344
KINJE/327
N1XX/336
WIGX/334
WIJS/339
K2LGJ/335
W2FG/334
W2JB/332 W2LNB/340 W2MZV/337 W2XN/351

W3GG/329

WA3HUP/332 WA3IKK/331 K4AIM/347 K4BBF/331 K4EWG/330 K4J/339 K4J/335 K4MZU/335 K4MZU/335 K4MZU/335 K4MZU/331 W4AUH/331 W4AUH/331 W4AUH/331 W4AUH/336 W4JD/327 W4ML/356 W4ZR/342 WA4WIP/336 K5GO/328 K5OS/329 K5UR/331 W5EJT/342 W5KGX/331 W5EJT/342 W5KGX/335 W5MQ/330 W5NW/354 W5TO/335 W5MQ/330 W5NW/354 W5TO/335 K6MA/341 K6KA/330 W6KZS/339 W6UQQ/349 W7CSW/343 W7LFA/331 K9RA/330 N9AB/329 N9ZN/342 W9BM/348 W9KNI/343 W9KOD/335 W9PN/343 W9FK/330 W9TKV/352 KØBUR/333 WØBTD/349 WØBL/333 WØPAH/333 WØPAH/333 WØPAH/333

313 CT2AK/327 DJ2AA/343 DJ4PI/330 DL1DC/348 G3IOR/345 G4CP/357 G13OQR/339 11RBJ/333 12DEZ/330 12LAG/329 JA1FHK/331 JA2ANO/330 JA2ANO/330 JA2ANO/330 JA2ANO/331 OK2RZ/329 ON4PA/348 ONEXC/329 ON4PA/348 ONEXC/325 ONSKL/328 OZ85S/347 PAØFX/355 PY5ATL/326 SM5DQC/326 UB5WE/324 UR2AR/347 VE3BX/334 VE3CTX/330 VK3YL/347

YV5BZ/344 Z24JS/333 K1BW/326 K1BW/326 K2BT/330 W2FP/330 W2IRV/351 W2SAW/352 WB2HXD/336 WB2YQH/328 K3KP/335 K3ZR/327 NAZY/326 K4AUL/331 K4KG/338 K4XG/330 N4JF/331 N4SU/355 W4BRE/334 W4DRK/341 W4OEL/333 W4XR/329 N5DX/336 K6AO/336 K6DT/338 W6ET/330 W6GC/326 W6GMF/344 W6HX/359 W6HX/359 W6HX/359 W6HX/331 N7DZ/331 N7DZ/331 N7DZ/331 N7DZ/331 W7ETZ/326 N8DX/331 W7ETZ/326 N8DX/331 W8EWN/359 W8EWN/328 K9GM/329 K9GRF/325 N9AF/332 W9EBJ/341 W9EBJ/342 W9HZ/342 WØMYN/329

J12

DJ5LA/336
DK3PO/329
DK3SF/319
DL8CM/342
F9GL/342
G3LQP/327
I5UA/349
I7HH/326
I7ZPB/341
IT9TAI/351
JA1ELY/321
JA1EAD/329
JA1JAN/327
JA7MA/330
JA8KB/325
JA9BJ/329
OE 1FF/346
OE8RT/330
OE3DX/332
PY1DH/343
SM3RL/326
SM6AOU/339 SM6AOU/339 SM7ASN/330 UA9VB/341

VE1KG/330 VE3HD/348

VE7BD/323 4X4FQ/342 K1NA/334 W1DA/323 W1JZ/330 W1KG/321 WIRG/321 WING/327 K2KGB/328 K2OF/328 K2VV/324 W2ZZ/330 W2SUA/329 WA2CBB/331 WB2NYM/327 K3HPG/328 K3NL/328 K3NL/328 K3NL/328 W3SO/337 W3SO/337 W3SO/337 WA3ATP/331 AB4D/329 AB4H/325 K4SMX/323 N4CC/324 N4XX/327 N4XC/327 W4GTS/332 W4FPW/327 W4GTS/332 W4NNH/347 W4ORT/330 WA4FFW/328 K5JW/328 K5JW/328 K5JW/328 K5JW/328 W5AL/354 W5DOZ/3114 W5DOZ/3114 W5DOZ/314 W5DOZ/ K9JF/327 W9T KR/330 WA9NUQ/333

KOGVH/327

พิติบัติ/ีส์สัก

DJ5JH/328 DK5PR/321 DL6KG/330 DL7BK/343 G2BOZ/351 G5RP/335 I1APG/324 JA1CRR/330 JA1CRR/330 JA1GTF/323 JA1GTF/324 JA1GTF/324 JA2ADH/328 JA2AH/326 JA2JKV/327 JA3APL/327 JA6BSM/324 JA8MS/325 OE1UZ/331 OH2BAD/328 OH2BR/330 ON5KD/326 ON5NT/322 OZ8BZ/326 PY2ELV/327 PP5UG/331

N4UH/329 W4FLA/322 W4KFC/345 W4KPC/345 W4YN/335 K5AQ/328 W5HDS/348 W5HDS/348 W5HDS/348 W5HUG/329 K6LQA/325 K6LU/339 N6EA/345 N6RJ/322 W6ABA/335 W6BJH/322 W6ABA/335 W6BJH/322 W6US/320 WBCA/345 W6TC/322 W6US/320 WBCA/345 W6TC/322 W6US/320 WBCA/323 WJYX/339 WJYX/339 WJYX/339 WJYX/339 WJYX/335 K8CW/324 K8RWL/325 K8ST/322 K8VUR/333 JAIAG/344
JHICJQ/325
JHIEIG/325
JHIEFS/320
JAIAG/325
JAIFS/320
JAIAG/325
JAIBGE/321
JAIFS/320
OE7/UDH/329
OZ7/JZ/324
SM3EV R/314
SM5AQB/330
SP3DO1/326
VE3CV/319
VE4SK/323
VE7HP/322
YU5NYP/322
YU5NYP/322
YU5NYP/322
W1GL/321
W1HGA/326
W1KGH/320
K2ER/330
K2LQ/317 XE1KS/32/ YO3AC/326 Y51RRD/319 YU1DD/318 YV56WO/320 K1BV/326 K1KI/320 W14M/323 W1ER/326 W1F 1 X/341 W1GG/330 W1SP/342 K2UR/333 K2UVU/343 N2S5/326 W2AZX/339 W2EQS/342 W2VUF/339 W2EQS/342 W2VUF/339 W3MV/339 W3WV/325 W3XV/339 W3WV/325 W3XV/325 N4KE/320 N4KG/328 K8ZR/318 KN8Z/327 N8AA/329 W8RSW/3329 W8TA/325 A19J/336 K9OTB/335 K9SM/337 N9MM/319 W9DE/323 W9GR/341 W21YX/318 W2MJ/342 W2QK/336 W2RS/320 W2SY/324 W2YD/323 WB2AIO/318 AE3T/321 W3EYF/339 W6JZU/324 N6AW/326 N6DX/340 W6AE/326 W6SC/334 W6SN/347 K7NN/321 K5LM/323 K5OR/315 PY7ZZ/320 SM7DMN/319 SM7EXE/326 UA1CK/339 VE3GCO/328 VE4QX/336 310 DJ2TI/319 DJ4AX/332 DJ8GR/323 DL8FL/324 G3HTA/329 I3EVK/330 I2ZZZ/322 I3LLD/319 IØOUD/314 JAIZZ/333 JAIIFP/328 WEPY/328 W5GC/340 W5GC/340 W5UP/323 WA5REU/325 K6IR/321 YO3JU/329 ZL1AMO/330 ZS4MG/338 K7NN/325 W7CNL/321 W7OMH/321 W7OMH/326 K8RA/322 W8NGO/350 W8NGO/350 W8QFR/328 W9AZP/339 W9HLY/341 W9KB/327 W9NA/344 W9RN/323 W9WNB/333 W9WNB/333 W6ILA/322 K6WC/321 K6XT/320 254MG/338 K1J0/324 W1AB/339 W1FJ/337 K25B/327 W2VJN/337 W3LB/326 K4EEK/327 N45A/324 W4AXR/348 W4BYU/351 W4GXB/354 W4WD/331 W3E YF/339 AA4A/321 AA4CJ/320 K4LSP/320 K4RD/317 K4TO/322 K4XI/319 N4RA/322 K6XT/320 W6CF/332 W6MUM/331 W7KSG/325 W7LZF/325 W7LZF/325 W7LZG/328 W8ZCK/335 K9FN/320 W9LF/317 W9S5/321 WA9WJE/323 AJØX/329 KØALL/339 WØNVZ/344 WØSR/318 W9GB/341 W9VNE/327 KØAB/335 WØTJ/351 JA11FP/328 JA3CMD/316 JA3EMU/320 JA3GM/320 JA7AD/343 KH6IJ/352 OH8SR/324 LA3XI/318 SM4DHF/322 SM5AZU/337 SM5BBC/327 VE6LU/337 VE6LU/344 VK6HD/397 W4FX/342 W4PZV/323 W4RJC/321 309 DJ1CG/326 DK9FB/321 DL6MK/337 F2IU/331 G3KDB/322 W4WG/324 W4YA/325 W4YV/325 W4WD/331 K0IEA/322 WA4DRU/325 N0RR/322 K50A/322 N5AR/337 WA4J (1/315 K5GH/321 VE6LU/344 VK6HD/327 HB9AQW/320 K2LQ/317 W5ZWX/326 WA3ATP/330 K4IKR/332 K4PDV/338 K4XO/327 K5JEA/342 K505/327 W5HJA/342 W5UAW/331 K60JO/325 N6NA/338 W6K0E/328 W6YB/331 W6YMV/339 W7EZ/325 W7KR/338 W7LZ/325 W7KR/338 W7LZ/325 W7KR/338 PT7Y\$/346 UB\$WF/333 VE3CTX/330 VE3CTX/330 VE3NE/332 E56JM/351 6W8DY/329 W1GKK/347 W2GKZ/337 W2GKZ/337 W2GKZ/336 WA3IGK/326 WA3IGK/328 W4EEU/330 K6GA/330 K6GA/330 K6GA/330 W6AR/334 W6ISG/336 W6KDT/340 W6XP/326 W6XP/326 W6XP/326 W6XP/326 W6XP/326 W7EKM/322 W7EPA/334 W8CFG/325 W8CNL/325 W8COG/325 OH3S R/330 ON4SZ/350 SM5BHW/331 SM5FC/330 VK4QM/346 V5BBU/334 ZS6RM/345 ZS6YQ/345 W1SEB/331 K2JMY/339 W3MP/337 K4AIM/347 K4BBF/331 N4WF/331 W4DPS/331 W4DPS/335 W5MC/335 W5MC/333 W6DC/333 W6DC/333 W6DC/333 W6DC/333 W6DC/333 W7LFA/331 W7LFA/331 W7LFA/333 N6AW/325 W7CMO/336 W7JYX/339 XE1AE/348 W1AA/352 W1FZ/350 W2GK/339 W2GLF/352 W2NUT/341 W2YYL/344 W3AZD/342 W3JK/337 A44MM/334 K4HJE/333 W4ELE/353 W4UWC/341 W4YJ/356 K5DX/350 K5UC/354 W5SZ/33/ W6HFL/344 W6KNH/334 W6YRA/350 K6YRA/349 W6CHV/357 W8CUO/343 W9DC/333 W9HPS/341 W9KRU/337 W9CUO/343 W9CU/334 W9CU/334 W9CU/334 W9CU/334 W9CU/334 W9CU/334 Phone VE3MR/342 YV5ANF/345 ZL1HY/363 ZS6LW/352 PY4KL/345 SM3BIZ/354 5M36LX354 5M6CKS/334 5M6CKS/334 5M6CKS/334 YE3WT/338 YS10/345 YV1KZ/331 YV5AIP/347 YV5AXQ/340 K1DRN/336 W1FXD/332 W1HX/350 W1CUJ/332 W1MX/336 W1MX/336 W1MX/336 W2LV/348 W3EVW/348 W3EVW/348 W3EVW/348 W4EVW/348 W 318 ZL1HY/363 ZS6LW/352 W1CKA/342 W1CKA/342 W1ONK/355 K2BZT/350 W2PT1/355 W2PV/342 W2TP/346 WA2EOQ/339 W3KT/354 K4HEP/359 K4JC/341 K4YYL/338 W4DR/352 W4LMX/350 W5LZW/347 K6CCY/346 W5LZW/347 K6CCY/344 W6EL/343 W6EL/343 W6EL/344 W7DX/344 WB8EUN/324 DL6EN/353 DL90H/352 IØAMU/359 IØZV/347 ON4DH/356 OZ3Y/348 PY2CK/363 VE5RU/352 4X4DK/359 4X4DK/359 N9AF/328 W9GU/324 W8JIN/348 W9BEK/336 W9HZ/337 W9ILW/338 W9HB/346 W9LA/327 W9ZRX/326 310 4X4DK/359 4X4JU/352 W1AFF/347 W1JFG/356 K2FL/348 W2BXA/363 W2OKM/357 W2YY/344 W3CWG/359 CT 111F/324 309 D4CBS/324 D4CBS/324 DL1JW/335 DL6KG/327 EA11Y/323 EA71R/328 GT1RM/317 GT1FL/326 DK3PO/326 DK3PO/326 DL9DY/327 EA3OJ/319 I1YG/321 I2DEZ/326 JA3APL/324 LA1ZI/321 ON5NT/320 PY2BU/321 UA1CK/337 UR2AR/335 VE3GCO/326 YV5DF1/322 W1HGA/326 K2YLM/331 N2SS/325 W2IYX/318 W2K/333 W3XM/331 K4LSP/320 W4AVY/328 W5GC/340 W5RNG/333 K6DT/319 K6FXOJ/330 W2YY/344 W3CWG/355 W3DDJZ/346 W3GRS/345 W3GRS/345 W4UG/342 W5G/358 W5PGA/355 K6WR/346 W6AM/364 W6EUF/338 W6EH/343 W6ZEH/343 W6ZEH/343 W6ZM/347 EA7IR/J328
F99GL/336
F99MD/335
F99MD/335
F99MD/335
F99MD/335
F99MD/335
F99MD/335
F99MD/335
F99MD/335
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F99MD/321
F99MD/321
F99MD/321
F99MD/3 F9GL/336 F9MD/335 311
DJ2Y1/348
DJ4PT/325
DL1HH/333
EA7GF/339
F6AOI/326
H59AHA/327
H1APQ/324
L1GEA/324
L1GEA/324
L1A1UQP/327
JA2AAQ/329
JA2AADH/328
JA7MA/329
OE3WWB/324
SM6AEK/329
V01CU/320
XE3EB/327
ZL1KG/349
W2SUA/327
K4SM/344
KE4I/325
N4MW/328
N4WW/326
K5OVC/327
K5DVC/327
K4SM/344
KE4I/325
N4MW/328
N4WW/328
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W5UR/329 311 K8CFU/343 K8IFF/330 W8GKM/330 W8KST/333 W8VHY/330 WA8AJI/337 W9BW/334 KØBS/338 KØBUR/332 WØMYN/329 W9DWQ/343 W9NZM/344 W9SFR/346 WØMLY/352 K9AB/335 K9LKA/332 K9MM/331 312 W9TKD/336 WøCSZ/340 EA4DO/331 F511/330 F5VU/325 G5AFA/327 I5UA/349 I7HH/326 I79ZGY/338 JA1JRK/327 JA1OCA/327 JA8ADQ/329 KP4CL/338 KV4FZ/327 ON8XA/330 PY2DSC/327 W8AH/357 W8GZ/364 W9ZM/352 W0BW/356 314 DL7FT/338 DL8NU/333 EA8JJ/329 F3DJ/345 CT18H/330 DJ7ZG/340 H89TL/354 14ZSQ/333 18AA/337 18KDB/352 119GA1/335 JA18K/344 LU9DAH/350 OK1ADM/339 PY4TK/354 SM5CZY/342 T12HP/361 VE3QA/353 VE3WA/353 VK5MS/358 VK6RU/361 315 DK2BL/330 DL7HU/345 EA2HX/342 EA4JL/332 F2MO/341 WOCM/358 WOPG1/347 313 F3DJ/345 G3JEC/334 G3NLY/335 G3UML/335 G13IVJ/349 HB9AAA/331 15FLN/328 15TDJ/340 10LLZ/332 JA1ADN/336 JA1BRK/334 JA1MIN/334 JA2JW/337 EA4LH/330 F9IE/331 G3TJW/327 F2MO/341 F8RO/332 G5VT/357 I2KMG/337 IV3PRK/332 I5WT/340 I6FLD/344 I9JX/332 I79JT/334 JA1BN/334 ON4UN/334 OX3SK/343 DJ28W/350 DL1KB/352 F9RM/349 G3FKM/353 LU4DMG/355 ON4DM/356 PY2PA/341 PY2PE/338 PY2PE/341 VE3MJ/338 G31JW/32/ 11RBJ/333 12AT/333 12LAG/329 14LCK/328 18YRK/333 JA11BX/333 ON8XA/330 PY2DSC/327 PY3BXW/328 SM6EOC/325 UB5WE/323 ZL3NS/335 K1NJE/325 W511X/332 W5UR/329 W6BSY/345 W6KZS/330 W6LQC/325 K7NN/325 K7NN/325 N7RO/322 KH688/334 OE2EGL/332 JA2JW/337 JA4ZA/336 PAGHBO/351 PY3CB/330

CW 309

W9KNI/314

307

K2TQC/308

N4WW/312 K9MM/310

DL6EN/309 ON5NT/308

304

K2FL/305 K3FN/306 N4RJ/307 W8AH/307

OZ3SK/343

303

K4PI/306 K6GA/307 W6PT/307

302

W1NG/303 W3KT/304 W9DWQ/304 W9ZM/304

301

W3GRS/302 K8MPQ/303

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SM5BHW/303 WA6TLA/302

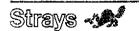
299

JA1JRK/304 K4XO/300 AA6AA/300

298

SM3EV R/301 SM0 AJU/301 N0 RR/300

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NO TOWER TROUBLE THERE

I'l The neighbors of Robert Pinkerton, WD9JMA, of Elkhart, Indiana, don't look at his Amateur Radio tower and antenna with disgust. Instead, they look with anticipation of local information important to

them. Aton WD9IMA's tower is a revolving red light that is activated during times of severe weather and emergency. Neighbors are thus warned that they should turn on their radios or television for more information.

This novel idea of creating local goodwill via Amateur Radio towers came about when members of the Elkhart County SKYWARN Group decided to let neighbors in on another positive side of Amateur Radio, The amateurs followed through with town officials, continuing a good working relationship they had established with them, and acquired almost 40 police cruiser lights to install on members' towers. So far the plan is working exceedingly well. WD9JMA's light, for example, can be seen for a halfmile radius by about 75 homes.

OST congratulates . . .

☐ Alan E. Highers, WA4NVS, of Germantown, Tennessee, on being appointed by Governor Lamar Alexander to the Tennessee Court of Appeals.

lub Corner

WHAT'S AN SSC?

Affiliated clubs, your attention please! You won't be alone in the club system much longer. Beginning in March 1983, there is going to be a new "little one"—The Special Service Club (SSC)—with all of the ac-

companying growing pains.

The Special Service Club program (introduced in the Long-Range Planning Committee report and developed with your comments and suggestions) is a new phase of affiliation open to all clubs. Affiliated club program participants will not lose any benefits; everyone will gain. Each Special Service Club will participate in a series of suggested Amateur Radio ac-tivities, or propose equivalent activities of their own. These recommended activities will help your club to become more effective and to receive more recognition within your community. The program will help you to earn respect from your Amateur Radio peers, and will improve cooperation between ARRL Hq. and clubs.

The areas of activity chosen include public relations, emergency communications, training, technical advancement, other operating activities and miscellaneous activities. Your public relations activities could include organizing an exhibit or resolving TVI/RFI in a way that reflects favorably on Amateur Radio. Sponsor an emergency communications group,

*Club Program Manager, ARRL

or ensure representation by your club in the National Traffic System networks. Organize licensing classes each year, or provide continuing education for club members. Other activities are managing a QSL bureau, maintaining a permanent club address or sup-porting/sponsoring an Amateur Radio Explorer Post. There are many others. These are just brief examples.

Those who want to get a head start in qualifying can begin establishing ongoing programs now. Use the six areas mentioned when preparing and training your club's members. As you think about the program, compile your suggestions or ideas within the categories and let us hear from you. An upcoming QST article will present the whole program approved by the

ARRL Board,

Why would you want to become involved in a program like this? Well, your club might want to become gram like this? Well, your club might want to become more active, and not know how to get started. Or, you might think that recognition of your club would be beneficial to you and your community. All Special Service Clubs will be identified in QST and presented with a certificate of recognition and appreciation after one year of participation. Participating clubs will be permitted to identify themselves with the SSC insignia, and will be listed in a special club section of the ARRL Repeater Directory. These clubs will have the authority to process and present certain ARRL awards; new ARRL members in its area will automatically be re-ferred to the Special Service Club nearby.

The Special Service Club program will become effective on March 1, 1983. Formal applications will not be ready until mid-February, and will not be con-sidered until March I. On this date, Section Affiliated Club Coordinators (SACCs) will start accepting application forms from existing affiliated clubs. (The Section Affiliated Club Coordinator is a new appointment that will be made by the Section Manager, effec-tive January 1, 1983. SACCs will be announced, as they are appointed, after January 1. We can't tell you who yours is until there is one!)

Those clubs wishing to begin participating immediately can do so, though no formal applications will be available before March. If you or your club are interested in participating more at the section level, contact your Section Communications Manager (soon to be Section Manager) and volunteer your services. Invite your section and division officials to speak about your club's role in the reorganization. Keep notes on your activities in the above mentioned areas

so you can let us know of your progress.

AMATEUR RADIO WEEK

Hawaii Governor Paul Calvo signed a proclamation declaring June 20-26 as Amateur Radio week. Club officers were present for the signing. Other clubs sponsor Amateur Radio week in their states.

Conducted By Mark J. Wilson,* AA2Z

Special Events

Nairobi, Kenya: Radio Society of Kenya will operate 5Y4ITU for six weeks starting Sept. 28 during the ITU Plenipotentiary Conference. Look for the station on all hf bands, phone and cw. Kenya amateurs are also allowed to use the SY4 prefix instead of 5Z4 for the duration of the conference. QSL via the bureau or P.O. Box 45681, Nairobi, Kenya.

Ridgewood, New Jersey: North Jersey DX Assn. members will operate throughout Oct. in celebration members will operate throughout Oct. in celebration of the club's 25th anniversary. Frequencies: cw — 35 kHz from low end; phone — 3.880 7.280 14.280 21.380 28.580. For certificate, DX stations contact 15 members; W/VE stations contact 25 members. DX stations also need 5 satellite QSOs. Send log data to: Ed Berzin, W2MIG, 47 Palisade Rd., Elizabeth, NJ 07208

York, Pennsylvania: York ARC will operate W3EDU during Oct., commemorating the club's 50th anniversary. Operation on 80-2 meters, Special QSL for s.a.s.e., to: W. Boyer, W3AMQ, 21 S. Findlay St., York, PA 17402,

San Diego, California: North Shores ARC will operate K6HAI from 1800 to 2400Z Oct. 2 from Shelter Island in San Diego Bay to commemorate the 22nd anniversary of the Bell of Friendship, given to the citizens of San Diego by those of Yokohama, Japan. Frequencies: 25 kHz up from bottom of General class phone bands on 40, 20 and 10 meters. QSL for large s.a.s.e. to: K6HAI, 2410 Deerpark Dr., San Diego, CA 92110.

Heard County, Georgia: Bill Gremillion Memorial RC will operate K4SEX on Oct. 2 for county hunters. Operation in General class phone portions, 80-10 meters. Some cw. QSL for s.a.s.e. to: BGMRC, P.O. Box 2327, Newnan, GA 30264.

Randsburgh, California: WA6NKL and W6LED will be active, along with several stations from Randburgh, South Africa, from 1300Z Oct. 2 until 2400Z Oct. 3. Contact one station from each country for QSL. Operation in 10-, 15- and 20-meter General class phone bands. QSL for s.a.s.e. to: WA6NKL, P.O. Box 1211, Torrance, CA 90505.

Monmouth County, New Jersey: Garden State ARA will operate W2GSA from Treasure Island in the Manasquan River from 1400Z Oct. 2 until 1400Z Oct. 3. Frequencies: cw — 3.535 14.035; phone — 3.900 7.235 21.375 28.725. Certificate available from: L. Eloe, WA2SSH, 7 Carol Ave., Neptune, NJ 07753.

Albuquerque, New Mexico: KN5D, KC5DT and K5MIJ will operate during the New Mexico International Hot Air Balloon Fiesta in the morning hours

*Assistant Communications Manager, ARRL

Oct. 2-10. Mostly ssb operation 50 kHz up from bottom of General class hf bands. Special OSL and certificate available; get details from station you work.

Rome, Georgia: Coosa Valley ARC members will operate from 1200Z Oct. 9 until 2200Z Oct. 17 during Heritage Holidays. Operation 25 kHz inside General class phone bands, 80-10 meters. Certificate for large s.a.s.e. to: CVARC, Box 183, Rome, GA 30161.

Columbus, Ohio: Bell Labs/Western Electric CRES ARC will operate W8ZPF from 1600 to 2200Z Oct. 10 to commemorate the 25th year of the WE Columbus facility. Frequencies: 7,245 and 14,050 first half of each hour, and 14,290 and 7,050 the second half, Cer-tificate for QSL and large s.a.s.e. to: CRES ARC, 6200 E. Broad St., Columbus, OH 43213.

Tehachapi, California: Southern Sierra ARS will operate K6RL simultaneously from Mt. Whitney, the highest point in the continental U.S., and Bad Water, the lowest point in the western hemisphere. Operation from 1900Z Oct. 10 until 1900Z Oct. 11 on 7.110 and 21.110 (Mt. Whitney) and 7.105 and 21.105 (Bad Water). Certificate for QSL and large s.a.s.e. to: SSARS, Rte. 2, Box 338, Tehachapi, CA 93561.

Moultrie, Georgia: Colquitt Co. Ham Radio Society will operate WD4KOW from the fifth annual Sunbelt Agricultural Exposition on Oct. 12-14, from 1300 to 2100Z each day. Operation in the General class portions of the hf bands. Special QSL for s.a.s.e. to: CCHRS, P.O. Box 813, Moultrie, GA 31768.

Graham, North Carolina: KA4MBZ will operate from a mountaintop from 1300 to 2100Z. Oct. 16 on the low end of the Novice and General cw bands. Certificate for large s.a.s.e. to: KA4MBJ, 205 Windsor Dr., Graham, NC 27253.

Chicago, Illinois: Fox River Radio League will operate W9CEQ from the top of the Sears Tower, 1454 feet above sea level, from 15002. Oct. 16 until 2000Z. Oct. 17. Operation on 80-10 meters, phone and cw. QSL for s.a.s.e. (certificate also available) to W9CEQ Callbook address.

Telephone, Texas: North Texas High Frequency Assn. will operate KB5TO from the Calvin Felts barber shop from 1700Z Oct. 16 until 1700Z Oct. 17. Operation 25 kHz up from lower General class hf phone hand edges and some 15- and 40-meter Novice operation. QSL info will be given on the air.

Nationwide and worldwide: World Scout Bureau will sponsor the 25th Jambore-on-the-Air Oct. 16-17 from 0001 local time until 48 hours later. U.S. frequencies: phone — 3.940 7,240 14.290 21,360 51,150; cw — 3.590 7,030 14.070 21,140 28,190; SSTV and RTTY — usual frequencies. Certificate for s.a.s.e. to: W2GND, 216 Maxwell Ave., Hightstown, NJ 08520.

Moscow, Michigan: Hillsdale Co. ARA will operate WB8HIZ from 1700Z Oct. 17 until 1700Z Oct. 18. Frequencies: 3.940 7.260 14.285 21.360 50,120 52,525 144.310 146.57. Exchange signal report, name and QTH. Certificate for QSL and large s.a.s.e. to: Ham, P.O. Box 206, Moscow, MI 49257.

Wallace, Kansas: Western Kansas DX Society Wallace, Kansus: Western Kansas DX Society will operate KØEQH from 1700Z Oct. 23 until 1700Z Oct. 24 from the highest point in Kansas. Frequencies: phone — 1.830 3.935 7.260 14.360 21.360 28.560 50.160 144.210; cw — 60 kHz from low end; Novice — 3.730 7.125 21.160 28.160; RTTY — 3.625 14.095 144.210. Special QSL for s.a.s.e. to: WKDXS, P.O. POR 21.2 Control City IEEE CONTROL Box 813, Garden City, KS 67846.

Philadelphia, Pennsylvania: University of PA and Holmsburg ARCs will operate W3WP from Penn's Landing from 0000-2359Z Oct. 24 in conjunction with the city's 300th hirthday celebration. Frequencies: phone — 3.925 7.275 14.290 21.365 28,550; cw — high end of hf cw segments. Special QSL for s.a.s.c. to: H. White, N3HW, 7520 Veree Rd., Philadelphia, PA

Annapolis, Maryland: Anne Arundel RC will operate W3VPR from Sandy Point State Park during Chesapeake Appreciation Days from 1600 to 21002. Oct. 30-31. Operation on 14.290; other frequencies announced on the air. QSL and certificate for large s.a.s.e. to: AARC, Box 604, Glen Burnie, MD 21061.

Great Gorge, New Jersey: Cherryville RA will operate WAZCVK from the Hudson Division Convention from 1300Z Oct. 30 until 1700Z Oct. 31. Frequencies: 3.940 7, 260 14, 285 21, 360 28, 590. Certificate for large s.a.s.e. to: K2K1Q, 22 Sylvan Rd., High Bridge, NJ

Rio de Janeiro, Brazil: Pica-Pau Carioca will sponsor the Rio QSO Party from 1500Z Oct. 30 until 1500Z Oct. 31 to promote cw QSOs between Brazilian stations and the rest of the world. Exchange signal report, QTH and name. Frequencies: up from 3.510 7.020 14.030 21.030 21.130 28.030. Send no logs, but quick QSLing is desired.

Burlington, New Jersey: West Jersey RA will operate W2JUG for the entire 24-hour day of Oct. 31 from the South Jersey Pine Barrens, home of the Jersey Devil. Frequencies: phone — 15 kHz from bottom of General bands; cw — 15 kHz from bottom of Novice bands. Certificate for large s.a.s.e. to: WJRA, Box 62, Burlington, NJ 08016.

Note: The deadline for receipt of items for this column is the 15th of the second month preceding publication. For example, your information would have to reach Hq. by Nov. 15 to make the Jan, issue.

Coming Conventions

October 2-3 New England Division, Boxboro, Massachusetts

October 1-3 West Gulf Division, Houston, Texas

October 8-10 Pacific Division, Santa Cruz, California

October 9-10

Virginia State, Virginia Beach

October 15-17

South Florida Section, Clearwater

October 23-24

Tennessee State, Chattanooga

October 29-31

Hudson Division, McAfee, New Jersey

ARRL NATIONAL CONVENTIONS

October 7-9, 1983 Houston, Texas

July 20-22, 1984

New York, New York September 27-29, 1985

Louisville, Kentucky

SOUTH FLORIDA SECTION CONVENTION

October 15-17, 1982, Clearwater

The Florida Gulf Coast Amateur Radio Council is proud to announce its annual convention, and to sponsor the ARRL South Florida Section Convention, October 15-17, at the Sheraton Sand Key, Clearwater, Make it a family weekend on our beautiful Gulf beaches at this "Sun Coast" convention.

ARRL forums, technical forums, demonstrations,

*Convention/Travel Coordinator, ARRL

meetings, exhibits for the amateur, special exhibits for nonhams and a limited swap area will be featured. Lots of women's activities. QCWA-sponsored Saturday noon luncheon, Saturday night pool-side luau with all the trimmings, Sunday noon luncheon and fashion show, and lots of "SURprises."

Registration is \$4; those under 12 years old free. Swap tables are \$10 for the weekend. Luncheon tickets, \$6; luau tickets, \$14. Special hotel rates for conventioneers are available; get your reservations early. For further information or reservations, write to ECCARC, P.O. Box 157, Clearwater, FL 33157, or contact Charlotte, WB4PEL, tel. \$13-733-6937. Repeater talk-in will be on 146.37/97 and local repeaters.

TENNESSEE STATE CONVENTION October 23-24, 1982, Chattanooga

The ARRI. Tennessee State Convention/HAMFEST CHATTANOOGA 1982 will be held Oct. 23-24, at Chattanooga State Techical Community College on Amnicola Highway in Chattanooga. Admission is free

Features will include prizes, forums, women's and children's activities, a large dealer area, and indoor and outdoor flea markets. A cafeferia on the premises will be open both days. We will also have a hospitality party and the Wouff Hong Ceremony. A variety of motels and camping areas are located at the interchange of 1-75 and U.S. 41 (East Ridge exit), approximately 15 minutes from the hamfest site.

For dealer information write to HAMFEST CHATTANOOGA, P.O. Box 3377, Chattanooga, TN 37404, or contact Maxine Barrett, N4ECA, tel. 404-398-3358, For indoor flea market spaces, contact Dave Roberts, KA4BNY, tel. 615-899-9043. Talk-in on 1979.

HUDSON DIVISION CONVENTION October 30-31, 1982, McAfee, New Jersey

There's lots of good news for those planning to attend HARC's ARRL Hudson Division Convention at Great Gorge in McAfee, NJ, the weekend of Oct. 30-31. The resort hotel at Great Gorge (its name has changed from Playboy to Americana) remains a most beautiful site for a convention.

And if the scenery isn't enough, Steve Mendelsohn, WA2DHF, has put together one of the strongest programs ever available at any Amateur Radio convention. ARRL General Manager, Dave Summer, K12Z, will discuss Restructuring of the League, Dave '4-eaky Lines' Mann, K2AGZ, will cover Current Legislation

Affecting Amateur Radio, Murray Barlowe, WA2PZO, will describe a Poor Man's Spectrum Analyzer (available in the Exhibit Area for under \$100).

There will be seminars on AMSAT Phase III, packet tadio, whf contesting, microprocessors, repeaters, IVRO, computers, YERL, traffic and MARS. George Diehl, W2IHA, will lead the Interference Task Force session. Coming from ARRL Hq. will be Chuck Hutchinson, K8CH, to present the Antenna Primer; Pete O'Dell, KBIO, to run the Public Relations Forum; and John Lindholm, WtXX, to take part in a public service session and a contest program, and to give a slide-show talk on the recent VEISPI DXpedition to St. Paul Island. Also representing Hq. will be Ellen White, W1YL/4, conductor of the QST column How's DX7 Amateurs at the convention will also meet ARRL President Vic Clark, W4KFC, and will he able to discuss League policies with him and other League officials at the always popular ARRI. Forum.

In addition, you will visit the buge exhibit area where prominent manufacturers of ham radio equipment display their latest items. Adding to the excitement will be an indoor flea market.

Convention festivities begin officially on Friday night, Oct. 29, at 8 P.M., with a slide show presented by Dave Porter, K2BPP, on his six weeks at the Antaretica McMurdo Naval Base. This will be followed by Alfred Mayer and his "one-man band" providing music for singing and dancing. Snacks and refreshments will be available, and the party goes until midnight.

Programs and exhibits open early Saturday morning and continue through the afternoon. The Saturday might banquet, which immediately follows the "attitude adjustment" hour, will feature Douglas Edwards of CBS Radio News fame as main speaker. Exhibits and programs resume on Sunday morning, and the convention comes to a close Sunday afternoon with the awarding of several "grand" prizes.

Great Gorge is easily reached from anywhere in the Northeast. It is located in the majestic Vernon Valley area of Northwest New Jersey and I-80, I-84 and I-87 all connect with direct routes to the convention site. The hotel caters to the entire family, with a large indoor swimming pool, whirlpool, game rooms, entertainment, shops and several restaurants. So bring the family along — everyone will enjoy the weekend. You'll meet old friends and make many new ones at Great Gorge.

Write now to HARC, Box 528, Englewood, NJ 07631, for hotel and convention registration forms. Please include your self-addressed, stamped envelope for a prompt reply.

Hamfest Calendar

[Note: Sponsors of large gatherings should check with League Headquarters for an advisory on possible date conflicts before contracting for meeting space. Dates may be recorded at ARRL Hq. for up to two years in advance.]

Alabama: The Annual Selma ARC Swapfest will be held Sunday, Nov. 7, from 9 A.M. to 3 P.M., at the Selma Convention Center, located at the corner of Dallas Ave. and Washington St., Selma. Tables \$3. Plenty of food, parking, prizes, Talk-in on 52. For more info, contact any member of the Selma ARC or write to SARC, P.O. Box 211, Selma, AL 36701.

Georgia: The 1982 Rome Hamfest will be held on Sunday, Oct. 3, at the Rome Civic Center, Rome, from 9 A.M. to 4 P.M. The location on Turner McCall Blvd. (U.S. 27 and GA 20), is different from past years. Many prizes, barbeque, fun and fellowship. Talk-in on 90/30. Contact Buddy Waller, NO4U, 18 London La., S.E., Rome, GA 30161.

†Georgia: The ARC of Savanna will sponsor a hamiest on Oct. 23-24, at the National Guard Armory on Eisenhower Drive. Tickets are \$2.50 in advance, \$3 at the gate. Tables, \$7 for first table; additional tables

\$5. Dealers, prizes, flea market, ARRL and refreshments, Talk-in on 37/97 and 28/88. For further information, write to ARC of Savannah Hamfest, P.O. Box 13342, Savannah, GA 31406.

Illinois: The Chicago Citizens Radio League is holding its first annual hamfest on Oct. 17, at the North Shore American Legion Post, 6040 N. Clark St., 7 A.M. to 4 P.M. Limited table space; reservations must be made in writing to Fred Marlette, KA9FUO, 1851 W. Chase, Chicago, IL 60626.

Indiana: The Hoosier Hills Ham Club will have its 21st Annual Hoosier Hills Hamfest Sunday, Oct. 10, at the Lawrence County 4-H Fairgrounds, 4 miles southwest of Bedford, on U.S. Hwy. 50. Registration is \$3. Swap shop \$2; bring your own tables. Free fish fry, campfire, entertainment, coffee, and overnight ramping Sunday, Oct. 9. Gate opens 10 A.M. Saturday for campers and flea market setup (registration required). Talk-in on 13/73; setup on 3910. For further information, contact Dick Reistter, KA9JTZ, Hoosier Hills Ham Club, Box 891, Bedford, 1N 47421.

†Louisiana: Radio amateurs and computer hobbyists from the Central Gulf Coast will meet Oct. 16-17 at Amacom '82, the New Orleans hamfestcomputerfest, at a new location — Delgado Community College near City Park. Meetings and technical forums, exhibitors, flea market and convenence to New Orlean's attractions. Amateur Radio exams given Saturday morning by New Orleans FCC staff. International broadcasting will be discussed by Joseph M. Costello III, WASHISI, owner of WRNO-Worldwide, the nation's only commercial shortwave radio station. Other features include a DX forum; rolor slow-scan television and computering; meetings of ARRI., Louisiana Council of ARC, MARS, old-timers and computer groups; women's activities. Admission is \$3 per person older than 12. Host hotel will be Holiday Inn — Fat City, 1-10 and North Causeway Blvd., Metairie. Talk-in on 147.285/885, linked with 449.0/444.0. Reservations for FCC tests and other information may be obtained by writing or calling W. D. "Bill" Bushnell, WASMJM, Amacom Chairman, c/o Jefferson ARC, P.O. Box 73665, Metairie, LA 70033, tel. 504-887-5022.

Louisiana: The Twin City Ham Club will hold a hamfest on Nov. 14 at the West Monroe Convention Center, from 8 A.M. until 2 P.M. Tickets \$1 each, or 6 for \$5. Dealers, plenty of swap tables and fellowship. Talk-in on 25/85 and \$2. For information, contact Randy Cage, WB5VIR, 2005 North 7th, West Monroe, LA 71291.

Maryland: The Columbia ARA will hold its 6th annual hantest at the Howard County Fairgrounds (15 miles west of Baltimore, just off 1-70 on Rte. 144, 1 mile west of Ret. 321 on Sunday, Oct. 10, from 8 A.M. to 3:30 P.M. Prizes. Food available. Talk-in on 735/135 and 52. For table reservations or information, write to Sue Crawford, 6880 Mink Hollow Rd., Highland, MD 20777, tel. 286-3805.

Massachusetts: The 19-79 Repeater Assn. of Chelsea, will hold its annual flea market on Sunday, Oct. 17, from 11 A.M. to 4 P.M. (sellers admitted at 10 A.M.), at the Beachmont VFW Post, 150 Bennington St., Revere. Admission is \$1. Sellers' tables are \$6 in advance, \$8 at the door if tables are still available. Talk-in on 19/79 and 52. For table reservations, send check to 19-79 Repeater Assn., P.O. Box 171, Chelsea, MA 02150.

Massachusetts: The 1982 New England DXCC Dinner will be held Oct. 23, at the Concord Lodge of Elks, Rte. 2, Concord. The event will begin at 2 P.M. with a variety of DX-oriented talk and slide programs. Charge for afternoon session is \$2. Cocktail hour begins at 6:30 P.M.; dinner at 7:30 P.M. Cost of evening session is \$12.95. Reservation forms will be mailed in September and available at the ARRL New England Division Convention, Boxboro, Oct. 2-3.

Massachusetts: The Framingham ARA, Inc., will hold its 7th annual fall flea market on Sunday, Oct. 31. We have moved to the Framingham Civic League Bldg. (a larger facility with double the area), located at 214 Concord St. (Rte. 126), downtown Framingham. Doors open at 10 A.M. (sellers setup at 8:30 A.M.). Admission is \$2; tables are \$10 (pre-registration strongly encouraged). Radio equipment, computer gear, food, bargains galore! Talk-in on 75/15 and 52. Contact Ron Egalka, K1YHN, 3 Driscoll Dr., Framingham, MA 01701.

Michigan: The 6th annual radio and electronic hamfest sponsored by RADAR/SMART will be held on Sunday, Nov. 7, from 8 A.M. to 2 P.M., at the Kennedy High School, Taylor. Prizes, food, seminars, displays, cw qualifying runs. Admission is \$2. All tables are \$1 per foot. Contact RADAR, Inc., P.O.

Box 3154, Melvindale, MI 48122, or call Bea Johnson, tel. 313-561-3911

Minnesota: The Viking ARS will sponsor the 12th annual swaptest on Oct. 16, from 9 A.M. to 3 P.M., at the Waseca High School. Talk-in on 34/94. For more information, write to VARS, Box 3, Waseca,

New Jersey: The Bergen ARA is holding a ham Swap 'n Sell on Oct. 10, 8 A.M. until 4 P.M., at Bergen Community College, 400 Paramus Rd., Paramus, Tailgating only. Bring your own tables. Sellers \$3; buyers free. Thousands of spaces. Talk-in on 79/19 and 52. For more info, contact Jim Greer, KK2U, 444 Berkshire Rd., Ridgewood, NJ 07450, tel. 201-445-2855.

New York: The Orange County ARC will hold its annual auction on Saturday, Oct. 2, from 10:30 A.M. to 2:30 P.M., at Munger Cottage, Cornwall. Sellers may arrive at 9 A.M. Admission \$1. Refreshments available. Talk-in on 52. For further information, call Bill, N2CF, at 914-928-6288.

†North Carolina: The Cabarrus ARS, Inc., will hold its annual hamfest on Nov. 7, from 9 A.M. to 5 P.M., at the Concord Boy's Club, Spring St., Concord. Admission is \$2.50 in advance, \$3 at the door. Flea market tables are \$4, or table space \$2.50. Speakers, forums, prizes, food and beverages available. Talk-in on 146.655. For advance tickets and flea market tables or space, send check to CARS, P.O. Box 1290, Concord, NC 28025.

Ohio: The Marion ARC will hold its 8th annual Heart of Ohio Ham Fiesta on Sunday, Oct. 31, from 8 A.M. to 4 P.M., at the Marion County Fairgrounds Coliscum, Large parking area, prizes, food. Tickets are \$3 in advance, \$4 at door. Tables \$5. Check-in on 52, 90/30 or 223.34/224.94. For information, tickets or tables, contact Paul Kilzer, W8GAX, 393 Pole Lane Rd., Marion, OH 43302.

Penusylvania: Swap and Shop, sponsored by the Irwin Area ARA, will be held on Saturday, Oct. 16, at the Circleville VFD, Robbins Station Rd., Irwin, just off U.S. Rte. 30, 3 miles west of Penn. Tpke, (Exit 7). Plenty of indoor and outdoor space available. Flea

market, vendors, prizes, food, Talk-in on 925/325 and 52. For further information, write to John Romesburg, WB3FKB, 835 Butterfield Dr., North Huntingdon, PA 15642, or call 412-863-8397.

Pennsylvania: The Foothills ARC annual Swap and Shop will be held at St. Bruno Church, South Greenshurg, on Saturday, Nov. 6. Tickets are \$2, or 3/\$5. Indoor flea market, refreshments and prizes, Talk-in on 07/67 and \$2. For further information, contact W3TTN, or write FARC, P.O. Box 236, Greensburg, PA 15601.

Pennsylvania: The R. F. Hill ARC will hold its 6th annual hamfest on Nov. 7, in the Sellersville National Guard Armory, Sellersville. Doors open at 7 A.M. for sellers, 8 A.M. for buyers. Prizes, refreshments and heat. Talk-in on 28/88 and 52. For further information, contact R. F. Hill ARC, Box 29, Colmar, PA 18915

†Tennessee: The Memphis Hamfest, the last big one of the season, will hold its hamfest at the Memphis Fairgrounds (Mid South Bldg.), Saturday, October 9-10, 8 A.M. to 4 P.M., and Sunday, 8 A.M. to 2 P.M. Children under 14 free. Flea market and dealers may set up Friday evening until 9 P.M. Activities include radio and computer forums, women's programs, hospitality party Saturday night. On site trailer hookups. Talk-in on 28/88 and 25/85. For more info, contact. Clayton. Elam, K4FZJ, 28 N. Cooper, Memphs, TN 38104, tel. 901-274-441c. days, Memphis, TN 38 901-743-6714 nights.

Texas: The Caprock Repeater Club will have its swap meet on Oct. 3, at KOKO Corners, 50th and Ave. Q, Lubback. Doors open at 8 A.M. Hospitality room sponsored by Meocom at the Villa Inn on Saturnight. Tickets available from Don Mosher, WB5BRY, 5404 44th St., Lubbock, TX 79414.

Texas: The San Angelo ARC is holding its annual swapfest on Sunday, Oct. 3, starting at 8 A.M., at the club house adjacent to Mathis Field. Pre-registration is \$4; at the door \$5. Barbeque served on grounds. Prizes. Talk-in on 34/94. For more information, contact Mark Haskell, Rte. 3, Box 92, San Angelo, TX

W1AW Schedule

October 31, 1982 -- April 24, 1983 MTWThFSSn = Days of Week Dy = Daily

EST

Slow Code Practice Fast Code Practice Cw Bulletins RTTY Bulletins Voice Bulletins

Dy: 5 P.M., 7 P.M.; TThSSn: 4 P.M., 10 P.M. MWF: 9 A.M., 10 P.M.; TTh: 9 A.M.; TThSSn: 7 P.M. Dy: 5 P.M., 8 P.M., 11 P.M.; MTWThF: 10 A.M. Dy: 6 P.M., 9 P.M., 12 P.M.; MTWThF: 11 A.M. Dy: 9:30 P.M., 12:30 A.M.

CST Slow Code Practice Fast Code Practice Cw Bulletins RTTY Bulletins Voice Bulletins

MWF: 8 A.M., 6 P.M.; TThSSn: 3 P.M., 9 P.M. MWF: 3 P.M., 9 P.M.; TTh: 8 A.M.; TThSSn: 6 P.M. Dy: 4 P.M., 7 P.M., 10 P.M.; MTWThF: 9 A.M. Dy: 5 P.M., 8 P.M., 11 P.M.; MTWThF: 10 A.M. Dy: 8:30 P.M., 11:30 P.M.

PST Slow Code Practice Fast Code Practice Cw Bulletins RTTY Bulletins Voice Bulletins

147.555 MHz.

MWF: 6 A.M., 4 P.M.; TThSSn: 1 P.M., 7 P.M. MWF: 1 P.M., 7 P.M.; TTh: 6 A.M.; TThSSn: 4 P.M. Dy: 2 P.M., 5 P.M., 8 P.M.; MTWThF: 7 A.M. Dy: 3 P.M., 6 P.M., 9 P.M.; MTWThF: 8 A.M. Dy: 6;30 P.M., 9:30 P.M.

Code practice and cw bulletin frequencies: 1.818, 3.58, 7.08, 14.07, 21.08, 28.08, 50.08,

RTTY bulletin frequencies: 3.625, 7.095, 14.095, 21.095, 28.095, 147.555 MHz. Voice bulletin frequencies: 1.89, 3.99, 7.29, 14.29, 21.39, 28.59, 50.19, 147.555 MHz.

On Monday, Wednesday and Friday, 1400 through 2200 UTC, transmissions are beamed to Europe on 14, 21 and 28 MHz.

Slow code practice is at 5, 7-1/2, 10, 13 and 15 wpm. Fast code practice is at 35, 30, 25, 20, 15, 13 and 10 wpm.

Code practice texts are from QST, and the source of each practice is given at the beginning of each practice and at the beginning of alternate speeds. For example, "Text is from August 1982 each practice and at the beginning of alternate speeds. For example, "Text is from August 198 QST, pages 9 and 66" indicates that the main text is from the article on page 9 and the mixed number/letter groups at the end of each speed are from the contest scores on page 66.

On Fridays, UTC, a DX bulletin replaces the regular bulletin transmissions.

Cw bulletins are sent at 18 wpm; Teletype bulletins are sent at 60 wpm with 170-Hz shift, then repeated on 110-baud ASCII.

W1AW is open for visitors Monday through Friday from 7:30 A.M. to 1 A.M. EST and on Saturday and Sunday from 3:30 P.M. to 1 A.M. EST. If you desire to operate W1AW, be sure to bring a copy of your license with you. W1AW is available for operation by visitors between 1 and 4 P.M. Monday through Friday.

In a communications emergency, monitor W1AW for special bulletins as follows: voice on the hour, RTTY at 15 minutes past the hour, and cw on the half hour.

W1AW will be closed on November 25 and 26, December 24, 25 and 31, January 1, February 21 and April 1.

Station staff: Chief Operator/Asst. Communications Mgr. C. R. Bender, W1WPR; Charles Chadwick, K8AXL; Bruce Kampe, WA1POI.

Strays 🦥



Members of the South Jersey RA "ham it up" aboard the Queen Elizabeth II, where they operated K2AA/QE2 when the cruise ship was in port at Philadelphia as part of that city's 300th anniversary celebration. Operating on 40, 20 and 2 meters, club members made about 2000 contacts in April. (photo by Jeff Richmond, WA2WSV)

QST congratulates . . .

W. Jack Warren, WB4MDC, of Lynchburg, Virginia, on receiving a certificate of merit from the Lynchburg City Fire Department for exhibiting "the highest order of humanitarian concern for fellow citizens" while attempting to rescue a woman from her hurning home,

I would like to get in touch with . . .

II hams with high IQs who would be interested in joining the Radio/M group of Mensa, the high-IQ society. Chod Harris, WB2CHO, 3529 Deer Park Dr., Santa Rosa, CA 95404.

Bilent Keps

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

W1AGB, Frank R. Warden, Adamsville, R1
W1CBV, Lauris P. MacGown, Newport ME
W1BYX, Alfred C. Denson, Rockville, CT
W1FNE. John F. White, New London, CT
K1RWF, Jean P. Boisclair, Sr., Granby, CT
K1ZHA, Perry A. Allen, Newport, R1
W1ZPG, Warren H. Hinterland, Cranston, R1
W2CBY, Emil J. Spisak, Bayonne, NJ
W2CET, Victor i... Miller, Bethpage, NY
W2EQS, Charlie M. O'Brien, Mishawaka, IN
W2FST, William W. Deckert, Sweetwater, NJ
W2FST, William W. Deckert, Sweetwater, NJ
W2FST, William W. Deckert, Sweetwater, NJ
W2HO, William E. Kind, Succasunna, NJ
W2JBK, Charles F. Cella, Toms River, NJ
*WBZJMA, Frank F. Bicking, Jr., Cannden, NJ
W2MJB, George Waksmonsky, Clifton, NJ
W2PV, Dr. James L. Lawson, Schenectady, NY
W2QBZ, William L. Rust, Apalachin, NY
W2RHY, John Kreyling, Skillman, NJ
W2THC, Frank W. Potter, Syracuse, NY
W3CNT, Alfred J. Gross, Blasdeli, NY
W2THC, Frank W. Potter, Syracuse, NY
W3CNX, Sennett A. Kendig, Rochester, NY
*W3CNX, Samuel J. Ferraro, Carrollton, MI
K3DOC, Thomas R. Warner, Silver Spring, MD
W3FVC, Albert F. Storz, Pottstown, PA
W3GBA, Richard J. Travatti, Brookhaven, PA
W3GBA, Richard J. Travatti, Brookhaven, PA
WA3RUL, David C. Abbott, Battimore, MD
WA3SGE, Paul C. Fly, Pittsburgh, PA
K04BL, Millard J. Klimaszewski, Springville, TN
NDDAV, James C. Goodwin, Vero Beach, FL
K4ESE, Dr. Darrel L. Vaughn, Morganfield, KY
K4JFG, Oscar B. Enright, Jr., Lynchburg, VA
K4JK, Edwin A. Kirchhuber, Elkmont, AL
WB4NDW, Cornelius J. Seay, Jr., Mechanicsville
VA

VA
W4NPG, Clayton W. Hanson, Alexandria, VA
W4NPG, Clayton W. Hanson, Alexandria, VA
W4NNJ, Paul J. Warrick, Englewood, FL
W440BC, William F. Coleson, Gonzalez, Fl.
KA4UCC, Joseph C. Nichols, Richmond, VA
WA4VBV, Lt. Col. Harold W. Dukett, Sumter, SC
W4VBW, Thomas T. Mosby, III, Sarasota, FL
WA4VSZ, Alfred Churchwell, Sterrett, AL
K4YN, Luther H. Anderson, Naples, Fl.
KA4ZDN, Jack J. Nichols, Robbins, NC

WD5BHC, Virginia P. Verble, San Angelo, TX
W5CMV, Dayle S. O'Dell, Shreveport, LA
N5DVO, Patricia A. Wiggins, San Angelo, TX
W5GKR, Finis E. Wills, Temple, TX
W5GKR, Finis E. Wills, Temple, TX
W5GC, George T. De LaMatyr, Beaumont, TX
W5IXZ, Cecil V. Self, Roy, NM
W5LAE, William F. Brown, New Orleans, LA
W5LZ, Leo F. Weiss, Lone Wolf, OK
W5RBE, John C. Doerflinger, Greensburg, IN
W5SSHX, Tommy S. Buse, Luka, MS
WA5UCD, Frank A. Wilshire, Tyler, TX
K5ZK, Stanley E. Rupert, Oklahoma City, OK
W6BYS, William P. Green, San Francisco, CA
W6CCZ, William W. Olsen, Valley Center, CA
W6CCT, William W. Olsen, Valley Center, CA
W6CCT, William W. Olsen, Valley Center, CA
W6CGU, Philip I. Olson, Palm Springs, CA
W6EAC, Alfred M. Jensen, San Mateo, CA
W6EAC, Alfred M. Jensen, San Mateo, CA
W6GOJV, Charles D. Stotts, Jr., Fresno, CA
W66QJV, Charles D. Stotts, Jr., Fresno, CA
W66QJF, Theodore E. Von Zell, Whittier, CA
W66QJF, Theodore E. Von Zell, Whittier, CA
W64RHA, Robert C. Neumann, Laguna Hills, CA
W67F, Floyd A. Trueblood, Reseda, CA
W6VEI, Donald G. McVicker, California City, CA
K6VR, Jay W. Patterson, Sr., San Francisco, CA
W66WPC, Robert M. Langston, Bakersfield, CA
ex-KN7DML, James L. Conley, Cottage Grove, OR
K7JJ, William L. Wallace, Inchine Village, NV
W7JS, Walter W. Walker, Seattle, WA
W7KBP, Thomas W. Moore, Eugene, OR
W7NC, Lloyd K. Cochrane, Kahlotus, WA
WA7OYX, Jones E. Corwin, Mesa, AZ
W7SLU, Charles E. Wyatt, Phoenix, AZ
W7SLU, Charles E. Wyatt, Phoenix, AZ
W7SLU, Charles E. Wyatt, Phoenix, AZ
W88AJK, Charles L. Jenks, Fostoria, OH
W8BOQC, Thomas J. McDuffee, Cincinnati, OH
W8BOQC, Thomas J. McDuffee, Cincinnati, OH
W8ECG, Frank A. Denes, Elyria, OH
K8ERE, Richard D. McFadden, Dayton, OH
K8ERE, Richard D. McFadden, Dayton, OH
K8ERE, Richard D. McFadden, Dayton, OH
W8ENDX, Paul F. Richardson, Carey, OH
ex-W8OAJ, Pete Antolich, Masury, OH
W8BNDJB, Walter M. Drake, Jr., East Cleveland,

WB80JB, Walter M. Drake, Jr., East Cleveland, OH WA80NS, Herman H. Vogeler, St. Bernard, OH WA80YU, Peter Pritko, Parma Heights, OH

WASQNP, Kenneth E. Portz, Mansheld, OH WaTH, Paul G. Wiegert, Jr., Centerville, OH WARWAX, Eleanor J. Paxton, Akron, OH WAWKY, Albert A. Aurelio, Barberton, OH WWKYG, Paul T. Crowell, Springfield, OH WBSZFB, John S. Beardsley, Tecumsch, MI WD9DHT, Kobert W. Ward, Harshaw, WI KA9DWC, Edison A. Thomas, Sr., Borden, IN W9IOG, Evan W. Barton, Ellenton, FL KA9IVF, Charles A. LaForce, Sr., Wauwatosa, WI W9QLD, Hiland E. "Hi" Hewson, Waukegan, IL ex-W9RCH, Earl G. Brey, Manawa, WI W9GLD, Hiland E. "Hi" Hewson, Waukegan, IL ex-W9RCH, Earl G. Brey, Manawa, WI W9TGX, Cornelius "Neal" Perry, Vincennes, IN K9THR, Harvey F. Guilette, Sturgeon Bay, WI W9ZEL, John J. Waycuilis, Barrington, IL W0CPC, Frank b. Osier, Solon, IA W0DJU, John M. Johnson, Sioux City, IA W0FOB, Arthur R. Gaeth, Omaha, NE W0GMC, Eugene M. Kilbury, Bunker, MO *Al01., Larry D. Wilson, La Plata, MO W0NJI., Thomas J. Neumann, Omaha, NE W0NTA, Leo V. Davis, Des Moines, IA N0RN, Robert M. Nelson, Dassel, MN W40WAC, Woodrow W. Franklin, Willard, MO WB0WLM, George H. Staats, Hermitage, MO KH6EXB, Charles N. DeClue, Ewa Beach, HI V22AB, Alex Lariviere, Quebec, PO V23GO, Harold G. Palin, Guelph, ON VE3HI, James F. Potts, London, ON VE3HI, James F. Potts, London, ON VE3HOJ, William H. Waters, Oxford Mills, ON VE3TO, Charles P. Henstridge, Nanaimo, BC VE7UW, Roland L. Havard, Victoria, BC VE7WZ, Arthur W. Filtness, Vancouver, BC

*Life Member

In order to avoid unfortunate errors in the Silent Keys column, reports of Silent Keys will henceforth be confirmed through acknowledgment only to the family of the decased. Thus, those who report a Silent Key will not necessarily receive an acknowledgment from

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

October 1932

[3] In the editorial, Assistant Secretary Budlong reports that WISZ of the Hq. staff is scheduling EAR96 for relaying the latest developments at the Madrid conference, as reported by Warner and Segal. In the same editorial, Budlong quotes a newspaper account that Marconi has successfully transmitted 'phone and code a distance of 170 miles on a wavelength of 57 cm..." ... with the implication that the eminent inventor had at last found a way to 'bend' such short waves and overcome the horizon range."

☐ In "W6USA — The World Was Its Oyster," Bill Lippman, Jr., W6SN, describes the famous station at the 1932 Olympic Games, and presents some statistics to justify the title. The worldwide Amateur Radio service rendered the athletes and relatives received excellent press coverage and made the two-month operation very worthwhile.

"I George Grammer describes "Electron-Coupled Oscillators for the Small Transmitter," and selects the '24 tetrode as a good choice to drive a '47 pentode amplifier and a '46 high-µ multiplier.

Harman and the supply for A.C. Receivers," developed by D. Dekker, PAPPDA, and W. Keeman, PAPZK, uses a string of neon "night lights" as the voltage regulator for the rectified-a.c. plate supply.

True McLean of Cornell University writes of "Transmission-Line Feed for Short-Wave Antennas." A good case is made for keeping the open-wire line halanced (to avoid radiation from the line), and, after pointing out inherent advantages of coaxial line, the author asks the readers if they have any good ideas for

its inexpensive manufacture.

☐ Ross Hull reports that "The 56-Mc. Eclipse Expedition" had lots of luck, all bad. The vehicle that was to carry the radio gear was an autogyro with a ceiling of about 3000 feet with gear and passenger aboard. The day of the eclipse it couldn't get off the ground, despite everyone's best efforts. The eclipse was right on schedule — scratch one eclipse expedition.

25 Years Ago

October 1957

☐ The editorial pays tribute to the 144-Mc. QSO of W6NLZ and KH6UK (reported last month).

"... The contact broke the amateur record by more than 1100 miles, and it exceeds by some 25 percent the greatest distance over which signals of anything like this frequency had ever been received before."

"An Ultrastable Keyed V.F.O." by J. M. Shulman, W6EBY, is a description of his version of the remote-tuned oscillator used by some of the side-band gang. For chirpless keying, the screen voltage is "keyed" over a range of about 2 V, sending the tube "just in" and "just out" of oscillation. A warm-up drift of under 2 parts per million was quite superior to the 63 p.p.m. of a commercial job.

□ W. B. Bernard, W4ELZ, says, "Let's Increase V.F.O. Stability." He offers as a promising approach a return to the high-C Colpitts circuit, and gives his reasons why.

© QST Advertising Manager "Pete" Morrow, WIVG, doubles in brass (pun intended) as a contest man, and his "Contests" is a four-page account of the

advantages of entering these battles, 'phone or c.w. He has some good operating suggestions and a list of some of the more popular tests.

□ Phil Simmons, W1ZDP, takes over 10 pages (mostly small type) to report that "1957 field Day Tops 'Em All!" Who's arguing? Phil had to recheck his figures several times to convince himself that there were indeed 10,264 participants.

"The 'Club Saver' 2-Meter Portable," by Robert Tschannen, W9LUO, tells how a group project (50 units were built by club members) brought lots of new activity and an increase of 300 to 400 percent in club attendance. The rig is a crystal-controlled transmitter and a superhet receiver with superregen second detector. Cost was \$30 per station, less power supply.

U.H.F. Editor Tilton, WIHDQ, describes his "Six Elements on 6," a wide-spaced Yagi with gamma match design based on the "trombone" variable capacitor of W2VS.

Lew McCoy, WHCP, tries to help those with "impossible" locations with "A Window-Sill Antenna." It utilizes a mobile "whip" and an L-C matching system, and it works on 80 through 6 meters.

☐ To fill a need for a variety of well-regulated amplifier screen voltages, L. D. Chapman, W4PRM, designed a "Combination Regulated Power Supply" that will work over 225 to 1200 V. It is done by increasing the reference-voltage range.

(1.14A Universal Power Supply) of Robert Foltz, W9GBT, delivers 50 W plate power from a 6- or 12-V ear battery or the 115-V a.e. line. Vibrators and tube rectifiers are used.

CI George Luick, WØBFL, takes the "hang" a.g.c. circuit of W1DX (Jan. 1957) and builds it like it shoulds been the first time around. He tells all in "Improved A.V.C. for Side Band and C.W." Audio rectification is the straightforward solution.

Byron Goodman, W1DX

In Training

INSTRUCTORS RESPOND TO A CODELESS LICENSE

July's In Training column asked for your perspective on the issue of a code-free license. The column sparked over 70 responses from you, ARRL members and Amateur Radio instructors. Overwhelming support was expressed for continuing the code requirement for all Amateur Radio licenses. Even though the ARRL Board of Directors and the majority of amateurs in the field are against a no-code license, the FCC continues its movement toward the elimination of the code for a future class of license

Comments came with reasons and explanations based on your experience in teaching and learning the oased on your experience in teaching and rearning the code. You responded to far more than just those questions posed in July QST. You expressed values and feelings inseparable from a skill that has been the common thread binding all radio amateurs since the

early days of spark gap.

On what premise is the possibility of a no-code license based? As one person answered, "A codeless amateur license would serve one purpose and one pur-pose only: FCC deregulation." Another respondent saw a different motive: "In all fairness, however, I suppose we should at least consider the premise by the FCC that the code may be denying a group of 'technically creative people' the opportunity to 'advance the state of the art significantly.''

An unofficial FCC announcement in early July reported that the Commission had instructed its staff to prepare a Notice of Proposed Rulemaking toward implementing a no-code aniateur operator class. The news release explained that two options were to be presented; "eliminating the slow-speed telegraphy test requirement of the existing Technician operator class and creating a new operator class patterned after the

*Training Program Manager, ARRL

Canadian Digital Radio Operator class.*

The ARRL Board of Directors officially went on record during the March Board Meeting as strongly opposing a no-code Amateur Radio license. This stand reflects the opinions of licensed amateurs throughout the country, and particularly ARRL members. A seven-to-one ratio of letters in opposition to a codefree license appeared on the Training desk during

Many of you said that the Morse code is not a barrier to technically qualified individuals. One instructor said, "In fact, I cannot remember ever having a Novice class student show great technical potential, but give up on Amateur Radio because of difficulty learning code. It seems like those people who can meet the challenges of making technical advances Amateur Radio are not going to let themselves be deterred by the Morse code test,"

For those who claim that they cannot learn the code, even at 5 wpm, only a negative attitude is in the way, according to many letters. One instructor who has a professional background in education said, "I have dealt with students with learning disabilities, hearing loss and other problems which would cause many to shy away from the Morse code. I have found, in my experience, none that could not learn the code if they chose to do so. This includes those with a learning disability and up to 60% hearing loss."

letters stressed motivation, effort and persistence in learning cw as the major factors for success. "The code requirement serves as a sort of filter. The really dedicated person will make the effort it requires to obtain a license," one instructor pointed out. Interested persons are not left without help as another respondent added, ARRL instructors are more than obliging and helpful in bringing newcomers aboard,

but none in our circle are willing to waive the present simple requirements."
Why is the code requirement important to keep for all amateur licenses? We received ample comments, one of which echoes a strong fear: "I do not want to see a code-free license, because I am afraid that it will

turn a code-free amateur band into nothing more than another Citizen Band," Conversely, another sug-gested: "The fears that a no-code license would open the flood gates to a CB-type syndrome is unrealistic. That type of ham without a deep interest in radio goes on to other things when the novelty wears off."

There were a few members who felt today's

technology has made the basic need for the Morse code requirement obsolete. One person wrote, "I believe that a codeless license should be available to anyone who can pass the Extra Class exam. Cw operation, enjoyable as it is, is no longer a progressive influence in Amateur Radio. (Some might disagree, of course.) Brass pounding has had its day. It was truly a magnificent day."

agnificent day."
The standards and traditions of our hobby are threatened by the proposal, according to some: feel strongly that weakening of the licensing standards by eliminating the code test will similarly weaken the high standards we all have come to respect through Amateur Radio." "And," an old-timer questions, "what in fact is a ham? He is an Amateur Radio Operator. It is the American Radio Relay League. We are, I trust, not merely a large crowd of 'talkers.' The learning of the code is indeed a small requirement from those who wish to enjoy the great privilege of entering the world of Amateur Radio."

The ARRL Board of Directors has taken the posi-

tion to support the continuation of the code requirement at all license levels. However, FCC Chairman Mark Fowler has signaled his intention to introduce a code-free license of some kind during his term. The Notice of Proposed Rulemaking considering two specific options - a codeless Technician class and a Digital Radio class — is a step toward implementing a no-code license. If a codeless license were adopted, no-code license. It a codeless license were adopted, which is by no means a certainty, which of the proposals under consideration would be more desirable to you? We welcome your suggestions. The Training Branch thanks everyone who has responded to this important issue.— Steve Ewald, WA4CMS, Training Assistant, ARRL

Strays

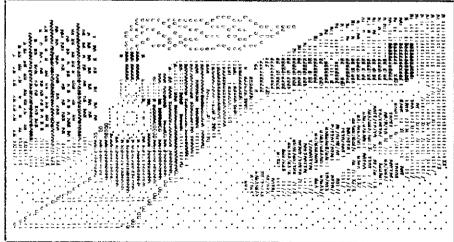
I would like to get in touch with . . .

[1] anyone who has a schematic that includes voltage specifications for a Model ES-550B oscilloscope built by Precision Apparatus of Glendale, New York, about 1959. Ray Pike, WA4BHP, Rte. 6, 8336 Sevigny Rd., North Fort Myers, FL 33903.

iii anyone who has technical data on a TU75B tuning unit. It has three tubes (815/832), and can be converted into a 10-meter transmitter. Paul Boller, WBIRT, 1868 Springmont Ave., Springfield, OH



Robert Dickinson, W2CCE (center), of Berkeley Heights, New Jersey, receives the National Cable Television Association's 1982 Engineering Award for Outstanding Achievement in Development. Presenting the award in Las Vegas, Nevada, are NCTA President Tom Wheeler (right) and outgoing Chairman of the Board Allan Gilliland. (photo courtesy NCTA)



"The Railroad," by Jean Carter, KA6HJK, of Buena Park, California, won first place in the 1981 Worldwide RTTY Art Contest, sponsored by the Southern Counties (California) Amateur Teleprinter Society. Entries by WA2OQJ, of Hicksville, New York, and K3YUH, of Monaca, Pennsylvania, took second and third place, respectively. OZ5RT and WA7NGN received honorable mentions.

I would like to get in touch with . . .

(1) anyone using the Heathkit SB-610 in conjunction with the SB-102 or any other transceiver/receiver for RTTY tuning purposes. Daniel T. Ruth, KA3AQV, 2621 27th St. S.W., Allentown, PA 18103.

I would like to get in touch with . . .

O anyone interested in joining the Interstate College Net every Friday at 1 P.M. EST on 7.247 MHz. Kenneth M. Klima, KA8BQF, 5992 Chestnut Hills Dr., Parma, OH 44129.

The World Above 50 MHz

Conducted By William A. Tynan,* W3XO



How Goes It with 50.2?

At its 1980 conference held that year in Colorado Springs, the Central States VHF Society voted to recommend the use of 50.2 MHz as the 6-meter "Domestic Calling Frequency." In addition, 50.110 was retained as a calling frequency for attempts to work stations outside the continental U.S., or Canada, This proposal was announced via this column in December 1980, and has been mentioned on several occasions since that time, including a discussion on the use of calling frequencies in general in May 1981. It is also noted that 50.2 is referred to as the "National Calling Frequency" in the 1982 edition of the ARRL Repeater Directory. The lead for this month's column is devoted to presenting a status report on how the 50.2 is faring, and to making another plea for its greater use.

First: How is it going? There have been two summer Sporadic E seasons and an equal number of winter F2 seasons since the CSVHFS proposal was made, I must say that summer 1981 did not show much evidence that anyone had heard of the idea. Even on long widespread openings it was difficult to get answers to CQs on 50.2. Anything above 50.15 was apparently considered by many to be "super high frequency," unreachable by their dials. During the winter F2 season the situation was slightly better, but even then only on the most active weekend transcontinental openings was there appreciable ssb activity at 50.2 and above. But. 1982 has been a different story. As I have stated that I would, this conductor has spent a lot of available operating time around 50.2, unless it appeared that DX contacts were likely at the time. This year, CQs in that portion of the band brought numerous replies, sometimes even pileups. I hasten to point out that my kilowatt amplifier was not in service a good portion of the summer, so my power was in the 100-W range most of the time. Thus, my potential for attracting attention and generating pileups was not particularly great. Even when I was not actively operating. I heard an increased amount of activity in the 50.15 to 50.2 part of the band and even above. Also, the crowding around 50.110 was often not quite as severe as it had been in previous years, although it was still greater than most would like.

There are, of course, those who will always insist on using the most popular frequency in whatever band they are on whether they are talking 10 miles or 10,000. If they do condescend to QSY, their limit is usually 3 or, perhaps, 5 kHz. Almost invariably, they are the ones with the big and not necessarily the

cleanest signals, so at that separation their buckshot is often more difficult to conv weak signals through than is their main signal. I am sure that if 50.2 becomes the place to be on 6 meters, they will be there. Certainly, 144.2 has its share of problems, just as 144.110 did when it was the prime spot on 2 meters. Nevertheless, because a rallying frequency located 100 kHz from the band edge affords much more room for moving off once contact is established than does one only 10 kHz away, people tend to move farther. Two meters is now a much better band on which to operate than it would have been if 144,110 had remained "the frequency." It was just this sort of logic, and the knowledge that it would be difficult to communicate to the DX stations sufficiently to convince them to move from the vicinity of 50.110, that led the Central States VHF Society to recommend 50.2 as the "domestic calling frequency," while keeping the area around 50.110 as the DX calling and working portion of the band. This suggestion is in consonance with the recommendation of a group of 6-meter DXers in south Florida that 50.1 to 50.125 be used only for working, or attempting to work, international DX stations.

Despite those who hang on to the customs of the past — and they will always be with us — the rest of us can still forge ahead and help set new, more desirable operating patterns. Even if there remains a few diehards clinging to 110 for dear life, it will still be easier for the rest of us to copy the weaker DX through one or two S-9 signals than through 10 or 20 of them.

When presented with the argument for 50.2. many say: "Fine. When the band opens, I'll move up; but when it's dead why worry about it." The logic of this contention is certainly persuasive. However, 6 meters is a unique band, which is one of the things that makes it intriguing for so many of us. It may be a local band one minute, but open for worldwide contacts the next. The problem is that few of us remember to QSY until the QRM becomes so bad that we are forced to. Many times we get so wrapped up in our QSO that we don't even realize that the band is open. The number of instances that a local contact on or near 50,110 has prevented others perhaps 10, 100, or even 1000 miles away from hearing a fleeting, weak DX signal - and thus to miss out on a new country — is unknown, but the possibility of it happening under our present operating habits certainly exists. The point is that it need not happen at all. There is no reason that local and regional QSOs cannot take place above, say,

50.130 or higher. If they begin on 50.2, there is more likelihood that they will remain well up in the band following a QSY off the calling frequency, so they are much less likely to disrupt the chances of those who are pursuing clusive DX.

Getting answers on 50.2 when the band is wide open, and having anyone come back to your call when the band is dead, are two entirely different things. I know. I have tried. What is the answer, then, to generating more consistent activity in this part of the band? For one thing, we can QSY to a frequency near 50.2 after establishing contact on 110. This is in line with the concept that calling frequencies are for initiating contacts and not for long-winded QSOs. Another approach is to call CQ first on 50.2 and, if no response is forthcoming, to call on 50.110. Those with scanning receivers certainly can include 50.2 in the frequencies they watch regularly. Those who do not have the time they might like to engage in numerous contacts might park their receivers on 50.2 rather than 50.110. When they do hear a CO. they could go back to the calling station and spend a few minutes, at least, in a OSO. In this way they can act as a catalyst in helping get activity launched in that part of the band. The rallying spot was changed on 2 meters a few years back, and it can be made to happen here as well if enough people put forth some effort.

With the DX potential available on 6 meters, some of which we may be experiencing again about the time this appears, the benefits are even greater than on 2 meters. Those who don't believe in the idea, and I am sure there are quite a few, are not expected to be persuaded to change their minds by the arguments presented here. That is not the intent of these paragraphs. What they are intended to do is to provide some encouragement to those who believe that the CSVHFS has come up with a worthwhile suggestion for improving life on 6 meters, and to help in getting the ball rolling. For, if the shift to 50.2 is to occur, they must be the ones to lead the way. The rest will follow when most of the people to talk to are no longer to be found on 50,110.

How goes it with 50.2? There is progress, but it is slow. This is not surprising for such a major change in operating habits of so many. However, 50.2 can become accepted as the domestic calling frequency if enough people who believe in the idea get behind it and actually begin to use it that way, rather than waiting for the next guy to make the first move.

CII around 50.21

THE 1982 CENTRAL STATES VHF SOCIETY CONFERENCE

As always, this year's Central States VHF Society's Conference was well worth the attendance by anyone interested in getting the most out of the world above

*Send reports to Bill Tynan, W3XO, P.O. Box 117, Burtonsville, MD 20866, or call 301-384-6736 to record late-breaking information. 50 MHz. This year's gathering was held in Baton Rouge, Louisiana, under the stewardship of Society President Bob Taylor, WB5LBT. In addition to proding the chance to meet face-to-face with many of the most accomplished wheres in the country, as well as some from other parts of the world, the conference featured its share of interesting and informative papers on a variety of whf/uhf-related subjects.

Among them, Derwin King, W5LUU, presented a very interesting talk on sky noise and its effects on moonbounce. He showed a number of detailed plots illustrating very graphically one reason that some

times are better than others for digging those weak moon reflected signals out of the noise. Budding radio astronomers would have found his talk especially interesting. Al Ward, WBSLUA, provided an informative paper on system noise temperature. One of the points that Al brought out was that GaAs FETs tend to provide their lowest noise figure when matched to an impedance in the vicinity of 50 ohms, whereas bipolar transistors must be mismatched in order to gain their best noise figure. Since a matched line exhibits a lower loss than does one with a high VSWR and losses translate to increased noise, GaAs FETs



Among those attending the Central States VHF Society Conference held at Baton Rouge, Louislana, July 29-Aug. 1, 1982, were (I-r) VK6KZ, W6ABN, ZS1FE/KE3D and LU3DCA. (photo by W4HHK)

have a distinct edge over bipolars, especially when used with a transmission line of any appreciable length.

fim Stewart, WA4MVI, ably filling in for K4PKV, discussed meteor scatter, a very timely subject with the Ferseids shower coming up in mid-August. A report on the Phase III satellite, due for launch early in 1983, and what it can mean to vhfers was the subject of a talk by AMSAT President Tom Clark, W3IWI. Tom sees the new spacecraft replacing the current hi nets where depend on for keeping in touch with each other.

Russ Wicker, W4WD, told how he obtained an experimental ficense for the 902-MHz band, and of the EME experiments he has already conducted with Bob Sutherland, W6PO, who holds a similar authorization from FCC. Russ urged more people to apply for these experimental licenses in order to gain experience on the band and to demonstrate to Washington that hams are interested in being authorized operation on 902 to 928 MHz, allocated to us at WARC. Since this kind of grant is in the Experimental Service, not the Amateur Service, power and type of emission are not restricted, but must be specified on the application, and a report of results obtained in the experiments is called for. Those wishing to avail themselves of this opportunity should write to FCC, Washington, DC 20554, and request Form 442. One requirement is that the applicant have available a copy of Part 5 of the Commission's rules.

rules,
"The Wonderful World of ATV" was the title of a
very interesting talk given by long-time vhfer W5DFU,
and WB9SNR provided an insight into the latest
design wrinkles for solid-state 23-cm linear amplifiers.

Monbounce operation from England was the subject of a Sunday morning talk by G5CSZ/KR5F, VK6KZ, co-holder of the 23-cm terrestrial DX record, gave a fascinating account of microwave operation from his corner of the world, Another foreign guest, familiar to most 6-meter operators, was LU3DCA. G3POI, a whifer well known in Europe, was also among the attendees.

among the attendees.

John Lindholm, W1XX, from League Hq., led a discussion of the deliberations of the ad hoc Committee on VHF Contests, and showed, in simple terms, how to determine one's grid square. These are being considered as multipliers, replacing ARRL Sections, in future vhf contests. As in previous years, noise-figure and antenna-gain tests were very popular features of the Conference.

The Saturday evening banquet was one of the high spots of the three days. This year's conference was dedicated to the memory of Mel Wilson, W2BOC/WIDEI, who passed away earlier this year. Mel's widow, Ellie, was present to receive a special plaque commemorating his service to vhf and the

The John Chambers award, given annually in recognition of outstanding contributions to vhf and uhf, went this year to Al Katz, K2UYH, for his many accomplishments on 70-cm and 23-cm EME and the help he has provided others over the years through publication of *The 432 and Above EME News*. This conductor was overwhelmed and extremely honored upon being presented with the Melvin S. Wilson Award, initiated this year to recognize general contributions to vhf, not necessarily of a technical nature.

Thanks to the diligence of Prize Committee Chairman Al Ward, WB5LUA, there were more prizes than attendees, who numbered nearly 200. The women did well in this department, too, as a result of the work of Al's XYL, Emily. Many of the wives participated in a very interesting tour of several antebellum plantations in the vicinity of Baton Rouge.

in the vicinity of Baton Rouge.

Society officers for next year will be Tom Bishop,
KØTLM, President; Jim McKim, W@CY, Vice Presi-

dent; and holdovers Joe Muscanere, WA5HNK, Treasurer; and the always faithful Ted Mathewson, W4FI, Secretary. The 1983 Conference will be held in Kansas City the last weekend in July.

TWO UPCOMING VHF CONFERENCES

Fall has become an important time for vhf conferences, just as have spring and summer. The first of these is sponsored by the Mt. Airy VHF Radio Club, popularly known as the Pack Rats. It will be held Saturday, October 2, at the Warrington Motor Lodge in Warrington, Pennsylvania, just north of Philadelphia. Speakers will include WA3AXV, on microelectronics; W4RI, on packet radio; KAIGT, on 10-GHz, propagation; W3HQT and WA3JUF, on practical solid-state equipment for 2304; and K2UYH, on stressed dishes. The technical presentations will be topped off by a social hour and dinner. The following day, the club also sponsors the big annual Hamarama flea market at the Bucks County Drive-in, just up the road from the lodge. For further information, contact Ron Witsel, WA3AXV, at 215-355-5730.

road from the lodge. For further information, contact Ron Witsel, WA3AXV, at 215-355-5730.

The other conference will be held at Western Michigan University in Kalamazoo, Saturday, October 23, in the University's Kohrman Hall. I do not have a list of the papers to be presented, but if they are of similar quality and coverage as those given last year and published in the conference proceedings, they should be worthwhile for any serious whier. For further information on this affair, contact Dr. Glade Wilcox, W9UHF, Department of Electrical Engineering, Western Michigan University, Kalamazoo, MI 49008.

ON THE BANDS

6 and 2 Meters — There was so much that occurred during late July and early August that, this time at least, I will combine the reports for these two bands.

As promised last month, here is more information on the Saint Paul Island DXpedition. Gerry Hull, VEICER/AK4L, who was one of the members of the team that also included VEIASJ, VEIAI, VEIFH, WIXX, WIGNC and KIWJ, reports that, on 6 meters, they worked some 450 stations in all U.S. call areas except 6 and 7. He says the band was hot virtually their entire stay on the island, from July 8 to 13. During the peak of the opening on Sunday evening, VEIASJ, who did most of the 6-meter operating, ran up 160 contacts during a single hour. Equipment for this hand consisted of a TR-6 and a Cushcraft 617-6B. Considerable effort was put into 2 meters with a view toward moonbounce, A kW ARCOS amplifier, using a pair of 8930s, fed four Jr. Boomers through 60 feet of 3/4-inch hardline. An ARR 0.5-dB GaAs FET preamp, a Microwave Modules transverter and a TS 520S completed the set-up. No EME contacts were made, due, in part, to difficulty in locating the moon because of larger than expected magnetic compass errors. But the $E_{\rm g}$ of July 11/12 made up for that. Beginning at 1932Z on the 11th with a contact with K9NR in Illinois, they were off on a wild binge that was to last for about six hours and result in some 110 QSOs in U.S. call areas 2, 3, 4, 8, 9 and \emptyset , as well as a number U.S. call areas 2, 3, 4, 8, 9 and 0, as well as a number of VE3s. Best DX appears to have been Rapid City, South Dakota, station KAØGGS. As noted last month, that works out to about 2065 miles. The following morning, a tropo opening down the coast produced QSOs with several Maine stations including WAIEXN, who was S-9 plus 30 dB, and WIRIL in Massachusetts. The last station worked was VEILIT. Massachusetts. The last station worked was VEIUT, at 0205Z July 13, on a weak aurora contact. Unfortunately, they had to pull up stakes and leave the island on the 13th, missing by hours the huge aurora opening that began that evening. It boggles the mind speculating on what they might have been able to work from that northern QTH during the biggest aurora to occur so far this decade, QSLs for both VE1ASJ and VE1SPI go to VE3EUP. An s.a.s.e with a U.S. stamp is fine for Ws. VEs should, of course, affix a Cana-

In other aurora-related information, SM6PU writes that often during the winter, and occasionally during the spring and fall as well, he hears Pacific Northwest and Alaskan 10-meter stations when auroras are in progress. Best times for this propagation is usually between 1900 and 2300Z. In recent months, he has also noted signals from 35- and even 43-MHz paging systems. Olof wonders whether or not this propagation reaches 50 MHz. In an attempt to find out, he will transmit on 28.885 via cw CQ DX A DE SM6PU QSX 50.105 whenever he hears the paging signals.

From the Northeast VHF News comes some more

From the Northeast VHF News comes some more interesting overseas information. On June 5, GW3MHW noted a strong E₅ opening with the ZB2BL 6-meter beacon in for many hours and the 584CY beacon in for over two hours. Even more intriguing, John also heard the ZS6PW beacon at 579, During a crossband (14.280/50 MHz) contact with ZB2GW, that station also reported hearing the South

African beacon. In addition, G4BPY reported hearing the 50-MHz signals of PJ9EE, and G3UUT is understood to have received ssb transmissions from W4OO. The previous day, G4BPY reported hearing the PY2AA beacon, and the same day ZB2BL completed 50/70-MHz crossband contacts with G3APY and E16AS.

Recalling the contacts made with VE8BY over Field Day weekend, WA8LXJ in southwestern Ohlo notes that similar propagation occurred during an aurora on July 24. At about 0500Z, Bill heard VE8BY working K8WKZ, so he tried a CQ and raised KL7NO along with VE5s DX and JQ. Signals were of $E_{\rm g}$ quality, but faded after about an hour, leaving the closer-in aurora signals still present.

Well into August, both 6 and 2 meters have been treated to E₂ openings too numerous to cover in detail. W4GJO in northwest Georgia reports a 2-meter opening the evening of July 27 in which he apparently worked W7HAH in Montana, among others. This conductor caught a nice one the afternoon of August I while driving between Baton Rouge and Houston, following the Central States VHF Conference. Worked were 10 stations in Missouri, Illinois, Indiana, Michigan and Ohio. WB5LUA and WA5HNK, a rew miles behind, also participated in the fun. This was the first 2-meter E, that I have experienced while mobile. Apparently getting in on the same opening, NØAJU, who was mobile in the Oklahoma Panhandle about the same time, contacted Florida and Alabama stations, including W4ODW/M4, who was headed home following the Conference. This is the first I have heard of a mobile-to-mobile 2-meter E_c contact! Later in the evening, NØAJU worked another string of Florida stations, plus Tennessee and the Carolinas. PI have more to say about my 2-meter mobile experiences on this trip in a forthcoming column.

In addition to ionospheric propagation, tropo was very much in evidence during the period as well. WB9MSV Dunlap, Illinois, is one reporting on the fine tropo sessions that took place the last week in July. Larry says that on the 25th, he worked several Nebraska stations with S-7 to S-8 signals. The following morning, it was the East Coast with K3HCE Maryland and K2GK New York. By that evening, the word had spread and the band was still cooperating, as 65 East Coast stations went into Larry's log including state number 24, W3BDP Delaware. K3HCE, who operates weekends from the Eastern Shore of Chesapeake Bay, tells a similar tale. Bill lists contacts with 19 stations from Ohio to Iowa on Sunday morning the 25th. Another first-class tropo opening occurred the morning of August 14, with W3ZZ and others in the Washington, DC area working WA0SJR Missouri and several Tennessee stations.

As this is being written, it's too early to draw conclusions on the Perseids Meteor Shower; however, WB3LJK Maryland believes he did quite well. Mike says this is the first shower in which he has put forth a real effort, but it appears to have paid off, Stations worked include W5JTL Mississippi, a new state; WBØTEM and WBØYYV lowa; KB9RM Wisconsin; WA4VWR and WD4I)GF Tennessee; WAØCQG, WØPN and WØVQH Minnesota; and W4EQR and WB2OTK/4 Horida.

The Higher Bands — KSFF and WSFF New Mexico took good advantage of what the Perseids Shower had to offer to add states to their 1-1/4 meter totals. Both completed exchanges with WA9KGQ Wisconsin and WDRISA Ohio. This makes 28 states for Lee, and 27 for Fred. They tried some other schedules without success. In general, they thought conditions on north-south paths were fairly good, but poor on east-west paths. WB5LUA also used the shower to up his state total, working K4GL South Carolina on Monday evening. August 9, well before the predicted peak.

The tropo session of July 26 was profitable for W3ZZ in the Maryland suburbs of Washington. Gene used the lift, as they call it in Europe, to nab K9MRI Indiana, as well as Illinois stations WB9CAS, K9HMB and WB9SNR, on 70 cm. From signals heard on 2 meters and 70 cm, he concludes that it was a long eastwest opening that did not extend very far north or south. During the same opening, WA3NZL, a few miles north of W3ZZ's QTH, also worked a number of Midwest 70-cm stations, plus Chicago-area stations W9Z/H and WB9SNR on 23 cm. On that band, Paul gets 18 W out of a tripler feeding a single 23-element F9FT.

The 432 und Above EME News published by K2UYH notes that the equipment used for the portable 70-cm EME station, which gets shunted around to various rare states, will soon have to be given back to its rightful owner. Contributions to purchase replacement gear are being solicited. If enough money is not raised, this program must be terminated. Contributions should go to Joe Reisert, W1JR, who has been acting as coordinator for the station. Incidentally, the station is due to be in Connecticut at W1AW during October. Those wishing to work the Hq. station on 70-cm moonbounce take note.

The New Frontier

The World Above 1 Gig

CALIFORNIA-HAWAII ON 1296 MHz

Preliminary reports have been received of the reception of the Hawaii 1296-MHz beacon, KH6HME (see "The New Frontier" July 1981, p. 72), in California by N6CA. Unfortunately, the beacon keeper was unavailable at the time of the beacon reception, and so a two-way contact could not be made. Now that the path is definitely known to be workable, I doubt that it will be too long before a two-way contact is achieved.

UoSAT PROBLEMS

UoSAT-OSCAR 9 continues to have problems at the time of this writing. Owing to an unfortunate software problem in the onboard computer, both the 2-meter and 70-cm beacons became active at the same time, thus causing severe desensing problems to both the 2-meter and 70-cm command receivers. Since the spacecraft will not respond to command signals, neither beacon can be turned off, and none of the microwave beacons can be turned on. The 150-foot dish at Stanford University is to be used soon in an attempt to put a stronger signal at the spacecraft and obtain a response to a command signal. Let's all hope that this is successful.

SWEDISH MICROWAVE SUPPLIES

Parabolic, P.O. Box 10257, S-43401 Kungsbacka, Sweden, can supply a number of 1296-MHz components, including transverters and a 125-W, two-tube amplifier, that appears from photographs to be similar to the WB61OM design. They, will also soon be announcing 1269-MHz equipment for use with the Phase IIIB satellite. Write directly to them for more details,

HAMARAMA '82

I hope this QST arrives in time to remind you of the Mid-Atlantic States VHF Conference, to be held October 2 at the Warrington Motor Lodge. Warrington, Pennsylvania. It's always an excellent conference, with much of interest to the microwave enthusiast. On the following day, there is a flea market at the Bucks County Drive-in theatre, Warrington, which is usually a very good source for UHF/microwave parts. See you there, I hope.

MILITARY EQUIPMENT NOMENCLATURE

Military surplus equipment is often found at flea markets or in catalogs, and it is sometimes difficult to tell exactly what a piece of equipment is supposed to be just from a military type number. Table I will give you some idea of what a piece of equipment was designed to do from its type number.

For example, suppose you find a TRC-29.

Table 1
Military Equipment Nomenclature

	1st Letter (Type of Installation)		2nd Letter (Type of Equipment)		3rd Letter (Purpose)
Α	Piloted aircraft	A	Invisible light, heat radiation	A	Auxiliary assemblies (not com- plete operating sets used with o part of two or more sets or sets series)
В	Underwater mobile, submarine	В	Pigeon (do not use)	В	Bombing
C	Air transportable (inactivated, do not use)	C	Garrier	C	Communications (receiving and transmitting)
D	Pilotless carrier	D	Radiac	D	Direction finder, reconnaisance, and/or surveillance
		E	Nupac	E	Ejection and/or release
F	Fixed ground	۶	Photographic*		
Ğ	General ground use (includes two or more ground-type instal- lations)	G	Telegraph or teletype	G	Firecontrol or searchlight di- recting
				Н	Recording and/or reproducing igraphic meteorological and sound)
		1 J	Interphone and public address Electromechanical (not other- wise covered)		
ĸ	Amphibious	ĸ	Telemetering	ĸ	Computing
	•	Ĺ	Countermeasures	L	Searchlight control (inactivated, use "G")
М	Ground, mobile (installed as operating unit in a vehicle which has no function other than transporting the equipment)	М	Meteorological	М	Maintenance and test assemblie (including tools)
		N	Sound in air	N	Navigational aids (including al- timeters, beacons, compasses, r cons, depth sounding, approach and landing)
P	Pack or portable (animal or man)	þ	Radar	Р	Reproducing (inactivated, use
		Q	Sonar and underwater sound	Q	Special, or combination of purposes
		R	Radio	R	Receiving, passive detecting
S	Water surface craft	Ş	Special types, magnetic, etc., or combinations of types	ş	Detecting and/or range and bearing, search
Ţ	Ground, transportable	T	Telephone (wire)	1	Transmitting
U	General utility (includes two or more general installation classes airborne, shipboard, and ground)				
٧	Ground, vehicular (installed in vehicle designed for functions other than carrying electronic equipment, etc., such as fanks)	٧	Yisual and visible light		
W	Water surface and underwater	W	Armament (peculiar to armament, not otherwise covered)	W	Automatic flight or remote con- trol
		X Y	Facsimile or television Data processing	Х	Identification and recognition

*Not for US use except for assigning suffix letters to previously nomenclatured items.

This is a ground-transportable (i.e., probably big and heavy) radio transmitter and receiver. If the first letter is A, then it is intended for aircraft use, and will require a de supply of a few hundred volts to operate. If the first letter is P, then it is designed for portable use, and will run from batteries. A UPX-4 will be a utility (probably ac-powered) radar transmitter, whereas a UPM series box will be a radar test set. From these numbers you can often get a good idea of the unit's nature, and whether or not it might be of use to you. Radar units often contain parts of use to the microwave en-

thusiast. If you ever find a UPX-4, you have found a good power amplifier for 1296 MHz with about 400-W out!

NEW RECORD ON 10 GHz

Over the period from July 3-10, IØSNY/EA5 worked IØYL1 and IWØBFZ, at distances of 1101 and 1166 km, respectively. These are new world records for the 10-GHz band, and the first-ever contacts over 1000 km on 10 GHz. Full details will appear in this column next month.

^{*103} Division Ave., Millington, NJ 07946

49th ARRL November Sweepstakes Announcement

he rules for this year's contest are identical to last year's. Remember that there is a three-QSO penalty for unremoved duplicate contacts and for miscopied call signs. Take a few seconds to make sure you have the call right before you move on. At four QSOs each (including the original QSO), bad calls reduce scores quickly.

Another point to remember is that you must receive a *complete exchange* for each claimed QSO. If you get everything except the check, that's not good enough. You must copy it *all* for a complete contact, QSOs with stations "not in the contest" are fine, too — *if* you can get all of the required information.

Official log sheets, summary sheets and dupe sheets are available from ARRL Hq. Send an s.a.s.c. with one unit of First Class postage (U.S.) for each five sheets requested. You'll need one summary sheet and one dupe sheet for each mode. Log sheets hold 100 QSOs each, so order accordingly. Order your official entry forms now; they not only make it easier on the log checkers, but also help make sure you submit all of the required information.

Logs must be postmarked by December 22, 1982. You should send them via First Class Mail to ensure timely delivery. Entries not postmarked by the deadline will be classified as checklogs; no exceptions. If you want to make sure your entry arrived safely, include a self-addressed stamped postcard. We'll return it to you when we get the log.

Club officers: Remember to send us a membership roster as detailed in the club competition rules (January QST, page 92). CU in SSI

Rules

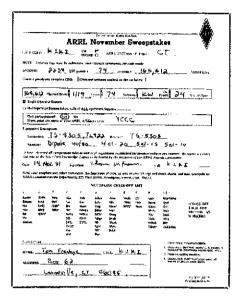
1) **Object:** For stations in the United States and Canada (including territories and possessions) to exchange QSO information, as detailed in Rule 4, with as many other U.S. and Canadian stations as possible on 160 through 10 meters.

2) Contest Period:

- (A) CW First full weekend in November.
- (B) Phone Third full weekend in November.
- (C) Time Begins 2100 UTC Saturday and ends 0300 UTC Monday. Operate no more than 24 of the 30 hours. Off periods may not be less than 30 minutes in length. Times off and on must be clearly noted in your log, and listening time counts as operating time.

3) Categories:

- (A) Single operator. One person performs all transmitting, receiving, spotting and logging functions.
- (B) Multioperator, single transmitter only. Those obtaining any form of assistance such as relief operators, loggers or use of spotting nets.
- 4) Exchange: A consecutive serial number, precedence ("A" if you run 200-W de or less, "B" if more than 200-W), your call sign, check (last two digits of the year you were first



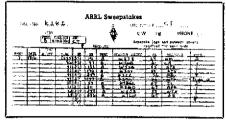
licensed), and your ARRL section. For example, K5ZD answers W1AW's call by sending W1AW NR178 B K5ZD 73 NTX for QSO number 178, more than 200 W, first licensed in 1973 and North Texas section.

5) Scoring:

- (A) QSO points. Count two points for each complete two-way QSO. No cross-mode contacts. Work each station only *once*, regardless of the frequency band.
- (B) Multiplier. Each ARRL section (listed on page 8 in this issue) plus VE8/VY1 maximum of 74. KP4, KV4/KP2 and KG4 stations are in the West Indies section, while KH6 and other U.S. possessions in the Pacific count as the Pacific section.
- (C) Final score. Multiply QSO points (two per QSO) by the number of ARRL sections (plus VE8/VYI).

6) Miscellaneous:

- (A) A transmitter used to contact one or more stations may not subsequently be used under any other call during the contest period (with the exception of family stations where more than one call is assigned by FCC/DOC).
- (B) One operator may not use more than one call sign from any given location during the contest period.
- (C) The use of two or more transmitters simultaneously is not allowed.
- 7) Reporting: Contest forms (log sheets, summary sheet, dupe sheet) are available from ARRL Hq. for an s.a.s.e. Official forms are



recommended. Any entry claiming more than 200 QSOs must submit duplicate-checking sheets (check sheets). Incomplete or late entries will be classified as checklogs. Logs should include dates, QSO times, exchange sent/received, band and mode. Postmark your entry within 30 days after the phone portion of the contest (December 22, 1982).

- 8) Club Competition: ARRL-affiliated clubs for club gavels and awards in the local, medium and unlimited categories as described in January 1982 OST, page 92.
- 9) Awards: Certificates to the top single operator cw and phone scorers in both the "A" and "B" categories in each ARRL section, and the top multioperator entry in each ARRL Division.

10) Conditions of Entry:

- (A) Each entrant agrees to be bound by the provisions as well as the intent of this announcement, the regulations of his licensing authority and the decisions of the ARRL Awards Committee.
- (B) Disqualifications, See January 1982 QST, page 92.

Suggested Frequencies Phone 1800-1810 1855-1865 3550-3650 3710 3850-3950 7050-7100 7110 7200-7250 14,050-14,100 14,250-14,300 21,050-21,100 21,110 21,300-21,400 28,050-28,100 28,110 28,550-28,650

Conte	st Period	
	Starts	Ends
Cw	Saturday, Nov. 6 2100 UTC	Monday, Nov. 8 0300 UTC
Phone	Saturday, Nov. 20 2100 UTC	Monday, Nov. 22 0300 UTC

Explanation of Exchange	Expla	nation	of E	xchange
-------------------------	-------	--------	------	---------

	Number	Precedence	Call	Check	Section
Exchanges	Consecutive serial number	Power input more than 200 W dc	Send your station call	Last two digits of year first licensed	Your ARRL section
Sample	NR178	В	K5ZD	73	NTX

Results, 1982 ARRL International **DX Contest**

"DX contest is coming in sight, Rig's ready to go day and night, I'll go it nonstop, 'Til I finally drop, About 11 P.M. Friday night." — K8CH

By Mark J. Wilson,* AA2Z and Bill Jennings,** K1WJ

he old adage that the more things change, the more they remain the same, even applies to DX contesting. You'd think that the 1982 ARRL International DX Contest would bear little resemblance to its 1972 counterpart. In some ways you would be absolutely correct. while in others you'd be dead wrong,

Sure, much of the equipment has changed. And people are doing things with antennas and receivers these days that wouldn't even have occurred to a 1972 DX contester except during a pipe dream. Back then the contest was 96 hours long on each mode, QST had a 75-cent cover price and a smaller format, an Alpha 77 cost only \$1795, and the ARRL contest man was Rick Niswander, WA1PID (now K7GM). Even the name was different; the contest used to be known as the ARRL International DX Competition.

The 1972 contest was similar to this year's in that it was during the first few years after a sunspot peak. The phone weekends were blessed with better propagation than cw (an understatement this year). The soapbox commented on how great it was that 10 meters was still in such great shape, and Rick wondered what many of us are now wondering: Will 10 hold up for next year's onslaught of rf?

1982 brought us 3705 logs (1979 phone and 1726 cw) compared to last year's 4162 - an alltime high - and 1972's 2470. In 1972, there were about 200 more cw entries than phone, a trend that has reversed itself during the intervening years.

While many of the top operators have come and gone, an amazing number of the star players then are still around now. This year's top cw man, K1GQ, used to be K2SIL. Sound familiar? He operated KH6RS to the number two worldwide spot on phone and number three on cw in 1972. How about the top W/VE cw op from 1972? He was K1ZND, now known as K1ZZ, 1982's top cw multi-single entrant.

The top 1972 phone and number two cw scores for W/VE entrants were turned in by

*Assistant Communications Manager, ARRL **Communications Assistant, ARRL

K7VPF (now K7JA) operating at W7RM. Those of us who operated any 15-meter phone this year undoubtedly heard W7WA operating from there in his successful quest for the singleband plaque. Same station, albeit a different antenna systems thanks to a hurricane several years ago.

1972's number three cw single op, K1LPL/3, is better known as W3LPL and is this year's big phone multi-multi. AK1A, 1982's number two phone man, probably didn't even know what Amateur Radio was in 1972 as he's only been licensed since 1979.

The W/VE scores are a bit lower than in 1972 because the contest is only half its former length, W7RM's score of 2,992,770 (3024 Qs and 330 multipliers) represented 82 hours of on-the-air effort. K1ZM operated W1ZM to first place this year with 2,645,730 points (2390 Qs and 369 multipliers) in just over half that time. This says something for equipment and operating improvements, as well as for the greater interest in phone overseas. The top 1972 cw score by K1ZND of 2,509,359 (2207 Os and 379 multipliers) was quite a bit higher than this year's top score by K1GQ of 1693 contacts and 328 multipliers.

On the DX front, the top 1982 phone score came from N6RJ operating from ZF2FL. Jim was in there 10 years ago with the number four worldwide phone score from VP2LAT. OZ1LO, the 1972 European cw continental leader, holds the same spot this year. And ZS6DW, 1972's African phone champion, commented in the soapbox that at 66 years old he realized that it was time for someone else to take over. He's still going strong, however; with this year's 40-meter phone entry W. F. Meyer comments, "At 76, 1'm beginning to get a bit long in the tooth."

Enough of the 1972 highlights. By now, it's

1983 ARRL International DX Contest

February 19-20

Phone March 5-6



It was KN2M/J6L's first experience at the "other end" of the pileup. He handled it quite well, for at the end of the cw weekend there were over 1800 QSOs in his log. Dave advises that KA2NIQ will handle his QSLs.

obvious that despite 10 years of progress, the game and many of the players remain the same.

The 1982 phone weekend was just outstanding in terms of propagation and participation. Ten meters was the star performer; the big guns made about half of their QSOs on that band alone. All but three of the Top Ten W/VE scorers made more than 2000 QSOs, and all but one broke 1900. Things were so good that it took more than 1.8 million points to make the Top Ten box, a score that would have netted fifth place nationally last year. The East Coast cleaned up on phone, with eight of the top scores coming from the first three call areas. WA8YVR just barely made it, as did VE3BVD. Congratulations, fellows!

On cw. things turned out differently, Conditions were definitely not up to snuff, and the top scores were down significantly from last year. Besides the usual ones, twos and threes, it was nice to see N6RO, K5RC (K5GN, opr.) and KØRF (WØUA, opr.) in there slugging. An interesting side note is that the average age of the Top Ten ew ops is well over 30, showing that when conditions aren't so good experience counts for a great deal, and the "young whippersnappers" aren't the only ones who can do well. One of the cw highlights was the great 160-meter opening to Europe on Saturday night. A look at the QSOs/Multipliers Per Band boxes show just how good things were.

Some nice scores are reported in this year's W/VE Low Power Leaders box. K1JX took both modes using his two-element tribander at 60 feet and some dipoles, a feat that should provide inspiration for similarily equipped 'small guns." W2TZ and N5AW (now back in Texas after a stay in Connecticut) were back in there trying again after their wins last year and placed second with fine scores on phone and cw respectively.

United States and Canadian Plaque Winners

Single Operator Winner W1ZM (K1ZM) WA2SPL K1PT N5JJ All Band 1.8 MHz 3.5 MHz 7 MHz 14 MHz

21 MHz W7RM (W7WA) 28 MHz QRP KA1VQ Multi-Single Multi-Multi K1OX W3LPL

Donor

Frankford Radio Club

Frankford Radio Club
in Honor of W1BB
Lance Johnson Engineering
David Thompson, K4JRB/K5MDX
Mark Michel, W9OP and
Richard Loehning, N9ACP
Roy and Kathryn Tucker, N6TK and AA6TK
Lawrence F. Emery, K1UO
Rockford Amateur Radio Assn. — W9AXD
The VPZE Contest Operators
Buffalo Area DX Club — W2RR

CW

ORP

Multi-Single

Multi-Multi

Single Operator Winner All Band 1.8 MHz 3.5 MHz K1GQ N4WW W1ZM (K1ZM) W6XX 7 MHz 14 MHz 21 MHz 28 MHz

K1KI K6LLi7 N4ZZ AC2U K1ZZ K2UA

Donor

Frankford Radio Club Frankford Radio Club
W1TX Roy Fosberg Memorial
Northern Illinois DX Assn.
Chuck Cullian, KØRF and
George Schultz, WØUA
Neenah-Menasha Amateur Radio Club
Carl Luetzelschwab, K9LA
Mike Badolato, W5MYA
Hollywood Amateur Radio Club
The VPZE Contest Operators
Colorado Contest Conspiracy

DX Plaque Winners

Single Operator

V3MS (WØCP) EL2AV JA1BWA OZ1LO K8WW/VP9 All Band-World Africa Ásia Europe North America Oceania KH6ND HK3A (K3ZO) South America 1.8 MHz JASDOH

3.5 MHz 7 MHz 14 MHz 21 MHz 28 MHz

ORP

Africa Asia Europe North America Oceania South America

Multi-Single World

Multi-Multi World Asia Europe North America

Single Operator

World Combined

IDJX YU4GD LUSDQ XE2BC (N6OP)

DL1KB

Winner

YV2BE VP2E JA9YBA DLØAA PJ7ARI AH6BK

FYØFOL VZAMK JA7YAA OH1AF

Donor

North Jersey DX Assn. San Diego DX Club Alamo DX Amigos — S Clarke Greene, K1JX San Antonio

Clarke Greene, K1JX
Pete Grillo, KNØE
Ray Stone, W5RBO
W5CUU Charles Cheatham Memorial
Jim Dionne, K1MEM and
Bill Poelimitz, K1MM
John Alfyn, W7XR
Art Boyars, K3KU

Bencher, Inc. Southern New England DX Assn. West Jersey Communications Products — W28N

— W28N Nashua Amateur Radio Club — AJ7S George Schultz, W∮UA and John Brosnahan, W∮UN Red Stick DX Assn., Baton Rouge, LA Red Stick DX Assn., Baton Rouge, LA

Mile HI DX Assn. Tom Taormina, K5RC ARRL

ARRI ARRL ORL DX, Weekly DX Bulletin Martha Doucett Ellis Schenectady ARA — W2PV Memorial Jim Thayer, W1FZ

DX Plaque Winners

Phone

Single Operator All Band-World Africa Asia Енгоре North America Oceania South America South Ar 1.8 MHz 3.5 MHz 7 MHz 14 MHz 21 MHz 28 MHz ORP Africa

Multi-Single World Asia Europe North America Oceania South America Multi-Multi World Africa Asia Europe North America Oceania

Winner

ZF2FL (N6RJ) TYA11 JA3CZY G3FXB VP2MP (K2YY) VK4VII P42J (W1BIH)

YV1CD HC1HC F2SI IØWDX G4GIR TG9GI VP2E

UK ØQAA F3TV KV4FZ KH6XX W6QL/PJ2 J3AVT

JA7YAA I3EVK KP4DX AH2L

Donor

North Jersey DX Assn. John M. Shinall, K4BYK Acadiana ARA, Lafayette, LA Murphy's Marauders Chod Harris, VP2ML Ray Stone, W5RBO Carl Smith, W9BWJ Dane 4450bys M1CF Carl Smith, WBWJ
Dana Atchley, W1CF
Robert Peterson, W3YY
Kansas DX Assn.
Don C. Wallace, W6AM
Roy and Kathryn Tucker, N6TK and AA6TK
Mike Badolato, W5MYA
ABRI ARRL Delta DX Assn. Devid Vogel, NL7P Bill Brown, KØUK; Western Colo. Contesters Metro DX Club

Metro DX Glub Nick Lash, K9KLR Carl Smith, W6BWJ Hamfesters Radio Club Gioucester County ARC Dan Robbins, KL7Y

Mike Badolato, W5MYA
Tom and Joy Middleton, WB4CKY
Megahertz Manor Maniacs
Dale Meyers, W4BIM/3D2DM

Special Plague Winners

Winner

P42J (W1BIH)

JF1SEK

K1JX

K1JX

K1JX

RVY8AW

NSRZ C6ADV

4X6AG

JA1BWA

JA3CZY IT9GSF SM5GMG

Lincoln ARC

VP2E

K6RU (N6BZA) K5RC (K5GN)

World Combined Score (Both modes) WVE Highest Combined K1DG Total Multiplier Japan (combined) WVE Operator JF1SE N3BB (combined) W/VE Low Power (Top both modes) W/VE Low Power

(cw) W/VE Low Power (phone)
W8 (phone)
California (cw)
California (phone) Texas (cw) Texas (phone) Caribbean Resident

(phone) Israel (cw) Israel (phone) Japan (cw)

Japan (phone) Sicily Scandinavia Multioperator

Caribbean (cw) Caribbean (phone) Most Improved Club (points per entry) Donor

Yankee Clipper Contest Club

The DX Bulletin

Northern California Contest Club National Contest Journal Ken Bolin, W1NG

Wireless Institute of the Northeast

Rochester DX Assn.

Livonia Amateur Radio Club Southern California Contest Club Dave Bell, W6AQ Dennis Motschenbacher, N5DKG/KZ5M North Texas Contest Club Arturo Gigante, HI8GB

Martin Hartstein, N6WW Martin Hartstein, NowW Martin Hartstein, N6WW Tom Morrison, K5TM and Randy Thompson, K5ZD Western Washington DX Club John Lindholm, W1XX John Lindholm, W1XX

The YASME Foundation W5QBM Joe Johnston Memorial Steve Place, WB1EYI



PP2ZDD, Dick, licensed for 48 years, the top phone scorer for the past six years from Brazil. makes it number seven in 1982. Keep it up, Dick.

Some of the single-band plaque winners turned in scores that beat even the biggest of the multi-multis. Check out the single-band scores, particularly those of K1KI on 20 meters on both modes, W7RM and K3LR on 15-meter phone, WA2SPL on 160-meter phone and N4WW on 160-meter cw.

Among the multi-single entrants, K1ZZ came out first on cw by a clear margin. On phone, two stations normally found in multimulti battled it out to a photo finish, with K1OX narrowly beating K8LX, K2UA posted the top cw multi-multi score again this year, while W3LPL took the honors on phone, 1982 brings us a sad note in multi-multi competition. Jim Lawson, W2PV, a staunch supporter of this class, passed away last spring.

From the other side of the pileup, WOCP operated as V3MS for the cw weekend and came out on top, helped partially by excellent 160 and 80 meter multiplier totals. K2YY, last year's phone winner from VP2MP, tried it again but lost by a small margin to N6RJ at ZF2FL. These two giants ended up only 13 QSOs apart, but 10 multipliers made the difference. Other big scores came primarily from North and South America on cw. telling us how conditions were. Kudos to KH6ND, OZ1LO, Y24UK and I2UBI for making it across the ponds. On phone, the top scores came from North America, Europe, South America and Oceania, with the emphasis on the first two, P42J and KH6ND were the only two stations to make the DX Top Ten on both modes.

The VP2E crew did their thing on phone again this year, and as if that isn't enough they took the multi-single competition for DX stations on cw by a huge margin also. Theirs was an outstanding operation on both modes, both in terms of score and of operating style and signal quality. As of this writing they don't plan to be back in '83, but next year's winners will have a tough act to follow.

Of course a DX contest without some good DX would be nothing. Our thanks go to those 1652 overseas hams from a total of 122 different countries who sent in logs. These hams from countries as diverse and rare as A2, A7, CEØA, DU, FO, HBØ, J2, JT, JW, JX, TY, UH8, UI8, VS6, YK, ZB2, Z2, ZK2, 5Z, 7P, 9K, 9U and 9V among others helped make this

Top Ten, Phone — Single Operator

W/VE	
W1ZM (K1ZM) AK1A K1AR W3BGN K2VV N3BB K1DG AA2Z WABYVR VE3BVD	2,645,730 2,251,494 2,224,088 2,129,289 2,081,970 2,032,524 1,887,693 1,836,285 1,832,544 1,825,920
DX ZF2FL (N6RJ) VP2MP (K2YY) G3FXB SM5GMG	4,972,014 4,805,643 2,702,898 2,390,895 2,384,640

Top Ten, CW — Single Operator

P42J (W1BIH) I6NOA

6FLD

W/VE	
K1GQ N2LT NBRO K5RC (K5GN) N3BB N3AD W2IB W2RG K3LR KØRF (WØUA)	1,665,912 1,519,614 1,478,211 1,429,392 1,407,504 1,373,566 1,298,151 1,292,484 1,288,056 1,253,616
DX V3MS (WØCP) HK3A (K3ZO) P42J (W1BIH) N5DKG/YV5 KH6ND YV1NX K8WW/VP9 OZ1LO Y24UK I2UBI	4,006,002 3,575,754 3,008,184 2,824,392 2,408,675 2,228,311 1,625,013 1,530,857 1,487,016 1,433,544

W/VE Power Leaders (200 W or less)

D	hi	٠,	•

KIJX	918, 189
WZTZ	764, 181
N7ABJ	520, 194
WSARK	288,585
KC3H	285,864
WSJPT	265,650
AG9E	256,462
WAIFCN	249,444
WØWP	248,508
WAØECN	245,508
CW	
K1JX	800,664
N5AW	709,686
K8NZ	666,645
W2TZ	659,097
W1GL	526,851
N8DE	426,405
W9OP	401,598
K2MFY	398,682
W3ARK	356,562
W6UQF	339,228

Division Leaders - Single Operator

Phone	Division	CW
W3BGN W9ZRX KØTPF W5ZR W5ZR W5ZR W5ZR K2TR KØSCM W1ZM K7RI K6RU N8II N7DF KX4R KM6B N5RZ	Atlantic Central Dakota Delta Great Lakes Hudson Midwest New England Northwestern Pacific Roanoke Rocky Mountain Southeastern West Gulf	N3BB N8DE KØSR KSKU WASTBQ N2LT WØWP K1GQ KF7Z N6RO K4GKD KØRF W8ZF/4 WA6JAH K5RC
VE3BVD	Canadian	VE1AI

another exciting contest for the veterans and first-timers alike.

Competition among our affiliated clubs was as intense as ever this year. Looking at the 1972 writeup, we see that the "Big Four" were Potomac Valley RC, Frankford RC, Murphy's Marauders and Northern California DX Club, in that order. PVRC's winning score was 64,776,111 points and 80 entries. This year, those same four clubs make up the Unlimited Class, but the power structure has shifted. In 1982 64 million points was still the magic number in the Unlimited Class, and Frankford Radio Club's 96 entries supplied enough points to earn them the gavel. Yankee Clipper Contest Club, a spinoff of the original Murphy's Marauders, came in second with 56 megapoints and 80 entries. One of these days . . . Meanwhile the "new" Murphy's Marauders won the Medium Class gavel for the fourth year in a row with a shade over 20,000,000 points, while the North Texas Contest Club finished a dis-



The "family portrait" of I3EVK, the top European phone multi-multi. Left to right are I3MAU, I3ON, I3FIY, I3EVK and IH3DYG.



DU1EFZ did 80-meter phone only in the contest, but Edwin has a potent signal on the high bands also when he couples that kilowatt station to his 5-element tribander at 50 feet.

tant second, again. The Local Class has become somewhat of a multioperator hattleground between the K9GL multi-multi giant of the III Wind Contesters and the smaller multi-multi and multi-singles of the Central Virginia Contest Club. III Wind won the gavel again this year, but not by much.

We'll finish up this year's DX contest report with a few words from Rick's 1972 writeup that still apply today: Listen before transmitting; sign your call more frequently if you're DX; and be courteous throughout the fray. Although this is a competition, there is still plenty of time to remember your manners. Many casual ops listen to the contesters, and many a non-contester's image of contesting has been soiled by the inexcusable bad manners a few of us display. As Rick summed it all up: "And last, but not least, remember the tamous saying of the esteemed philospher V. Y. Senny Tree, who said, 'Before and during the battle make sure your house is in order.""



WØCP operated V3MS. FB job with over 4400 QSOs and 4 megapoints to his credit.



The operators of the phone multi-single at Y21YK are (I to r) Y24TK, Y21YK, Y24UK, and Y23EK. These guys made more than 7000 QSOs using just 20, 15 and 10 meters.

	Africa	Asia	Europe	North America	Oceania	South America
All Band	TYA11	JA3CZY	G3FXB	ZF2FL	VK4VU	P42J
1.8 MHz				tuere.	um.	1881
3.5 MHz	EA9EU	JA7NX	CT1FL	***	AH6BK	YV1CD
7 MHz	EAGIE	JA2BAY	OKITN		****	HC1HC
14 MHz		4X6DX	F2SI	HIBGB	are.	ZY5EG
21 MHz		UAØSAU	IØWDX	KL7IDT	YC2BSF	PT7VOB
28 MHz	EA8ZI	JAISGX	G4GIR	6D5LLS	KH6MD	LUIVŘ
QRP		JA1CG	YU7AV	TG9GI	DPL .	mrst/
Multi-single		UKOOAA	F3TV	VP2E	KH6XX	W6QL/PJ2
Multi-multi	~~	JA7YAA	13EVK	J3ÁVT	AH2L	n

DX Continental Leaders — CW							
	Africa	Asla	Europe	North America	Oceania	South America	
All Band	EL2AV	JA1BWA	OZ1LO	V3MS	KH6ND	НКЗА	
1.8 MHz		JA5DQH	F8V.J			~-	
3.5 MHz		JA1SGX	DL1KB		.eeee	····	
7 MHz	EA9EU	JASEAT	IØJX	HI8LC		1	
14 MHz	J28DM	UADSAU	YU4GD	HISCH	KG6DX	LU4DTJ	
21 MHz	EA8ZZ	JH3LPT	G3MXJ	XE2BC	ZK2BGD	LUSDQ	
28 MHz	***	JG1NBD	10MGM	XE2BC	VK4XA	PYIBOA	
GRP	EASEY	JA1MCU	DL8CM	HP1XAT		YV2BE	
Multi-single		JA9YBA	DLØAA	VP2E	AH6BK	FYSFOL	
Multi-multi	***	JATYAA	OHIAF	V2AMK	,		



SM1IED (sitting), SM1JBM (I) and SM1ALH are all participants in the SK1BL cw multi-single operation. The saucepan on the desk is to reproof their keyer.

SOAPBOX

My original intention was just to put in a few hours on 7 MHz to improve my 5BWAS totals. But, to this end, it proved a futile exercise. I need just four more states on 40 meters, but in spite of over 400 OSOs, I couldn't find even one of those needed states. Nevertheless it was thoroughly enjoyable with a creditable level of operating skill and courtesy from the stateside operators. . . I hope that we sounded as well on your operators. . . I nope that we sounded as well on your side (G3NLY). [You sure did sound real fine from this end end — Ed.] My results prove that contests can be fun. You don't have to break your neck to win; it's just loads of fun to participate (W7FGT), I leaned back and just laughed several times at the very polite operators (on ew) who broke in on the lower 25 kHz and sent "QRL?"; just where ain't it QRL down there during the DX contest? (N4AW/W51UW). Please continue the single band categories, it gives us "water pistols" a chance to win an award (WAØETC). My good friend "Murph" was sure on my case this year. Just as the JA path was opening up, a heavy rain caused all kinds of static for about two hours. QRN was \$7 to \$9, so even the "big ones" were difficult to work at times (KB4KA). How about DXpeditioning to Vermont, Delaware, Rhode Island or Wyoming next year? (VK2AYD/N3AFU). Once again, another fun time in spite of worsening propagation conditions. I'll sure hate to see 10 meters go south (N4FD). It's tough pitting my 10 watts against the kW stations, but it sure gives me a lot of satisfaction (DL2EF). There were excellent long path openings to the west coast on 14 MHz between 1500 and 1630Z on both days (cw) (G3PVA). . . . one W station insisted that we were out of the band when we were on 14,195 kHz (FY0FOL/W6QL/W6KG). Thanks for the past four years of contesting from the "EL-land." I enjoyed every minute of them, especially after the rules and format were changed back to the original scheme. I take back to the states with me a lot of fine contest memories and three contest plaques, which I will always cherish (EL2AV). [Thank you, Tom, for four years of FB operating and that EL multiplier, which you made so easy to work. — Ed.] Why is there so much contest left at the end of the ambition? (KIUO), I still have problems with (other) DX stations not understanding that KL7 (and KH6) are also DX (KILID). (KL7IDT). Started on 20 meters (phone) to do a single band entry, but decided that all-band competition would be more challenging. Wish that I had worked more on the low bands on the first night (I6NOA). The only thing that the U.S. stations could improve on is keeping up their dupe sheets (DL5BAN). Mainly, I'm QRV on 6 meters, but occasionally I QSY to 15 or 40 meters to work DX. Thus, I decided to try 15-meter single-band operation on phone in this contest. Thanks to the good conditions, I was able to work many U.S. stations with my modest equipment thany C.S. stations with my modest equipment (JF2XPL). Also, my own personal annual problem was still in evidence as several stations raced away, logging my call as KH6JW. This will probably show itself in the log checking (KH6JWK). It sure did!—Ed.J. Eliminate the signal report part of the exchange. It is meaningless as it is now used as part of the contest exchange (KP4EY/W3EAX). Well, the "big guns" didn't edge me off my frequency again this year. A narrow receiving filter and a monohand Yagi proved to be all the edge that I needed to hold a frequency.

to be all the edge that I needed to hold a frequency.

Went through six bottles of pop and a carton of eigarettes during the contest. Who said that Amateur Radio isn't hazardous to your health? (WBICNM). The only state that I could not work during the contest was Vermont. Well, maybe next time (HI8CH/KS2V). Nice to meet old friends again on all five bands (ZB2EO). Please let the DX stations know that I'll be back next year and I'll be happy to work all those who

Affiliated	Club	Program
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Affiliated Club Program				
Unlimited Class	Score	Entries	CW Winner	Phone Winner
Frankford Radio Club	64,904,584	96	NSTA	W3BGN
Yankee Clipper Contest Club	56,883,453	80	K1GQ	W1ZM
Potomac Valley Radio Club Northern Calitornia DX Club	46,962,639 31,331,209	64 64	N2FB	N8II
	01,001,209	04	NGRO	K6RU
Medium Class				
Murphy's Marauders North Texas Contest Club	20,859,930	35	AA2Z	AA2Z
Mad River Radio Club	12,265,540 8,988,684	32 7	K5RX K8NZ	K5NW WD8MRF
Texas DX Society	7,883,721	18	K5RC	KN5H
Northern Ohio Amateur Radio Society Eastern Iowa DX Association	7,576,650 6,070,305	37 28	K3LR WØWP	K3LR KBØPR
Colorado Contest Conspiracy	6,044,223	6	KORF	Wøz∨
Southern California DX Club Kansas DX Association	3,234,762 3,022,608	17 24	W6TMD WØRT	KM6B WAØTKJ
Kansas City DX Club	2,821,506	11	NØTT	KØTLM
Rochester DX Association Northern Illinois DX Association	2,699,604 2,628,870	22 1 9	W2TZ W9RY	W2TZ AI9J
Meridan Amateur Radio Club	1,952,553	12	WIKKE	N1API
Frazer Valley DX Club Columbus Amateur Radio Association	1,949,709	12 3 13	\$100A	WB7WQ£
Gloucester County Amateur Radio Club	1,505,218 1,497,132	10	MSAC MBLNO	WD8RNC W2YC
Tri-State International DX Association	1,452,963	8 8		WA4EAV
Southeastern DX Club Northern Ohio DX Association	1,436,730 1,427,514	8 14	KX4R N8BC	KX4R WD8MOV
Alamo DX Amigos	1,425,888	14	K5VNJ	W5KCR
Eastern Michigan Amateur Radio Club Fort Wayne Radio Club	1,395,002 1,323,810	13 3		AC8W W9KBV
South Jersey Radio Association Mississippi Valley DX and Contest Club	1,279,896	17	WŻEA	W2FGY
Mississippi Valley DX and Contest Club Ventura County Amateur Radio Club	1,011,657 882,016	7	7973	ACØN
Grumman Amateur Radio Club	764.647	13 15	K2OB	K6VMN WB2FMP
Bluegrass Amateur Radio Society Morton Area DX Assn.	687,534 680,505 577,512	4		****
Larkfield Amateur Radio Club	577,512	3 5	WB9JKI KK2E	
Fox River Radio League	309,615	3		K9BQL
Long Island Mobile Amateur Hadio Club Westpark Radiops	274,215 57,009	10 4	MSFby	WA2JCX KG8F
Local Class	•			
ILL Wind Contesters	10,175,469	Đ	WD9IIX	Waanau
Central Virginia Contest Club	10,012,785	6	MOSILY	WB9POH W4IQ
Rubber Circle Contest Club	2,981,517	6	(Alcohietes)	K7BI
Point Radio Operating Society Albuquerque DX Assn.	2,631,501 2,306,091	86696	WB3KKX AA5B	K3UA - W5JW
Order at Bailed Owls at New York	1,906,152	5	K2LE	1999
Red Stick DX Assn. San Diego DX Club	1,642,893 1,629,2 94	3 10	WGUQF	N6ND
Lincoln Amateur Radio Club	1.399.980	3		
Halifax Amateur Radio Club North Alabama DX Club	1,290,931 1,266,255	4 4		N4KG
Neenah-Menasha Amateur Radio Club	1,161,831	3		poss
Long Island DX Assn. Dauberville DX Assn.	1,128,723 1,118,280	10 10	K2MFY KG3Q	W2GKZ N3CHL
River City Contesters	1,028,526	4		MOCHE
Flyweight DX Group Lynchburg Amateur Radio Club	1,025,982 976,581	8 5 7	W4VBH N4UA	AA4KT
Acadiana DX Assn.	957,752	ž	MADA	W5ZR
Reading Radio Club Willamette Valley DX Club	874,590 624,088	9	K3WGR	M3M1C
Overlook Mountain Amateur Radio Club	779,664	8	W2XL	WB7EEJ
Central Arizona DX Assn. Western Washington DX Club	695,472 676,320	5		WB7FDO
Ashtabula County Amateur Radio Glub	654,687	7	AG7M	AG7M AI8S
Ashtabula County Amateur Radio Club Central Florida DX Assn.	609,399	9 7 8 5 8 7 5 8 3 9	NE4F	
Sturdy Memorial Hospital Amateur Radio Club Radio Amateurs Club of Knoxville	518,457 501,873	8 3	KIZZJ	K1LXJ
Hollywood Amateur Radio Club	493,872	9	K8UNP/4	K8UNP/4
Southwest Ohio DX Association Montgomery Amateur Radio Club	446,892 408,045	3 7		КСЗН
Montrose Amateur Radio Club	344,607	6	-	KCØAT
Redwood Empire DX Club Chautaugua County Amateur FM Assn.	321,327 318,948	9 4	K6ZUR	KB6ZA WB2YQO
Greater Milwaukee DX Assn.	294,426	5		K890C
Utica Amateur Radio Club Michigan DX Assn.	252,177 216,57 9	6	K8LJG	KJ2Q
Four Cakes Amateur Hadio Club	184,116	3	VOL1G	K9KVA
Gentral California DX Club Split Rock Amateur Radio Assn.	154,635 144,999	3 5		
ARING Amateur Radio Club	114,828	6	W3HVQ	WA4PFN/2
Carbon Amateur Radio Club Mid-Ohio Valley Amateur Radio Club	63,873 56,520	4 4	***	 14(1)9(7 7 A
Rappahannock Valley Radio Club	56,529 36,237			WD8CZA WA4EMU
South Florida DX Assn. Harlan County Amateur Radio Club	32,730	5 3 5		Property Control of the Control of t
Lake Success Radio Club	31,767 22,323	9	KA4JMZ WA2ISH	WA2DZD
Southern California Contest Club	20,028	4	NE6I	-

need Wyoming (WB7RGN).... it was fun logging and checking for dupes with the new microcomputer for the first time. Made us feel like the big multi-multi stations but on a small scale (KG9Z), I was the number two single operator all-band entry from Japan on phone last year and thought that I would try for the number one spot this year. The propagation just did not cooperate. The 40 meter band was much worse than last year. Next year, I would like to have an 80 meter antenna up in order to get more multipliers (JA3CZY). A way to limit CQing by Ws must be found — especially urgent in view of declining sunspot activity which will narrow the usable range of frequencies (P42J/W1BIH). I approached the contest as a learning experience and I did increase my code speed — I can now copy "599 KW" at 35 wpm (WA4HAD), Didn't really intend to do a full-blown entry this year, but just came on to give out the GW multiplier to a

few stations. Wound up spending 16-1/2 hours in the shack for the contest weckend and made more than 1800 QSOs. I was disappointed to find that 90 QSOs were repeat QSOs, and in some cases triplicates, on the same band even though I did not call any station, but stayed on the same frequency all the time. . . . I had to pull the switch on big pileups as I was physically exhausted after working for many hours at 150 QSOs per hour (GW3NNF). I have always said that to make a big score running QRPp ou have to have outstanding conditions. How wrong I was (TG9GI). My second year as a single band (20 meters) phone entrant. I enjoy the FB operating by the W and VE types. My age is 15 years old (4X6DX). I'm in favor of reducing the operating time for single operator stations from 48 hours to 36 hours (OZ8T). I feel that this contest was a very good way for me to get back into ham radio after a 10 year absence (WB5LYT).

W/VE Call Area Leaders (QSOs/Multipliers)

Phone						
Single Operator	160	80	40	20	15	10
W1ZM (K1ZM) K2VV W3BGN K4CG (K7SV) W5.IW K6RU (N6BZA) K7RI (WA1KKM) WA8YVR W9ZRX KØSCM VF38VD	2/2 4/4 1/1 2/2 2/2 1/1 2/2 3/3	68/43 36/31 36/28 36/28 14/12 16/8 25/7 39/31 22/16 3/3 36/26	90/50 69/47 75/40 86/52 229/39 220/35 207/18 79/44 98/53 24/18 58/43	483/91 481/74 675/78 306/86 194/66 236/67 215/54 507/68 307/69 264/73 363/74	693/91 404/84 509/83 262/78 240/63 965/57 1028/66 357/69 443/80 193/63 494/81	1054/92 1113/94 940/84 475/92 907/82 498/74 878/75 1034/103 1066/93 604/77 966/90
<i>Multi-single</i> K1OX	4/4	45/41	129/63	661/104	823/101	1385/116
Multi-multi W3LPL	8/7	88/50	234/74	996/122	1209/124	1952/130

W/VE Call Area Leaders (QSOs/Multipliers)

CW						
Single Operator	160	80	40	20	15	10
K1GO N2LT N3BB W8ZF/4 K5RC (K5GN) N6RO N7DF WA81BQ N8DE9 KØRF (WØUA) VE1AL	7/7 3/3 	114/48 80/40 81/40 84/30 68/30 141/28 93/25 57/33 13/12 101/30 56/27	301/62 243/60 213/57 144/61 205/54 385/66 208/41 77/34 96/45 393/63 99/28	432/75 332/81 292/60 203/59 398/76 284/67 718/59 278/68 123/51 254/74 211/45	416/66 432/66 498/64 236/54 396/70 464/72 481/59 301/58 201/57 402/61 156/47	424/70 488/71 568/63 330/52 473/66 359/65 305/43 315/58 222/52 288/54 177/48
Multi-single K1ZZ	10/10	54/45	377/72	503/96	597/86	464/78
Multi-multi K2UA	17/19	252/68	722/83	781/113	954/103	729/88

DX Continental Leaders (QSOs/Multipliers)

Phone						
Single Operator	160	80	40	20	15	10
TYA11 JA3CZY G3FXB ZF2FL (N6RJ) VK4VU P42J (W1BIH)	Comments Commen	52/16 	488/46 201/30 296/41 620/55 425/49 190/39	554/49 306/43 918/54 829/57 762/56 493/53	743/45 429/54 1265/55 1019/57 547/50 644/55	921/55 874/56 1596/57 2907/57 1147/57 1355/57
Multi-single VP2E	63/36	467/55	922/56	1268/57	2780/57	4425/57
<i>Multi-multi</i> J3AVT	12/9	348/48	632/54	1170/56	1151/57	2879/57
CW						
Single Operator	160	80	40	20	15	10
EL2AV JA18WA O71LO V3MS (WØCP) KH6ND HK3A (K3ZO)	92/35 31/17	21/13 73/19 90/20 438/49 327/47 412/47	165/36 147/28 299/45 826/53 517/50 580/50	356/44 407/51 834/53 1042/55 375/51 1339/55	47:2/42 349/47 55:2/49 1045/55 849/55 937/52	692/47 325/44 632/45 1023/52 846/53 1334/55
Multi-single vP2E	147/39	369/50	624/54	1535/56	1477/56	1947/55
<i>Multi-multi</i> V2AMK	161/37	485/47	554/52	1170/54	1063/54	1477/55

FEEDBACK

Please note the following corrections to the 1981 ARRL International DX Contest on pages 81-94 of October 1981 QST. Phone: KAIGG at 178,263 points was omitted and should be the top Eastern Massachusetts 10M score, KB2SG in Western New York was listed as a 40M single-band entry. He should have been listed as the top 20M scorer. The top score among the multi-singles in 6-land should have been aA61. In Minnesota, WØUC, should have been listed in the number two all-band position with a linescore of 229,905-393-195-B, G3NT, listed as an all-band score, should have been listed as the top 15M entrant from

England. G4ANT, the world high scorer in the multimulti class, should have had the following linescore: 3,479,304-4999-232-C. JA2YKA, listed as the top JA multi-single scorer, should have been listed in the multi-multi class, making them the number two m/m score in Japan. JA1ZLO is the top multi-single. CW: ACZU at 206,901 points should have been listed as the top 10M score in the Northern New Jersey Section. N2DT, listed as the 20M top scorer in the NLI Section, should have been listed as the number two low score in Eastern New York. W5XZ was incorrectly listed as a multi-multi entry. They should really have been listed as the number two-multi-single in the fifth call area. WD9IIC at 158,850 points in the Illinois all-



Half of the N8II multi-single cw team — N8II, KC8C and KD8G. (WB8UDY photo)



Andri, YC2BSF, took top Oceania phone honors on 15 meters.

band listings should be listed as the number two 10m score from Illinois. WØUC not KBØRC should be listed as the Dakota Division cw winner. VE3CUI is not an 80M entry and should have been listed as a 40 meter monoband entry. WB6SHL (NC6T, opt.) at 217,008 points should have been listed as the top all-band entrant from the Orange Section. K7NHV should have been listed as the top all-band entrant from the Orange Section. K7NHV should have been listed as the seventh call-area leader instead of N7DF. The call sign of the top all-band score from Switzerland is HB9AGH not HB9AGN. JA7YAA listed as the top multi-single scorer from Ja7YAF is the top multi-single.

SCORES

The scores are listed by mode — phone and cw. For both W/VE and DX scores, single operators are listed first, followed by multitoperator, single transmitter and then multioperator, multi transmitter. W/VE single operator scores are broken down by call area and ARRL section. W/VE multi-single scores are broken down by call area only. All W/VE multi-multi scores are grouped together in descending order by score. DX single op, multi-single and multi-multi scores are grouped together in descending order by score. DX single op, multi-single and multi-multi scores are broken down by continent and country. Under each section and country, single op scores are listed in descending order by category, all band first and then 160-, 80-, 40-, 20-, 15- and 10-meter single-band scores. QRP scores follow single band. The line score gives call, score, QSOs, multipliers and power input used (A = 10 W or less; B = 11-200 W; C = more than 200 W). The first station in each category has a designator following the power (AB indicates all band; single-bands are indicated by 160, 80, 40, 20, 15 and 10; QRP entries are indicated as QRP). Example: In Connecticut, the top phone all-band scorer is WIZM; the top low power (200 W or less) entrant is K1JX; KE1F has the top 80M single-band score, tIBNQ the top 40m, K1K1 the top 20m, K1RM the top 15m, WB1CZX the top 10m and KA1CZF the top QRP score. W/VE multi-single and multi-multi entries have their ARRL section abbreviations listed after their power designator.

	· · · · · · · · · · · · · · · · · · ·						
W/VE-PHONE	2	WAZPHA KS2I WB2MVF	13,578- 73- 62-8 12,960- 72- 60-C 10,206- 62- 54-C	WBINL 60,912 WA4VEK 30,300 N4KG 3/1,448	• 282• 72-C-10 • 202• 50-8 • 616•201-A-QR	KSGOE KASELC	36,477- 193- 63-8-10 33,696- 216- 52-C
Single Operator	Eastern New York K2TA 1,431,360-1680-284-C-AB K2XA 1,050,732-1269-276-C KB2MG 309,573-649-159-C	WAZEKK WAZEEZ KAZODE WAZORX	8325- 75- 37-C 6372- 59- 36-B 10,032- 76- 44-C-40 5643- 57- 33-C	Georgia	- was was a second by	Louisiana W578	450,684- 702-214-C-AB
1 Connecticut	RA2MNJ 154,710- 382-735-B N2BIN 146,286- 378-129-B N2JJ 122,364- 309-132-C R2QF 122,744- 334-122-C N2F5 43,095- 169- 85-B	WAZETU KS2F W2HPF WAZLOG	69,768- 306- 76-C-20 35,550- 150- 79-C 88,914- 406- 73-C-15 45,426- 226- 67-C	KA4NEC 326,232 K4BAI (39,008 W4UYG 82,110	• 835-252-C-AB • 552-197-C • 362-128-C • 322- 85-C	WASIGD KCSHL WDSDHY KSCON	382,788- 588-217-C 219,816- 426-172-C 121,572- 307-132-C 84,132- 228-123-G
WIZM (KIZM, opr.) 2,645,730-2390-369-C-AB AA2Z 1,836,785-1795-341-C		KE28 N2F1 KE2C (N2/	35,685-183-65-8 8190-70-39-8 AU, opr.) 355,740-1210-98-C-10	N4TZ 18,000 W8ZF/4 178,848 W4VX 360	- 100- 60-C - 621- 96-C-15 - 12- 10-R	W5OB W85RP1 WA5ISZ W5RPK	71,868- 212-113-C 56,175- 175-107-C 15,288- 98- 52-C 10,089- 59- 57-C
KIJX 918,189-1097-279-8 AKIN 528,860-952-185-C KIWA 501,183-717-233-C KAIVC 436,050-765-196-C KGID 417.024-724-192-C NIAPI 384,375-625-205-C	N2ASL 24/282- 114- 21-8 W2DW 21,664- 116- 68-C N2EK 3552- 37- 32-8 WA2SPt. 495- 15- 11-C-160	WB2ZEL N2CUW K2LTM	123,576- 542- 76-C 29,400- 200- 49-C 11,058- 97- 38-C		- 362- 74-C-10 - 219- 70-C - 106- 39-B	KSKU Mississippi	30,780- 171- 60-C-40
WAIFON 249 444- 507-164-B	KF2O 14,256- 99- 48-C-40 K2RO 263,940- 830-106-C-20 W2IB 64,452- 262- 82-C-15 W2KHO 23,103,151,618	N2ÚS	5208- 62- 28-8 111,870- 330-113-A-GRE	, Kentucky NA4D 470,004 NIG174 452 145	- 739-212-C-AB - 701-215-C - 683-205-C	WASOVII	241,164- 462-174-C-AB 143,850- 350-137-C 107,580- 478- 75-C-10
KIWIL 222,180 460-161-C WIWEF 202,419 567-119-C KIDD 200,850-515-130-C KITHP 149,760-416-120-C	AG2X 159,732- 612- 87-6-10 KB2FC 12,792- 104- 41-8 K52X 8700- 100- 29-C	3 Delaware		KA4MBF /3,023 KA4JMZ 2394	- 38- 21-B	New Mexic	
KIVIIF 134,190- 355-126-C	New York City-L.t. WB2TCQ 448,800- 800-187-C-AB W2MOY 272,160- 540-166-C	AU3V	473,343- 689-229-C-AB 194,964- 422-154-C 24,750- 110- 75-B	ND4Y 4320 KA4GQB 13,992	- 45- 32-C-20 - 106- 44-8-15 - 460- 90-C-10	WSFS NSHH	,255,320-1585-264-C-AB 135,024- 388-116-C 115,290- 366-105-C
M11V 81,030 185-146-C K1DM 77,112- 238-1038 AK1B 72,867- 227-107-B W1VH 54,315- 213- 85-C W11W 45,927- 227- 67-C W11W W11W	KK2E 226,572- 478-158-C	K3JL K3HBP WB3GXD	17,157- 133- 43-C-15 82,164- 334- 82-C-10 3750- 50- 25-B	North Carolina K4KZZ 726,282	- 942-257-C-AB	N5DVY W3PC/5 K15X K51A	17,955- 95- 63-8 594- 18- 11-C 2320- 35- 20-C-40 23,328- 216- 36-C-15 198,180- 734- 90-C-10
W1DO 30,000-100-100-C W1BWS 23,634-101-78-C	RAZHEV 188,198-462-143-8 KZSHL 193,365-393-164-C W2GKZ 139,020-331-140-C KZPA 91,254-227-134-C W2YG 86,832-268-108-C WA2ICX 83,868-241-116-B N2RQ 76,032-256-99-C W32CMP 40,068-159-84-C W32CVG 30,261-131-77-C WB2PXA 27,816-152-61-C	Eastern Per		N4FD 708,609 N4UH 673,596 WD4AAM 389,325	-1199-197-C - 891-252-C - 725-179-C	11313.	
WIRMH 18,360-102-60-B KAIDSQ 5/96-69-28-B KAIFSC 5103-63-27-B KEIF /98-19-14-C-80	N2RQ 76,032-256-99-C W82FMP 40,068-159-84-C WA2OVG 30,261-131-77-C W82PXA 27,816-152-61-C	N3BB 3 N3AD 1 N3ED 1	,129,289-2239-317-C-AB ,032,524-2236-303-C ,398,471-1613-289-C ,106,280-1317-280-C	WD4MVX 86,655 K4JEX 71,280 KQ4G [656	- 348-118-C - 265-109-B - 180-132-C - 24- 23-B - 22- 16-C-40	Northern T NSRZ K5NW	814,380-1108-245-C-AB 713,688- 908-262-C 513,282- 847-202-C
K18NQ 25,071- 137- 61-C-40 WB1EAZ 12,420- 90- 46-C KIKI 656,124-1498-146-C-20	WB2PXA 27.816-152-61-0 WA2GUR 22.176-96-77-8 W2JGH 22.050-98-75-0 AC2P 17.199-117-49-0 WB2PUE 15.222-118-43-8	N3HW N3CHL W3DHM	611,325-1045-195-C 400,653- 781-171-C 388,614- 542-239-C	W4UW J056 Northern Florida	- 55, 10-C-40	MPCKE MPCKE MPTE MPTE	482,220- 705-228-C 367,155- 615-199-C
WB1CZX 2625- 35- 25.6 K1EM 406,020-1340-101-C-10 K1EF1 79,716- 364- 73-C	WA2FBQ 12,549, 89, 47,C WA2DZO 8280, 69, 40-B KS2G 8241- 57- 41-B WA2TSF 7257- 59, 41-B	WBARK KA3DSW WBGK	(398.471.1613.289.C 1,106.280.1317.280.C 875.925.1145.255.C 611,325.1045.195.C 400,653781.171.C 138.614542.239.C 150,406618.189.C 288,589605.159.8 277.488564.164.C 241,335465.173.C 241,335465.173.C 241,336301.223.C 39P1, opr.1 150,060410.122.8 137,448332.138.C	Qualities need and	- 560-158-C-AH - 122- 58-C - 5- 4-C-160	WRSVZL KDSDD WSLMG KASQ	294,637-507-197-C 204,585-593-115-C 167,350-367-152-C 144,592-361-144-C 144,904-347-144-C 1-(2,906-310-143-C 594,697-153-83-C 38,097-153-83-C
W1CNU 34,128- 237- 48-8 K155O 34,974- 201- 58-C WB1HBQ 29,484- 189- 52-B	WAZISH 1863- 27- 23-8 W25GK 1294- 22- 19-C W211 1200- 25- 16-8 KAZHRZ 147- 7- 7-8	MB3FAF WB3FAF	241,080- 490-164-B 201,369- 301-223-C 3PPI, opr.1	W4JAT 21,228 N4WW 15,696 W86ZEC 15,696 W4ZTW 67,134 N4WW (WB4YFF.cq 409,815	· 109 48-C-40 · 334 67-C-15 · 1301-105-C-10	Y NSUA W5AE W5UPV K15Q K2SCU/5	149,904- 347-144-C 1.(2,990- 310-)43-C 59,570- 234- 85-C 59,409- 161-123-C
WIÂW (Ñ\$AXĂ,apr.) 2160- 36- 20-B KATCZF 16,968- 101- 56-A-QRI	WB2KCT 2280, 38, 26,0	WB3KIL WB3KIL	135,705- 415-109-C 128,256- 334-128-C	WAUFU 66,132 KT4P 66,237	- 334- fib.C. . 291. 69.5	K25CU/5 KC5HO W5VGX W5FO K5OY	38,097- 153- 83-C 1584- 24- 22-B 1824- 32- 19-0-80 171,402- 539-106-C-20 37,107- 217- 57-C
Eastern Massachusetts KIAR 2,224,068-2233-332-C-AR	WB2AMU 17,907- [27-47-8 KC2DH 4698- 54-29-8 W2QAN 2760- 40-23-8	WBIFPA W3KT W3WJC W3KV	123,816- 308-134-C 113,280- 295-128-8 108,108- 286-126-C 101,232- 304-111-C		- 237- 71-C - 222- 54-B - 217- 50-B	WB5UDX WB5CY1 K5PX K5IID	70,818- 319- 74-C-15 3300- 44- 25-C 313,929-1057- 99-C-10 181,374- 703- 86-C
KIAR 2,224,068-2233-332-C-AB KIDG 1,887,693-1901-331-C KGIE 1,096,620-1402-245-C KAIGG 577,656-904-213-C KAIR 515,520-960-179-C WIJHN 389,835-585-217-C	W2NL 363- 11- 11-B K2LE 144-402- 587- 82-C-10 K2MFY 135,594- 558- 81-B W2KZE 29,700- 180- 55-C K2CMV 9207- 93- 33-B	M3CIA M3CIA M3ELB M3ELB M3CIA M3CIA	123 10-30 10-30 12-6 10-10-10-10-10-10-10-10-10-10-10-10-10-1	AA4V 4590 W4NL 333,792	51- 30-C-40 912-122-C-20	K9LA/5 NSAW W85CRG	85,644- 366- 78-C 36,075- 185- 65-B 10,731- 73- 49-B
NIAU 255,492 564-151-C KIKJT 245,916-594-138-C KAISA 242,400-505-160-C		KB3YJ N3CIX WB3HYX-	47,472-184-86-8 40,779-197-69-8 32,850-150-73-8 29,526-133-74-8	Southern Fjorida		Oklahoma	
WIFM 194,040- 440-147-8 K1LXJ 165,528- 456-121-8 KAIUE 131,193- 339-129-8 WIDYH 121,338- 321-126-C	Northern New Jersey	WEDJY V WEDJZE WEDDA WEDDA KEVYA	32,850: 150 73.8	∷KDÆFX 159,060 WÆBV 126,840	- 603-223-C-AB - 591-185-C - 462-110-C - 280-151-C	WSTWG WSTWG KSDEC KSWE	175,104- 384-152-C-AB 11,817- 101- 39-C 7128- 72- 33-C 2508- 38- 22-C-20
AD12 59,655-205-97-0 NIRC 56,745-195-97-B K122J 50,007-911-79-8 KA1EKR J4,368-179-64-8	N2LT L392,360-1640-283-C-AB W1GD 666,915-865-257-C- WA2IFS 114,615-28.1-135-C WA2ID 98,649-291-TT-R	KJYVA WJEHZ NJEC KJZPG	1104 W E4-527 II 4428-441 A 5 II 18,557 116 A 7 C 20 7752 61 41 C	W2DSE 1)4,678 N4CXK 94,695 K4ZA 46,314	- 306-135-C - 277-138-C - 295-107-C - 165- 93-C	Southern T	exas .
KB1Q 28,899- 169- 57-C KIED 25,986- 142- 61-8 NIBMS 19,620- 109- 60-B WILUU 19,530- 93- 70-C KO1U 13,800- 100- 46-6	97,344- 338-365-6 KA2MQY 79,608- 248-107-C	KG3Q SE WASLGG K3FN SE N3AZS	1995 15-19-8 126 7 5-8-15 158-295 535-199-C-10 39,501-209-63-8	WB4TIN 147	119 80-C 38 36-C 7 7-B-40	WD5AAH	807,807-1001-269-C-AB 509,580- 745-228-C 111,190- 395- 94-B 85,323- 239-119-C
KAICLX 3612- 43- 28-B NICR 693- 21- 11-B	N2ATT 14,700-100-49-C	110,0174	10,040- (2#-4)-D	WA4KXQ 27 WA4LLQ 3	1 1 B	W5BE W5BE N5CUY N5HB	85,323-239-119-0 81,252-222-122-0 78,975-225-117-0 40,365-207-65-0 26,904-118-76-8
KIPT 27,495- 141- 65-C-80 ABIA 37,170- 177- 70-C-40	WAZASQ 1794- 26- 23-B WAIDTX/2 1215- 27- 15-B N2WT 584.052-1636-119-C-15	Maryland-D N2FB I K3ZJ 1	,514,739-1877-269-C-AB ,056,750-1409-250-C	W25BD/4 6324	22 10-8-10	KSUCV WSPWG KSSNO KSBZU	20(736- 108- 64-0 15,600- 100- 52-B 12,402- 106- 52-B 1701- 27- 21-0-80 59,772- 293- 68-0-40
WIVN 13/514-53/-86-C-15 Klesk (wBIFPF.pr.) 35/475-1065-105-C-10 AGIC 230/139-843-97-C KAIFCG 5040-60-28-C	K2FE 14,868-118-42-C W2UL 576-16-12-B WB2EGI 220,500-875-84-C-10 KJ2N 41,949-237-59-B	WILCM	711,360- 960-247-C 531,240- 760-233-C 470,256- 776-202-C 412,902- 609-226-C	Tennessee	(20 000 d HH	NSJJ KSGA KSSF NSHA	266,733-801-111-C-20 144,576-502-96-C 70,812-281-84-C
WIPLI 3780- 45- 28-C KIVUT 3726- 46- 27-C	KD21 154,014- 386-133-A-QRI K2RF 22,425- 115- 65-A	Kasa	313,605- 505-207-C 302,238- 522-193-C 285,864- 554-172-B 265,650- 550-161-B	NR4S 209,466 K4CXY 77,610	532-200-C-AB 591-177-C 431-162-C 199-130-C		bWHR, opr.) 168,240-612-90-0-15 N, opr.) 543,840-1648-110-0-10 99,540-395-84-0
Maine KUB 237,258- 538-147-C-AB	N255 L,078,056-1302-276-C-AB K2F L 481,740-740-217-C KF 2U 459,000-850-180-C	K3KP W3CM N3AOE W3HVM	285, 864 - 554-172-B 265, 650 - 550-161-B 133, 866 - 402-111-C 129, 195 - 319-135-B 68, 016 - 208-109-B 47, 061 - 189 - 83-B 44, 376 - 172 - 86-B 29, 748 - 134 - 73-B 29, 748 - 134 - 73-B	N4BKN 243	- 214- 99-C - 215- 95-C - 35- 24-8 - 9- 9-C - 72- 41-C-40	K5RF KC5CY N5CMF	99,540-395-84-C 57,750-275-70-C 9360-120-26-8 6732-68-33-8
KAICVM 209,385- 495-141-C KRIU J85,640- 455-136-C KAIGGE 77,220- 250- 99-C WIIO 25,650- 171- 50-C	N2MH 450,432- 736-204-C N2VW 398,142- 657-202-C W2YC 360,444- 613-196-C	N4EOG W3EE K3NCO N3API N3COB	34,992 144- 80-8 34,992 144- 81-8 29,748- 134- 73-8 26,733- 133- 67-8 21,186- 107- 66-C 18,418- 93- 66-C	K4XO 270 KB4KA 41,040 W4JD 66,120	10- 9-0 228- 50-0-20 290- 76-0-15 1403- 93-0-10		
KAICNI 24,300- 90- 90- 8 KI18 14,400- 80- 60- 8 NIAFC (020- 20-)7-8-80 KIUO 520,289-)681-123-C-15	W2FGY 227,874- 466-163-C WA2VYA 212,592- 412-172-C K25NK 196,812- 497-132-C W2BLY 99,036- 262-126-B	MA3A1V M3CM K3AA	13,083- 89- 49-C 8640- 72- 40-B	NX4C 170.829	703- 81-C 526- 83-B	6	
KAIMP 16,356-116-47-C KAIAIF 15,840-120-44-B-10	WAZVYA 212,592-412-1/2-C K25NK 196,812-497-132-C W2BLV 99,036-262-126-B W2PAU 89,661-209-143-C WAZPAU 77,814-262-99-C W2EA 57,939-217-89-B WBERI 56,430-213-90-C W2F HY 55,332-154-116-C	WAJVPL WBJGCG KJTW WJEAX (KI	3813- 41- 31-8 144- 8- 6-C-160 2673- 33- 27-C-80 P4EY, opr.) 33,120- 184- 60-C-15	Virginia K4CG (K7SV, opr.)		East Bay AD6D	J1,620- 155- 68-L-AB
New Hampshire AKLA 2,251,494-2247-334-C-AB	W2F HY 55,332-159-116-C W2U8S 36,972-156-79-8 KB2GW 35,190-138-86-C W2SDO 19,467-103-63-C W2GWA 18,144-112-54-C W2GWA 18,144-112-54-C	WASEEE K4CGY N3BAI	30,444- 172- 59-C 35,110- 155- 54-C 5952- 62- 32-B	NI4Y 512556	1011-203-6	WA6BOB K6CSL WB6FCR W6BSY	16,200-100-54-C 8316-99-28-6 242,520-940-86-C-10 156,606-507-86-C
AKLA 2.251.494-2247-334-C-AB W1HNZ 482,625-975-165-C WA1YTW 101,022-298-133-C KEJE 98,100-300-109-B W1LGQ 93,573-281-111-C KALGEY 42,903-227-63-B	WB2SJA (5,000- 100- 50-8 KA2BEW 13,680- 80- 57-6	K7JBQ W3IDT W3PWO KD3U	1638- 26- 21-8 59,697- 297- 67-8-10 50,388- 221- 76-C 5070- 65- 26-8	K4GKII 452,790 W4RW 331,632 N4MO 228,984	774-195-C 658-168-C 406-188-C	KA6USW K56Q	55,986- 301- 62-0 720- 48- 5-B
WIPH 273,306- 902-101-C-10 N1BEY 25,200- 168- 50-B WICU 13,800- 100- 46-B	K3GYS 11,868, 86, 46, 6 N2BLT 7869, 61, 43-C N2BCT 5292, 49, 36-B WB2VFT 2553, 37, 23-C-80 KC2ME 90,960, 379, 80-B-10	Western Per	insylvania 117 824.1319.3844 / 0.00	W4YE. 96,300 WB4FIH 96,096	344-129-0 311-129-8 300-107-0 286-112-0 213-113-0	Los Angeles KMoB 1, WeCN	225,317-1533-263-C-AB 174,468- 434-134-B 43,605- 153- 95-C
KÍNH [*] 4956- 59- 28-B KAIVQ 487,306- 709-215-A-QRE	M22AMS 47,250 250 63-B W2QKJ 14,124 107 44-B W82QES 2553 37 23-B		,117,824-1312-284-C-AB 428,280-664-215-C C, opr.) 137,592-312-147-C 71,688-232-103-C	WB4QXE 27,702- K4FPF 11.664-		NEON NEON	2508- 44- 19-C 2460- 41- 20-C-80 29-160- 180- 54-C-20
Rhode Island K1VSJ 236,460- 563-140-C-AB W1RFQ 85,365- 271-105-C K1JYM 2277- 33- 23-B	Western New York	KBIWU KBIWU KBIJM	57,528- 188-192-C 43,650- 150- 97-B (X, opr.) 33,858- 171- 66-C-40	WA4E MU 9240- KA4RUJ 5138- KA4E RK 2967- W04KOU 2016-	77-40-8 66-31-8 43-23-8 32-21-8	Orange	290,(78- 987- 98-C-10
KIJYM 2277- 33-23-B WyMHK/M1 to,710- (05- 34-8-10	KT2H 474,573-803-197-C KB2NU 233,280-480-162-C	M3ELX M3EDL (MB	38FD, opr.) 151.452- 601- 84-C-10		29- 17-8 156- 67-C 40 84- 43-8-20 407- 84-C-15	AB6R K6EBK WA6UFF NE6H	92,352- 296-104-C-AB 49,500- 250- 66-B 36,105- 145- 83-C 30,226- 166- 64-8
Vermont W1KQ 60,144- 368- 86-C-10	WB2YQQ 203,463- 481-141-C KJ2Q 183,135- 421-145-C K82WN 152,064- 384-132-C KB2SE 68,907- 223-{03-B	KASCRC	57,723-271-71-8 51,975-231-75-C 38,178-202-63-A-QRP	W4KFC 8190- N4MM 101,016- K1KOB 95,440- WA4FHQ 18,414-	366- 92-C-10 280- 66-C	W6YMV KE6PO	30,720- 160- 64-B 22,620- 116- 65-C 3225- 43- 23-C 17,199- 147- 39-H-15
Western Massachusetts	W2PHT 57,792-224-86-8 WA2BDW 55,056-248-74-8 KB2RK 48,060-180-89-C W2FUI 47,874-202-79-8	4		5		Sacramento K6SG	
KIBW 1,361,395-1527-295-C-AB WIGG 622,698- 962-218-C WAIZAM 2520 35- 24-C-40	KA2CFH 45,240- 232- 65-8 W25NI 41,022- 159- 86-C W2FTY 25,026- 97- 86-B K2NV 25,020- 139- 60-C	Alabama		Arkansas		KVÉH KGDR NGJM WASBRV	342,294- 641-178-C-AB 242,676- 642-126-C 172,139- 331-123-C 18,936- 253-104-C 6720- 64- 35-B
WIAUT 46,080-256-60-C-10	Walsh 16,317, 111, 49.0	KR4F	194,250- 370-175-С-дв	W5EIJ 5966	54- 43-B-AB	Wenke	3360- 40- 28-C

KE6NO 2496- 52-16-8 WH6MRF (42,090-518-85-8-10	8 Michigan	WA9MRU N9BV5 W9CH KA9GRU	15,792- 112- 47-B 8658- 74- 39-B 33,600- 160- 70-C=40 /8,120- 280- 93-C-20	Missouri ALBN 298,460-610-162-C-AB WDØFSJ 178,200-399-150-0	WIOP (KIDT, KALAWS, NIBBM, WAIS RKL, TAG, oprs.) 47-16G-KI KIVH (+Net)
San Diego KO9E/6 76,200-200-127-C-AB AA6EE 7/70-70-37-C WORRID 2988-42-18-8 NIND 19,280-74-80-C-19 W6UQF 15,360-128-40-B	WASYVR (,832,544-2016-303-C-AB AIRI) 1,261,744-1664-252-C NRAFV 220,374-477-154-C-AB WBSWZT 132,858-366-121-B WBSWPG /1,280-279-108-B	W9BAH A191 K9DX K9AB K9RN K4VUD/9	2838- 43- 22-C 500,502-1413-118-C-15 476,112-1417-112-C 39,195- 195- 67-C 306,726- 938-J09-C-10 172,872- 686- 84-C 109,890- 50b- 6b-C	K9Î(M /6,230-231-110-C NBEZE 30,240-126-80-C WBCDC 8778-77-38-C WBGTCF 5580-62-30-8 AK8W 34/5-33-28-B KA8P 300-12-10-8 ABBIKBCS, COL.) 6678-53-42-C-80	### ### ### ### ### ### ### ### ### ##
San Francisco - N6CU 694,534-1173-186-C-AB K6ANP 559,662-918-203-C K8677 181,917-493-128-B WENNER 52,892-372-137-C AFO 147,846-38-128-C	K58Q 51,156-174-98-C W8GSV 46,656-192-81-C K08S 43,896-236-62-8 K8ICE 12,840-170-84-C K8BLDE 37,530-228-45-6 W8FFM 1080-20-180-20-180- WD8CFV 20,034-126-57-C-40 K8NA 234,312-75-104-020	Mater of the mater	85,428 - 339 - 65-C 85,428 - 339 - 84-C 24,138 - 149 - 54-B 23,430 - 142 - 55-C 14,241 - 101 - 47-C 11,730 - 115 - 34-5 447-3 - 71 - 21-B 46,352 - 198 - 78-A-QRI	WØPUD 161,250- 625- 86-C-10 Nebraska KØSCM 763,776-1088-234-C-AB	2 N2RM (+N2ATX,KB3TN) 1,436,966-1699-278-C-SNJ KQ2O (+K2BK)
WhPM 78,648-232-11.50 KD6GC 48,222-282-57-0 N6QC 38,979-183-71-0 NA6V 8268-106-20-0 K86HI 5610-55-34-0	K8KUH 7200- 80- 30-C K08T 249,799- 915- 91-C15 WA8BPR (71,000- 570-100-C NSAJF 08,609- 407- 89-C AC-8W 90,940- 337- 90-C WA8B5C 48-618- 222- 73-C K8DD 48-618- 222- 73-C N8BKO 35,820- 199- 60-B	W9 XD KC9FC	1,819,782-1938-313-C-AB 113,565- 335-113-B 57,246- 203- 94-C	NORTH Dakota KRIQU 183,158- 424-144-C-AH KMAW 174,859-459-127-C	828,240-986-280-C-NNJ W2REH (+Net) 815,751-1119-243-C-SNJ WA2JAS (KA2s CLQ-EXU,HOG,ISA, KPK,NWN,KR2B,KS2G,WB2s BXF, CNG,QEU, oprs,) 636,151-1161-197-C-NLI WA2LGO (KZS DUJ),OB, KC2DH,
San Joaquin Valley WDoF LB 160,428-461-L16-C-AB KB6AR 71,688-232-103-C W68YH 1,204-204-100-C W68YH 51,267-169-101-C W68YH 5280-147-80-C W60JPD 74,339-133-51-4-20 KA6HIM 1944-27-248-010	N8BKO 35,820-199-60-8 R8ULH 32,580-181-60-C10 RC8NF 114,000-475-80-C W8FGA 77,220-399-65-C W8FW 58,110-288-65-C K8LJG 54,900-305-60-8 W8FW 44,370-255-58-B N8CJX 33,984-192-59-8 WARIW 54,900-205-47-8	KYVIJK WASCYG KSWZB AGSS KBSZ KASERV WBSPOH WASVJI WASCJI	\$2,400- 144- 75-C 23,744- 149- 52-C 2100- 28- 25-C 2673- 38- 27-R-80 9471- 77- 41-C-40 72,759- 307- 79-C-15 65,280- 255- 85-C 250,280- 860- 97-C-10 47,718- 241- 96-B	W8CAQ 16,272 113-48-C KF\$A 16,200-90-60-C KARCYB 480-16-10-8 W0ADD1 243-9-9-8-20 KI\$E 309-43-24-8-15 KC\$BCU 54,015-277-65-8-10 W8CZ 42,273-231-61-8 N8CZO 2337-41-19-8	WAZLGO (28 D01) 0B, KC2DHL W2DKM, WBZKCT 0DF), W2U (+N3KR) 35-201-C-NLI 382,764-668-191-C-SNI K2TU (+N6) 373,296-616-202-C-SNI WAZDHZ (+KAZLIM) N2KF (+KAZLIM) N2KF (+KAZLIM)
Santa Barbara Winswim 419,832- 714-196-CAB NBBNO 131,840-398-110-8 KAVMN 102,102-286-119-C NBHK 99,081-303-109-C	F.J8A 22,140-170-44-B K8IFE J420-38-30-B KN8P 428,028-673-212-A-QRI Chio	WA9GER Wisconsin KE9A WH9GED W9OP KB9OC	12,870-110-39-8 852,346-1132-251-C-AB 763,30H-1042-243-C 653,961-104-209-C	South Dakota WD##BHV 155,760- 440-118-C-AB WWWUU 31,806- 171- 62-C W#ACT 99,045- 465- 71-C-10	H2KA (+N2IA) 43,776- 152- 96-C-SNI KCZKK (+WAZGVC) KA2BPD (+WBZBVC) KA2BPD (+WBZBVC) 22,425- 115- 65-C-ENY
KU6LB 88,290-270 (1994) WA6DJS 64,570-214-85-4 KOGBI 43,680-182-80-4 KU6LN 9504-88-36-4 WA6WYD 6930-77 ,10-6 KA06JKU 4200-50-28-8 NBVR 750-25-10-8 W88TGD 690-23-10-8	9/3HKK/8 861,021-1211-237-C-AB N8A1 R 627,912-918-228-C KC8JH 619,695-879-235-C N8BJQ 682,015-805-241-C M08M0V 4185 139,486-613-204-C 4185 248,409-450-184-C	K9KVA W9DP K9EC N9AU WB9NOV K9GTQ K9DXO	179/760 428-140-C 127,305-369-115-C 11,630 305-127-C 64,224-223-96-C 41,583-167-83-C 41,583-167-83-C 45,585-189-68-G 18,585-189-68-G 28,224-147-64-C	VE Maritimes-Newfoundland VE [A] 621,100-1190-230-C-AB	3 K300 (+K3NZ) 2,018,048-1728-397-0-FPA W3MA (+K3ZA) W3MA (+K3ZA) W3MA (+K3ZA)
WAGIJZ 20,040-167-40.B-15 WGOUL 3675-49-25 C Santa Clara Valley KGRU (NGBZA, Obt.) 1,412,073-1937-243-C-AB KGHNZ 1,034,476-1316-262-C	WD3RNC 229,944 536-143-B W8NXF 294,180 415-164-C W8F DN 180,096-469-128-C W8F DN 180,096-469-128-C N8TN 148,608-384-129-C K181 53/,072-362-127-C W8CBR 123,372-798-138-C KCBKO 111,384-408-31-C	W9GXR KC9LM W9YCDF K9GDF K9GDF W4RKP W4RKP W9AMM KM9H N9ACP	TS 900 100 53 0 15 228 94 54 0 7224 56 43 0 2070 30 23 B 19,404 132 49 0 20 1890 35 18 0 11,005 159 65 0 15 2925 39 25 0	VETYX 3276- 42- 26-C-80 VE_ICEG 77,544- 359- 72-C-20 VO1MP 200,277- 867- 77-B-10 Quebec VEZAYU 370,110- 730-169-C-AB	W3GG (+N3TO) 978,919-1236-264-C-MDC WA3EUL (+W31,G,WB3s AGC,EKV) 613,2/8-8-41-246-B-EPA WR3C7K (Multiop) 581,880-746-260-C-MDC W3YFV (+N3RG) 421.008-716-196-C-EPA
W6YX [N3ER, Obr.] 608,715-1215-167-C WA61KT 15K,592-448-118-C KMTL 117,114-298-131-C N6HR 83,525-223-125-C N6AN 78,966-246-107-C KD6XY 37,224-188-66-C	W8UPH 95,496-346-32-C KRBK 88,770-293-101-B WBKIFO 73,248-218-112-B KBBIZ 60,006-274-73-C KBIQB 59,100-197-100-B KBUS 55,752-202-22-C W8DWP 54,327-199-91-B	Mach Magne Mach Mach Mach	106,272- 432- 82-0-10 46,221- 217- 71-C 15,720- 131- 40-B 8217- 83- 33-B	VE2PD 49,446- 201- 82-C VE2WA 46,170- 190- 81-B VE2IO 26,970- 155- 58-B VE2FG\$ 82,536- 362- 76-B-20	K3HP (+KB3HE) 355,113-561-211-C-EPA WA3SPI (+KB3WM,WA2DLH, WA3KBH,WB3FPI 252,984-508-166-C-EPA WB3CAC (+K3WGR) WB3CAC (+K3WGR) W3GNQ (+KH7ZZ) W3GNQ (+KH7ZZ)
WHEDN 23,/12- 104- 76-C KA6HOK 15,792- 94- 96-B KJ6Z 567- 21- 9-C K6EMD 546- (4- 13-C W6HXW 2,081- 153- 59-C-20 WA6HKP 44,544- 256- 58-C-15 K65MH 2142- 42- 17-C-10	WARGMI 52,788-2(2-83-8) KRBWW 46,980-174-90-8 NRULR 46,125-205-75-0, KRBZW 42,408-124-114-0, WRYGR 37,422-126-99-8- WRCY 34,650-150-77-Cast NRCGJ 32,631-149-73-8	Calorado WASECN WBOSK KOZFUZ KOWAT KOWAT	245,508 499-164-8 AB 109-62:::315-116-C 103,806-237-146-8 21,112-192-37-C 19-323-113-57-8 1848-28-28-2 21-32-32-32-4 6048-53-33-8-2 3048-53-33-8-2 3048-107-104-2-3	VE3BVD 1,825,920-1920-317-C-AB VE3BVD 131-236-678-154-C VE3LDT 254,904-559-152-C VE3FLA 18,180-101-50-C VE3GWM 547-77-37-C VE3GWM 547-77-37-C VE3GYB 1,934-102-39-B:20 VE3GYK 225,720-792-95-C-15	150,096- 472-159-C-MDC 4 W4QAW (+CX1EK,K3ES1,W3Z2) 2,966,166-2394-413-C-VA N4RV (+633L,K2NA,N4RA,N5AM)
WSYVK 63,840- 304- 70.4-9RF N6NF 14,841- 97- 51-A	KRMR 7/972-126-74-C NBDHO 2/136-124-73-C NBDHO 2/136-124-73-C ADBO 24,192-96-28-C KBHF 19,158-103-62-C KBHF 19,158-103-62-C WDBQAC 17,940-105-66-B	WASONE WASCOE WA	1846-28-22-C 3584-52-23-40 6048-53-32-8-20 320,424-1027-104-C-15 676,140-1910-118-C-10 577,512-1851-104-C 585-39-5-C	VE3JTQ 128,160-480-89-8 VE3JMFT 359,073-1287-93-C-10 VE3JMFT 359,073-1287-93-C-10 VE3JDD (VE1BCZ, opr.) VE3JDD (VE1BCZ, opr.) VE3JDB 40,250-220-61-C	2,310,210-1930-399-C-VA K2BA (+KB8MF, KC8C) 1,310,133-1369-319-C-VA KJ45 (+AA4VK,N45F,K4NVV, W4YZX,WA45JW,TL(,V5L,YÖM, W9NNE,WABJWS)
Arizona WB/FDG 534,546-1042-171-C-AB WF-161 71,406-1249-98-C KC/V 15,600-100-52-B WRIB 6840-60-38-B K7OX 966-23-14-B-80 W901/7 40,580-716-66-C-15	NSCLA 15/287-89-614, WBEPAT 15,660-116-45-8 NSDFO 15,642-77-62-C KCBJE 14,322-77-62-C KCBJE 10,350-62-50-8 WBVZE 2560-72-35-8	lowa KBOPR KBJSY KBLUZ WGWP	\$65,110-1035-182-C-AB \$64,870- 991-190-C 468,504- 723-215-C 248-508-541-156-H	VE2AEJ/3 2898- 46- 21-6 Manitoba VE4AIV 41,118- 178- 77-C-AB VE4PR 32,412- 146- 74-C VE4SL 312- 5- 13-C-80	W4CUE (K4s ELV,IR,KA4s LIA,TSG, KC4MD,KD4DG,KU4J,MA5 DFC, DYA,QB,Nu4N,WA4QMs,DFC, PVI, oprs.) 1,067,922-1502-237-C-AL WB4PRX (+KB4NO,WA4CTA) 378,460-1210-242-C:TN W4CN (KC4MK,KC4WQ,KD4U,N4s LAH XM NOAR ons
W9F1/7 (40,580-710-66-C-15 KC7L1 (201-25-16-H W/AYY 33,222-226-49-B-10 W/KXH 2538-47-18-B K/BFB 71,610-341-70-A-QPF	WHRYEW 7524 57 44 B AFBO 6889 62 37 B W9N1 5957 62 17 B W8NPF 7384 47 24 C KBBWB 1173 23 17 B ADBC 30,615 157 60-C40 WASDXA 108,486 369 98 C-20	KEPV KAPD KCPFH AKPM WDEELF WPEJ WPEJ WOCF	248,399 501.143-B 163,167 397.137-C 141,180 362.130-C 136,851 319.143-B 101,310 307.110-C 69,264 222.104-C 65,460 248 90-C 65,424 232 94-C 95,541 223 89-C	Saskatchewan VESRA 1,500,048-1894-264-C-AB VESAE 32,550-175-62-B VE5ADA 88,209-363-81-C-20	LAH,XM,NOAR, oprs.) 56,357-808-228-C-KY KANDH (KTGKI,KAANWS,KR4K, NE4H,NIAP,WA4VGR,WD4JOB, KSOGU, oprs.) 505,199-718-235-C-VA NAAJZ (+K4ZGB,NE4L,NW4Y) 409,500-650-210-C-AL
KAZINI 17,802- 179- 46-B-AB Nevada WA/CWM 542,700-1206-150-C-AB AJ/S 480,078- 894-179-C KAZBRE 16,740- 90- 62-C	K180' 480- 16- 10-B K98E1 (WD8ALG, out.) 263,328- 844-104-Ct.5 10,578- 86- 41-C K8MN 110,485- 495-101-C-10 WBBKKI 152,220- 590- 86-C KC8PQ 82,179- 397- 69-B WDSMRF 46,299- 253- 61-C	NOVM WOPPF NOBDYO WOMJN NOBGI WOYSEL KBOUE	93,424 233 945 54,540 202 90-6 52,650 225 78-B 39,798 198 67-C 38,400 200 64-B 35,208 163 72-C 17,355 89 65-C 1,280 80 47-B	Alberta VE60U 1,808,136-2283-264-C-AB VE60GY 8436- 76- 37-C VE6WQ 407,349-1269-107-B-10	WD4KDV (KA48 NEX,SHH,WD4RXN, pprs.] 46,647- 213- 73-C-SFL W4DUG (+KQ4K) 10,368- 72- 48-8-SFL
KA7BRE 1G,140- 90- 62-C WB7VH 1701- 27- 21-C-20 Oregon KI/M 2/6,390- 555-156-C-AR WB7E1 240,691- 587-131-C W7XN 126,750- 338-125-S	WDRIOL 34,038-186-61-B WBKUK 21,684-139-52-C NRIPH 16,638-354-37-B NRRH 154,538-354-37-B KCBF 4978-73-41-B KCBF 4698-58-27-B WDRKIM 720-20-12-C WARAGH 54,312-248-73-A-QRI	KERY WARETC KROTM KONN KJOD KOAL	2523 29 29 29 C 12,816 85 48 C 40 30,810 158 65 C 15 51,129 247 69 C 10 41,724 228 61 C 29,016 156 62 B 24,255 165 49 B	British Columbia VE 7WJ (VE 77B, Opt.) 310,405-1305-207-C-A8 VE7AWT 450,543-839-179-L VE7VX 118,698-642-73-C-20 VE7DLM 58,575-355-58-C-15	5 KSKG (+K5s LZO,TU,KASGJO, K6SU,N5DU,W5ASP,W7SE) L370-340-1380-331-C-STX NSFG (+K5GY,KBSW0,WN51/Z, WD6EQP) 378,834-613-206-C-MS W5DV (+N5DDO) M5DV (+N5DDO)
W/KN 126,/50-338-125-8 W/GUR 94,312-288-108-C W//I 90,/50-250-121-B N/Ctq 1647-61-9-8 W/LXR 83,160-495-56-C15 W/MLJ 28,026-173-54-B W/I P 188,232-682-92-C-10 KA7LPD 3180-53-20-B	WD8IJP 12,600- 84- 90-A West Virginia N8II 1,573,197-1853-283-C-AB KN8D 134,904- 308-146-B K2AOE/8 129,600- 400-108-C	Kansas Wawa Kawa Kauh Webisw Acaa	730,368- 951-156-C-AB 470,043- 829-189-C 383,340- 734-165-C 247,048- 496-166-C 181,305- 395-153-C	Yukon-N.W.T. VY1DD 54- 6- 3-8-80	(15/470- 362:145-C-NTX KB5CY (1+KD5/D,KW5X,N5027, W5KIW,WB5GYQ,WD8GDE) 150,750- 375-134-C-5TX W65TTU (1+KA5KAY,WD5FUE)
Utah NZDF 1,480,290-1862-765-C AB NZSM 53,064-701-88-C Washington	KBBL J 110,004 350-103-t W8QMG 44,082 186 79-t W8VEN 26,040 124 70-t K8SUS 10,731 73 49-B K80QG 4032 42 32-t W8LRL 470 14 10-t 160 W8LRL 470 14 10-t 160 W8LRL 470 171 173 48-B-20 471 173 173 183-B-20 48-B-20 471 173	KISELY/S WDSCCU WDSEY KBJEY WDSCFZ WSUGD KBJBH	181,305-395,153-C 156,408-392,133-C 104,544-258-121-B 100,002-327-102-C 94,752-336-94-C 66,105-195,113-C 39,762-141-94-B 27,720-154-60-C 18,315-111-55-B	W/VE · PHONE Multioperator	82,416- 272-101-B-OK 6 N62V (+AE6P,K6OKW,N6s OHV, DK2)
K/RI (WATKKM, opr.) 1,5n1,365-2,35-221-C-AB N/ABJ 520,194-958-181-B W87WQE 265,356-819-108-C K/NI 72,192-256-94-C K/DEW 14,022-123-38-C	WAAHII 143,370 5.11 904.515 WDBCZA 14,524 10.6 424-10 9	KAMMO WAMAY WAMOZP KAMA KAMA WAMAZI WAMAZI WAMA WAMA	18,315-111-55-8 9290-80-41-C 2035-67-35-C 4350-50-29-C 1989-39-17-C 6144-64-32-C-20 19,440-120-54-C-10 10,488-76-46-C 8463-91-31-B	Single Transmitter 1 KIOX {+KIRX,KA1UA,KC1F,W1s	1,170,468-1599-244-C-DRG W6-TPH (+Net) 947,274-1258-251-C-5V W6-OWO (+K65 DC,KCM,WA6SLO, WB-DSV,WD6-ERA) 724,014-1102-219-C-SCV W6-UE (AABHX,N5-DLU,WA6O-1U, OPS.)
K7F5 7140-70. 44-0 N7EA 9720-90-8-0-40 WA7GVM 62,832-272-77-0-20 W7RM (W7WA, 0pt.) 696,795-2255-03-0-15 M7LGG 90,310-215-78-0 W7LGG 90,310-215-78-0 K07G 19,764-244-27-0	W9NUI 598,744,899-2/24-CAB K99W8 345,780,565-204-C K89AW 301,792,508-198-C AG9E 258,462,519-166-C K9YAX 171,315-405-141-B K9K94 161,489,499-1776 KC947 149,388-427-118-6	Minnesota Kø LPF WA/PHF1/4	544,968- 783-232-C-AB	FJ,EV) J,918,915-3045-429-C-NH WALTEF (FKALIG,NIBVM) I,830,948-1988-307-C-RI KIGW (FKIKA,N8RK,WB8BTH, AG9V) J/64/2201939-3045-NH	417,312-756-184-C-LAX N6ADI (+WD5JEA,N68 ADI,VR, WB61NB) 342,/47-621-184-C-SB W6BIP (+WA6DJI) 320,/42-519-206-C-SF KE6MN (+KA65+KRM,NIH,NIL,VL,V NSV_OMZ,RRL,SAS,N65-DSH,FFG,
Wyoming N/CG 120,384 392-114-C-AB RERKW// 372-50 (25 86-C REZM 15,930-118-45-B REZWN 480-16-10-8	N9AEJ 142,875 375-127-C WD9DBC 142,065 385-123 C K9MN1 11,832 238-153-C K9MP1 96,558 266-121-C W9C5G 49,068 188-87-8 W9HN1 20,880 128-70-8 W9BIY 17,756 94-63-C	KABIXD ACBW WBLXL WBLXL WBLXL KABCI KABC KABC	69,168-262-88-8 42,525-189-75-8 41,736-188-74-8 22,700-115-65-0 16,554-89-62-0 12,900-86-50-0 101,844-414-82-0-15 32,749-270-54-0-10	WBIDED (FWBYVKH) 907,758-1363-222-C-ME AGIK (+KAIS BBY,EHR,N1RI, WALBYE,WBLIDG 702,000-1000-234-C-RI KAICI (+WBICBY) 680,652-1022-222-C-CT K1XM (+KAIGHR) 427,518-702-203-C-EM	ND6N, WA'6PGH) 240,981-481-167-CORG K6UC (+NG6X) 180,642-374-161-C-SCV WA6IAX (K6SXD) KA6GFR, KE6LO, KD68 PN, ZM, N6S DHU, F JD, GAU, NG6K, W6RDY, WA6HGF, W865 HDG, RDM, WA6RSF, Upt.) 179,304-482-124-C-SB
WBZRGN 5346- 54- 33-C-40	A19P 16,368- 88- 62-C	NØDBG	18,150- 110- 55-8	427,518- 702-203-¢-EM	1/9,304- 482-124-C-SB



N5DKG/YV5 turned in the number four single operator score on cw from South America. Listen for Dennis with his new call, KZ5M, in the future.



Taka, JA3VXH, made 506 all-band cw QSOs using only 20 watts of power.



I8MPO operated IO8MPO to the tune of over 2500 QSOs in a monoband phone effort on 10 meters. Some of us might remember Lucio for his operation as TLØBQ a couple of years ago.

1115 F 144 C - E 4 - 4 - 4 - 4 - 4 - 4		
MO21WC/2 (+ KWOM)	MC K	:61(2)
WD5JMC/6 (+ KA6MI 94,863-	307-1	03-C-5B
ACSV (+Net)		
AC6V (+Net) 76,950-	225-1	14-C-SCV
W6FQF(+Net)		
71,940-	220-1	09-C-SCV
76,950- W6FQF(+Net) 71,940- W6ZKM (+Net)		
29,808	138-	72 C-SCV
W6OKK (+ K6AYA)		
4200-	- 0	28-C-5CV
K6Fri (+Netl		
1056-	22-	16-C-5V
K6LRN (+WB6TKD)		
270-	10-	9 B-5F

NTRO (+KAJUAH,W75 DQM,EKM, W95W (AIBE,KA85 KNE,M72,KNBJ, W95 OJE WUG,WABNOX WBBVYC, WD40FR,W035 DT UG,GUX HVVC, WD40FR,W035 NT,GUX HVVC, WD40FR,W035 NT,GUX HVVC, WD40FR, WD40FR,

WgUO (+K@KJS) 1,026,668-1206-281-C-MN KBSR (+AB@P-KF@P) 790,920-1014-260-C-MN WABYPY (+KBBGH,WABYASM, WRI)

WARYPY (+KBBGH, WARA SAM)
WRI)
46,353- 979-169-C-NE
VKRR (+WBBUEL)
443,750- 688-215-C-1A
VKRBA-FFT, NOBDM, KAAJZV,
KBRXO, NØS BIL, BKY, HNG, DFP,
WBØNAM)
56,208- 656-181-C-MN
WØFF (+KBK, KCS)G, WWYI)
283,582- 459-166-C-MO
WØGOR (+WBGOO)
KMØP (+KMØR, WØHHH)
285,5400-838-90-C-CO
WØGOR (*WBGON)
WØGOR (*WBGON

MBBUCW (+K8BV,WBBHDC)
b3q,564-956-223-COH
KBHLM (+K8S)A,KBBHC,KOBZ,NBS
CEU,CFC,DKO,WBBBHK)
386,764-942-226-C-MI
WMSY,WA2/OC,WBBSEHX,
WMSY,WA2/OC,WBSS-Z,7/D9S
WKJ,WA2/OC,WBSS-Z,7/D9S
WKJ,WMB,OOLOBS-71-01-195-C-MI
NBCXX (+NBBTU)
186,744-902-124-8-MI
KMBC (+KF,821)
137,944-291-158-8-MI
KASHJG (+KR,84 HE,KC,JNRCHC)
92,718-303-102-C-MI
VAJIGUD/8 (+KC,80),WBS CPG,
MXS)
78,228-318-82-C-MI

MXS) 78,228- 318- 82-C-MI KA8HDR (*WDSNOP) 40,716- 174- 78-8-OH WDBOFP (Multiop) 39,069- 186- 70-B-OH

WSGO, WASS MCLIVEF)

W3GM (HK15 GM,ND,WW,N3V,
W33 V)

#344,76-271.54.36-4.40-4.54

W2RQ (HK20 Y, KR21,NZN1,WZY,
M34 V)

#35 V)

#35 V, W2RQ (HK20 Y, KR21,NZN1,WZY,
M34 V)

#36 W, W2RQ (HK20 Y, KR21,NZN1,WZY,
M37 V, M37

DX - PHONE

Single Operator

Africa			
A22GM	42,588-	3.38-	42-B-10

CN8CO (W3EMH, opr.) 932,490-1594-195-B-AB CASZI 111,141- 699- 53-B-10

16,480-189-40-C-20 EE-288K (ALERN)
16,480-189-40-C-20 EE-288K (ALERN)
180-189-3690-1810-183-C-88 MAJAGRK (ALERN)
181-318-31-16-C HAVING (ES)
181-368-199-C HAVING (ES)
181-368-199-C HAVING (ES)
181-368-199-C HAVING (ES)
181-368-193-C HAVING (ES)
181-368

15.480 199 40-C.
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MSMA. UM8MDX UM8MAN HAUSIN

9396-9300-7695-7644-7482-6000-4268-1260-166-60MM 165- 11-90- 10-90- 12-12- 2-324,729-1899-12- 2- 2-8
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55 - 48-B-AB

51-498-32-6-20-4-21-8-27-4-

16,0748-16,982-111,540-111,140-8640-7150-111,140-8640-7150-711,140-8640-7150-711,140-8640-7150-7180-8640 JRTAHH JATCG JITCBE JATKEX JAMEX JAMEX JAMEZ JATHEA TEGERT 3- 1-101,760- 530-67,920- 293-35,037- 229-23,856- 142-21,624- 136-1935- 12-612- 76-168- 14-2

25,54% 131- 65-B-AB 3111- 51- 17-B-10

95,700- 658-120- 12-20,910+295+34-8-15 34,194+278+41 B-10 15,767 - 142 15,144 - 156 1701 - 17 57-8-AB 33 B-15 21 B-10 128,050, 810,135,8,48 91,290, 358, 894 44,982, 294, 41,8 192,528,1146, 50,815 157,775, 835, 55,8 16,861, 147, 41,8 16,872, 157, 37,8 16,861, 57,9, 50,84,0 7,7300, 452, 50,8 UA9FOL UA9MR UA9SAU UA9MAF

46 20-

UA9UUN UA9YE UK9QAZ RA9UAU UA9EAT UA9SGI UA9SUA UAPSDT 40,572- 294-33,247- 189-8064- 96-7690- 102-6180- 85-5103- 63-4290- 55-414- 23-GHT19740 172.260- 522-110-C-AB

4×6AG 416,988- 972-143-C-AB 241,110-1410- 57-C-20 9K2BE (G4BWP, opr.) (03;047- 701- 49-0-†0

18,216- 138- 44-B-AB

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67,608- 313- 72 8-AB 23,463- 237- 33-C-80 63,150- 421- 50-C-40 8568- 102- 28-B 27,049- 197- 39-8-20 540- 19- 12-8 CT4MS CT1FL CT1AO2 CT1RGM CT1UA CHAHO

CT2CE CT2CM CT2QP 69,300- 525- 44-8-80 290,640-1730- 56-C-15 ZX, opr.) 126,900- 900- 47-C 30,915- 229- 45-B-(n CTREE

30,710-269-456-CAB 201,929-1678-15-3-CAB 221,929-1678-15-3-CAB 848,840-859-1,36-C 848,840-859-1,36-C 147,640-540-122-C 147,640-540-122-C 147,640-540-122-C 147,454-49-102-C 89,505-351-85-8 54,275-279-74-C 25,901-147-6+8 AH MLC DLZGAR DE**g**si (DL

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3392 - 61 - 24-A

3394 - 61 - 29-A

583,48-3 - 529-149-C

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718,960 - 88-1-72-8

727,375 - 59-4-179-C

717,340 - 610 - 98-8

71,780 - 197-80-8

71,790 - 230 - 75-8

71,790 - 230 - 75-8

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23,164 141 488-88 20,304 141 48 88-88 14,550 97 50-8 8880 74 40-8 97,704 984 57,704 992 15,844 139 37-52 18,644 139 37-53 14,164 327 44-8-10 11,322 102 37-8 9207 99 31 8 312 48 73-8 F SERS F SURP

G3F ×B = 2,702,898-4144-219-0-AB

KARF (+KAGU,NACGI,WYXR,WAS UA,UN)

W9DUB (+K9s BN.JF,N9AW,W9RN) 2,66 (,244,236,3477-C.W) K9CJK (+W87DZN,SM7D77 I, K9LWI (,KB9US,W89AUK) K19D (+K43V,KM9R,KM9S, W9DBF)

KJ9D (+ KK9V,KM9R,KM9S, MYOBFI (+ KB9T) W9LT (+ KB9T) W9LT (+ KB9T) (59-1-544-7/8-C-1N W4QQ (+ KE9YW,N9GS,W99RGA) 899,940-113-2-265-C-1 RBDE (+ KA95 FYZ,HYM,KC9-BT, 80,KK9Z,WD9EQU) 857,888-1148-25-2-C-IN W9YB (KK9W,KM9D,N9NH, WD9GH, 0001-6-19-997-265-C-IN K9MFI (+ WB9JKI) 376,740-598-210-C-1 N9LE (+ KB9GR) 174,150-387-150-C-1

(JA,UN)

3,417,540-2765-412-C-CO
WØKEA (HK9MWM,KAØS BAD),
LRW,NØAFO,WBØITG,WDØASM)
1,638-630-1785-306-C-CU
KØRWL (HAKØA,KMØL,KØUAA,
KBØS U,WD,KAØLSA,NØCCX)
1,150,092-1389-276-C-MO

JAGEBR JAGEBR HABE UEBLI

October 1982

81

G3×BY G4HBI G3YBH	€1,845- 217- 95-B	OKEPBM OKIZL	103,428- 663 73,755- 447	< 55-C	Y45RN Y35XG Y41ZH	89 856-	658-121-B 312- 96-B 209- 77-B		DX -PHONE	UKéHCZ (UA6s HJU,HKP, UW6FC' oprs.) 135,228- 382-118-8
GZACI) GZNLY	37,536- 184- 68-8 51,600- 400- 43-0-40	OKZBJR OKIJPM OKZBQZ		- 31-B - 37-B	YSINO	38,640• 24,32	184- 70-8 159- 51-8		Multioperator	UK3D8V (UA3DFQ+4 oprs.) 102,588- 412- 53-8
G3NT G4GIR G4JVG		OK3CM	51,486- 188		Y241F/P Y25BU Y24NG	27.72%	139- 48-8 138- 67-8 120- 49-8		Single Transmitter	UKIADR (3 opis.) 10,800- 120- 31-8 UK6APP (UA6ARX+2 oprs.) 2451- 13- 9-8
7-41KS G4CHP G4FOH	134 946. 813. 54-H	OY9R	18,252- 117		Y22HF Y51ZE	18,144-	126 48-B 101 40-B			
G4FOH G5EBA (Ks	95,316- 6(1- 52-8 9FOH, opr.) 16,599- (58- 35-8	OZ4RT	,136,292-2116 135,468- 425	-106-B	Y21WF Y331A Y57WJ	340+ 5796+ 31.857-	39 10-B 84 23-C 259- 41-B	-40	Asia JAGYBA (JA9s LJI,LN,LWB,	UKSIAZ (U851HO+5 oprs.) (,587,600-2800-189-B UKSUDX (UB54 RCA,UAL,XCM,
G4KIU G3IMW	9445- 85- 37-R	OZRÍ OZZBM OZJERR	111,000 3/0 82,173-301 81,900-300	- 91-8	Y26LN Y33XB	1092-	26- 14-8 (075- 66-C		OTX, JH&CAZ, oprs.} 1,638,330-2815-194-0	Option and the second
G 3V OF	44,361, 279, 53-A 5480- 60- 36-A	OZIDAF OZEVQ	9996- 98 61 38- 62	- 34-B - 33-B	Y21JH Y455A Y27FN Y22TO	660- 273- 315,3-56-	20- 11-8 13- 7-8 1877- 56-8 806- 52-6	ŧ	JG1ZUY [JG1s iLF,IMM,JI1s ACI,QQI,JH7PKU, oprs.] i,628,883-2623-207-C	UKSMAF (UBS\$ MDC,MJX,MNX, MNY,MUV,US\$LK, 59rs.) 786,808-1712-153-B
GI4NKE	126,360- 520- 81-B-AB	OZICAH OZICAH OZICAH	27,183-221 4288- 52	28 B	YSIPA	93.600.	600. 52-0	É	JHTYJF (JATOWU,JHTS LRS,NHE,	UK5ICX (3 oprs.) 48,852- 236- 69-B UK5EDV (3 oprs)
GM3BCL GM5Ax Y GM4RHF	27,852- 211- 44-C-20	0232K 02712 021B1E	339,696-2022 334,134-1954 105,336- 627	- 57-8-10	Y26BO/P Y21HI/A Y56YF Y53WL Y32UG	21 522.	222- 47-8 203- 40-8 156- 46-8	a .	1,293,468-2629-164-C JA3YKC (JF 3s PMM,RAL, JG3LLB.JR4B5M, oprs.)	40,656- 30#- 44-B UK5GKW (3 oprs.)
GM3RAD GM3RFR	234,192-1394-56-C-10 1998- 77-18-A-GH		105,336- 627 57,000- 380 45,402- 322 17,442- 171 5325- 71	- 50-8 - 47-8	JWEST JWEST JUSEY	11.442	130- 35-H 115- 34-B 106- 36-B	í	JG3LLB,JR4BSM, opts.) 506,238-1214-139-0 JA1YFG (JG1VCZ,JH2PRZ, JH4CQQ,J11JMH,JL1HZR,JN1s	25,521 181- 47-B UK2PCR (UP2s BDF,BF1,BIO,
GW3NNF	802,956-1738-154-C-AB 449,388-2628- 57-C-15	OZ6MW GZ1AP	17,442- 171 5325- 71	25-B	V54XA	9990- 6642-	111-30-8 82-27-8	3	162,708- 596- 91-C	FBL,PC1, oprs.) 2,191,455-3865-189-B UK2BCR (3 oprs.)
HA4XX HA5KMB	117,894- 401- 98-B-AB 7776- 72- 36-B 169,290-1026- 55-B-20	PARAIR PAGLIE	98,298- 381 35,200- 170 23,427- 137		Y 31 X F Y 34 X F Y 24 N N / A	6237 - 5124- 4828-	61 28 B	3	UK6FGD (UF6s AW,FDB,FFH,	1,172,640-2443-160-B
HA4KYN HA@DU HG8KQX	(9,080- 159- 40-B 289 442-1692- 57-B-10	PANKOM PANJOS PANCE	544 5 - 55	- 57-8 - 33-8 - 30-8	Y49RF Y34YF	3381- 3060-	49 23-8	3	765Q- 75- 34-B	UK2GAB (4 oprs.) 440,181-1971-137-8
HASKO HASKO	1120- 1-2- 20-8 27,048- 184- 49-A-QRE	PANADC	25,840- 205 2052- 36	- 42-B-20 - 19-B					UK¶QAA (UAØs QAS,QBB,QCA, 098-74, oprs.) 1,864,080-3452-180-8	YUBDBC (YUBS THY, TOR, TPZ, opru)
HB9AAM	1,189,608-2044-194-C-AB 204,594- 559-122-0	PANEHE PA382V PANHER	116,424- 693 23,085- 171 19,557- 159	• 45-B • 41-B	North Ame	rica			UK¢ZAH (UA¢s ZBP,ZCJ,ZDD, oprs.)	1,904,859-2981-213-C YU2HST (2 opts.) 124,533- 411-101-B
HB9DX HB9ASJ	70,950- 473- 50-C-10 23,940- 140- 57-A-GRI	PLITRC PPANDUU	6972 83 63,336-406 14,592-128	⊦ 28-B - 52-A-GRP			1033-1 8 2-B	AB.	347,130-1015-114-B UK9FFF (UA9FUL, opr) 40,656- 242- 56-B	Y21YK (+Y23EK,Y24s TK,UK,
16F L.D (7,032,101-3093-2194:-AB 7,031,552-3527-192-C 1,675,047-2893-193-C	PASBLV SM5GMG (1,637,601-2685 2390,895-3965 14,592-126		HIBKW HI3AMF	88.494	1609-109-B 686- 43-B	S-AB	UK9FEF (UA9F) (U	oprs.) 3,5m/,312-7078-168-C 7762N (Y765 VN.WN, oprs.)
I4AVG IIBAF I4CS⊬	1]021]9(]-1969-173-C 59/26223883-H	SMØAJU ! SMSALJ SM68GG	1,637,601-2685 319,488- 632 287,780-1006	-203-C -128-C	HISGS HP1XAT		1341- 56-C 98- 42-A	- 20	4x6AW (+WA IDGC)	7762N (Y765 VN, WN, oprs.) 68,799- 323- 71-8
IMMGM IMMGM	476,235-2785- 67-C-20 495,447-2949- 56-C-15 474,432-2824- 55-C	SM7DMN SM7DRQ	209,664- 833 178,308- 508	5- 84-C 5-) 17-C	HR1JSH	139,380-	505- 92-8	-AB		North America
155DG 108MPQ 1111Z 125VA	434,280-2585- 56-C-10 363,033-2133- 57-C	SM4BTE SM5ALD SM/CQY	120,582-406 106,848-336 106,689-670	- 106-C	NL7P WL7AME KL7LF		953-133-C 832- 92-E		Europe	KV4FZ (K0TG,KM0O,N0s BG, BIH,NO,WA0RBW, outs.) 5,967,555-6743-295-G
ižŠVA TIPGSE TIGRX	215,160-1304- 55-B 144-648- 861- 56-B	- LIJ A.LI	H 1.494. 3.49	1. S2-H	KUJLE KUJIDT KUJISO	54,287- 67,680- 91,494-	553 93-0 470 48-0 598 51-0	-16 10	DIMES IDERCY DRACM DI ART	K2GBH/KP2 (WA2KCL,W4JVN
MWK5	16,325= 705- 55-C 14,015- 691- 55-H 78,936- 506- 52-C 18,270- 145- 42-B	21M2W4 A	77A1O, opr.i 77,274 - 311 47,532 - 23 24,003 - 12		KP2AI		1097. 5 <i>1.</i> H		OE2VEL, opis.) 2,031-918-3353-202-C DATUS (DATS BB,TN,UT,DF2YY,	K5NA) 3,263 ,232-4249-256-B
ÍZKÚŴ IØSKK	18,270- 145- 42-B 28,980- 230- 42-A-ORI	CRITICAL	(8,348-139 [1,48] 8	- 44-C - 43-B - 41-B	OX3ZM OX3KM	612,720- 78,780-	1104-185-C 260-101-B	LAB	oprs.) 1,440,594-2946-163-C OLBUR (DAZER,DF4NP,	VPSE (AA4NC,WB65HD,K8s CV,ND,W88s DQP,VPA, pprs.) 9,531,414- 991-318 -C
148FY/1\$\$	162,195- 983- 55-H-10	SM4CAN SM3DMP	194.865-1181	- 4-C-80 - 55-C-20	TG9G1	587,454-	1379-142-6	A-QRF	DH2SA1,DL8RH, oprs.) 444,312- 968-153-C	VP2EFS (N1BIC,WA1GSO, WB21HN, obis.)
JWØP	119,685- 395-101-C-AF	SM78YP SMØKV/# SKØLM	18,486-151 5700- 76 1632- 37	I- 39-C-15 - 25-B - 17-B	TI\$FQ		249- 44-€		OLSRAI (DLSRAS) 407,628- 871-156-C	504,252-1044-161-B
JX5VAA LA2GV	462- 14- 11-B-15 717,750-1450-165-8-AB	SM4CT1	1377- 2. 205.095-1243	1-17-B 1-55-C-10	ABSWB (K				F 3TV (F6s ARC, BEE, F9IE, oprs.) 4,016,061-5509-243-C	2F2FR (AB\$Y,KJ\$G, oprs.) 2,757-189-3721-247-C
LASÚL LAZAD	182,976- 535-114-C 196,353- 351-101-B	SMALMN	MSJBM, opi.) 150,810 - 914 102,663 - 67	l- 51-B	vP2VFU (WB1ABF, 232,932-	658-118-6	3-AB	F2AU (F1DDA,F6s CTT,EID, opts.) 3,664,080-5089-240-C	Осеаліа
LAIKQ LA3WHA LA9CQ	28,560- 170- 56-8 18,306- 113- 54-8 17,493- 119- 49-8	SMØBDS SM/WT SMJCGO	97,020- 584 52,185- 355 51,840- <u>36</u> 4	- 49 C	XETLCH 6D5CLS	220 2006.	1270- 56-E 1408- 54-C	^. 1 / 1	G3XEP (G3s KWT,ZGA,G4s EZX, FRS (OLIUE L VOLYM NDT.	KH6XX (+K7T1,W7ZR) 4,834,392-5576-289-0
LAIRN LABBBA	(6)786- 133- 42-8 3780- 42- 30-8 61,200- 425- 48-C-20	SM3AF SM7LSU	38,412- 29, 32,637- 25	48 8 44 8 3 43 B	ZFZEL IN BPGEZ (W	(BJ, oc).)	5898-281	≟ AB	G3XEP (G3s KWT,ZGA,G4s EZX, FKS,IDJ,IUF,LVG,LYM,NDT, 660GJ, oprs) (85,334-J606-163-B	KX6BU (AC VÁRXÉCEUMY.PL
£Д8DY 1 Д8КҮ 1 ДЧОГ	20,124- (56- 43-8-15	SM6FGP SM5DYC SM8FM	38,412- 39, 32,637- 25, 23,640- 19, 22,869- 21, 7917- 24	33.13	BreEX (M	18ED 200	072-149-	4Б.	igaBP (G3s CAA ISL JBP G4s "DWU EDR I72 KTH,MVA,G6s GAIB,GWU,CXK,D1A,G8YWF,	PZ,QO,QT, oprs.) 1,319,370-2210-199-C
LA92V LA21U LAXIAA	113,590- 688- 55-8-10 40,640- 560- 48-8 58,800- 400- 49-8	SM3CBR SM3CBR SM8FSM	3150 %4 2700 set	25 B = 20 B = 47 A - 12 BP		The second secon			305,046- 807-126-B	ZL16TZ (+2L1BXA) 972,096-1952-166-B
LASIX LASIX	35,520 296 40-B 11,088 112 33-C	SM6LRR SMØLPO	4478- 12 9810- 10 855- =1	38-A 30-A 30-A 30-A 30-A 30-A 30-A 30-A 30	THITET	228		B.80 *	3M4NFC (+GM3WOJ,GM4s COX, CXM,FOM,IGS,NFI) 1,577,844-3207-164-C	972,096-1952-166-B ZL#AED (ZLIAXE,WEEWMS, oprs.) 270,144-1608-56-B
LASAE LAZIJ LA4LG	7242- 71 54-8 4002- 58- 23-8	SM6LIF SVBAU	855- =1 144,228- 470	in the same	TOSGW	None and the second section of	- 302- 46.0 - 484- 801		CWARRS IGWAS BUILD ZE JOG.	South America
LA4EU L×1KN	(140- 20- 19-B 805,047-1801-149-B-AB	SVBBK	108,654- 39	8- à1-C	LIANCE.	1.483.600	94 21-900.0	n.a.s	CFU.EVZ,MUZ,ZIY, oprs.) 997,308-2131-156-C	South America WEQL/PJ2 (+WEKG)
	LZ2GJ, opra	UA3DUF UA4HCN UV3DN	905,355-194 123,318-40 61,440-25	3-102-B 5-80-B	KH6ND KH6GMP	1,869,840 104,832	-2597-240-E - 364- 96-9	B-AB	HG6V (6 oprs.) 2.891,268-4227-228-C HG5A (HA5s FM.FN.GF.HO.JI.	1,717,593-2281-251-B
⊙E6HZG	753,798-1721-146-C-AB	UAJIN UAJAET UAJGB!	97,420- 22 21,609- 14 10,080- 11	7· 49·B	AH6J KH6IJ AH6BK	7920	- 80- 33-0 - 258- 49-0	č c-an	LN,LZ,MK,OM,HA7RY, oprs.) 2.635,752-4328-203-C	79,781- 383- 69-0
OÉ7SHI OE5CWL	86,490-310-93.6 462- [4-11-010	UMIAE	29,100 19 18,363- 34	4- 50-B-15 3- 47-B-10	KHEMD WZPSOZKI	400,824 H6	-2344- \$7-0	(-) 10	HA6KKC (HA55 BV,LV,MA,MO,OG, WE, opis.) 2,238,560-4040-188-8 HA6KNB (HA65 ND NE NN OO	
OBSECA	,833,114-3166-193-C-AB 330,282- 933-118-C	UA3QIC UA3SAX UA6AZW	36,636- 28 21,274- 17 17,401- 15	3-41-B 3-39-B	VK4VU		- 141- 414 -2900-224-0		HA6KNB (HA65 ND,NF,NN,OQ, VDIS.) 1.825,464-3307-184-C	DV BUONE
OHTEV OHTEW OHTEN	61 517- 233- 88-8 27 300- 130- 70-0 22 035- 114- 85-0	RA3DKE UA2EC	25,245- 18 50,172- 22	7- 45-A-QRP	VK4UR VK4UR VK5ARO		-2900-224-0 - 247- 86-1 - 67- 33-1 - 999- 96-8		HAPKLE (6 oprs.) 1,289,355-1999-215-C	DX -PHONE
OHSBNI73 OHSTZ OHSTZ	20,196+ 132+ 51-8 14,964+ 116+ 43-8	UBSUKO	59.640 28	0- 71-B-AB	VK5BW VK6F5	113,202	- 662- 57-0 - 156- 37-0 - 77- 29-0	B	HABKLE (6 dp/s) - 289 355-1999-215-C HA5KDP/P (HA5s NPPP, T). HA7UX, oprs) - 109 980- 390- 94-8	Multioperator Multi Transmitter
OHSKS	ambus, opr)	UHSUAT UHSUFN UBSUGD	84,772-53 111,618-70 51,952-35 14,976-15	7- 52-H-20 2- 53-H-10 8- 48-H	A KENSD	2/12	44- 21-6	₽	108,567- 754- 48-B	High Francisco
ひHクHUU ひHもみち (ひ	706,745-1753- 95-0-15 3 0-69- 261- 43-0 H6DO, opt.1 25,740- 195- 44-B	UY5XE UB5IPJ UB5UKW	8904-10	6- 32-B 6- 28-B 7- 21-B	YB2SV YB3DC YC2BSF	35,739	- 804-119-1 - 209- 57-1 - 269- 47-1	B	HA4KYH (3 oprs.) 53,244- 261- 68-B	Asia
OHSUL. OHTPS	25,740- 195- 44-B 11,160- 120- 31-B 251,883-1473- 57-C-10	UBSCAY UBSING	2223- 3	9- 19-8 1- 38-A-QRF 8- 18-A	YBOACL	20,241	173- 39-1	B-10	HB9AUS (+HE9ASD) (,585,785-3143-165-C	JA7YAA (JH7s AEF,CUO,GFO, LIS,UJN,WTC,JH8BME,JJ1MVV, JR7s OMD,SEI, oprs.1 J, 199,940-3980-201-C
OH/XY	63,063- 429- 49-0 44,988- 326- 46-B	UBSMNO	3132- 5 1938- 3	8- 18-A 4- 19-A	∑L2AH	550.620	-1330-138-0	B-AB	19KWX (19s SNY,UBZ,UZF) 685,392-(744-131-B	JR75 OMD,SET, oprs.1 2,399,940-3980-201-C IA2YRA (JA45 UDF:XKL.JA95
OHTPY OHTOR OHETI (OI	(4(5/24- 274- 42-0 30(057- 233- 43-8 H5HA, opt.)	UO\$OCL	18,432-12		South Am	erica			19KWX (10s SNY,UBZ,UZF) 685,392;(744-131-B 12CZ (+125 AR1,CAB,GPG,JIP, QMU,RVW,SLA,WDB,YCF) 457,056-1058-144-C	1A2YKA (1A46 UDP, XKL. JA95 NFO.S\$Y JE2RQ1 JG1G1F, JH2QXG JH4YBQ, JH6RPZ, JJ1BTA JR2\$ BLT, GMC, opts.) 1, /47, 395-2987-195-0
OHEXHAI	H5BA, opr.) 9024 - 94- 32-0 8717- 88- 15-8	UP2BPM UP2BPM UP2BPM	54,351- 29 83 22- 7 79,560- 51	7- 61-B-AB 3- 88-B 0- 52-B-20	CESTA	85,536	- 549- 48-1	B-15	LGSLG (LAGEV,LABUU,LA9HW,	######################################
OHØXX 3	2,384,640-4140-192-C-AB	UPZDM UPZAV	179,025-108 5292- 8	5-55-6-10	CLØAÉ	5832	- 81- 24-1	B-10	. 1,266,900-2575-164-8 LA1N (LA2VY,LA4MY, oprs') [63,134- \$13-106-8	JE 1ZRQ (JÉTCÝV JGTGGU, JHTCNY JTPYO JRTRNC, JUES) 1,596,672-2688-198-C
OKIMSN UKSEZ UKIAŁY	- 689,280-1436-160-C-AB - 589,221-1413-139-は - 464,814-1054-147-C	PO2GG1 UQ2DZ	33,25#- 24 31,752- 25	1- 46-8-10 2- 42-8	СР6ЕЦ НСІНС		- 5/0- 74- - 695- 55-		1 22KRR (LZ2AF+1 00t.)	_
OKZBLG OKIJJB	355,590- 878-135-C 92,340- 324- 95-B	URZRKE URZRMZ	67,968- 47	2- 48-8-10 9- 13-A-QRI	HCIEA	5832	81- 24-	č-16	10,086- 82- 41-C	Europe DA2OV (DA1s EE.IX.IZ.YE.
OK) KZ OKJEON		4771,2711,712			K3ZO/HK	3 534 ,5 94	-1585-139-	H-AB	OK1KQJ (OK1s AYP,BY, oprs.) 26,040- 217- 40-C	DA2OV (DAIs EE,IX,IZ,YE, DA2s FM,KN,MU,TX,VK,YY, oprs.)
OK WA	88/872- 322- 92-B 77/220- 286- 90-B 47/925- 21 G 75-B	YOSKLA	383,450-115	Z-(10-B-AB						
OKJPQ OKJYN OKIKIR (17/220- 286- 90-B 47/925- 213- 75-B 16/920- 156- 63-B	YOSBRZ YOSBRZ YOSBEH	23,874-17 21,042-17 19,080-15	3- 46-B-20 6- 42-B 9- 40-B	LUSESU LUIVK	2646 179,592	-1069- 56-	8-10	OZSEDR (OZIS BMA,CCM,CKG, EDE,EZH,FOO,OZSSN, oprs.) 239,190-670-119-C	844,488-1902-148-C IBEVK [+136 FTY,MAU,ÜN,
OKZYN OKIKIR (OKITN OKZPDE	77,220- 286- 90-B 47,925- 21-4-75-H 28,830- 155- 62-B OK1AWH, 697.) 1740- 29- 20-8 86,250- 625- 46-C-40 462- 14- 11-8	YOSBEH YOSBEH YOSBEH YOSBSE	23,874- 17 21,042- 17 19,080- 15 5106- 7	3- 46-B-20 6- 42-B 9- 40-B 4- 23-B	LUIVA LUSECD	179,592 150,096	-1069- 56- - 944- 53-	8-10 8	EDE, EZH, FOO, OZ9SN, OPTS) 2 19, 190- 670-119-C PAGGN (PAGS ERA, GIN, OKA,	13EVK [#138 F1Y,MAU,ŪN, IN3DYG) 4,825,410-6730-239-0
OKZYN OKIKIR (I OKZPDE OKZPDE OKZABU OKIAWZ	77,220, 286, 90-B 47,925, 214, 45-B 28,830, 155, 62-B OK1AWH, opr.) 1740, 29-20-8 86,250-625, 46-C-40 462-14-11-8 75, 5-5-5 231,720,1415, 56-C-20	YOSBRZ YOSBRZ YOSBEH	23,874- 17 21,042- 17 19,080- 15 5106- 7 2340- 3 23,736- 18	3- 46-B-20 6- 42-B 9- 40-B 4- 23-B 9- 20-B 5- 43-B-10	LUIVA LUSECD OA4AWU	179,592 150,096 1,203,384	-1069- 56-	8-10 8	EDE, EZH, FOO, 0295N, oprs.) 249, 190-670-119-C PAØGN (PAØS ERA, GIN, OKA, oprs.) 1,641,240-2910-188-B	IBEVK (†138 FIY,MAU,ŪN, INBDYG)
OKZYN OKIKIR (I OKZPDE OKZABU OKIAWZ OKIAWZ OKID UKIDCU PKIDKU	7(220, 286, 90-8 4,925, 21.4, 75-H 28,830, 155-62-B 0K1AWH, 067) 1740, 29-20-8 462-14-11-8 75-5-50- 237,720-1415-56-0-0 17,540-1075-540-0 (69,290-1045-640-1),311-157-41-8	YOAHT YOSBAZ YOSBEH YOAATW YOAXE YUABXX YUSSBO YUSSBO YUSAPR	7.5,874. 17 21,042- 17 19,080- 15 5106- 7 2340- 3 25,736- 18 3500- 5	3- 46-B-20 6- 42-B 9- 40-B 4- 25-B 9- 20-B 5- 43-B-10 0- 24-B	0A4AWU	179,592 150,096 1,203,384 BIH, opr.) 2,063,460	-1069- 56- - 944- 53- -1729-242- -2890-238-	6-10 6-0-48 6-48	EDF, F. P. F., F. F. D., D. Z. SSN., OPFS.) 2.19, 190. 670-119-C PAGGN (PAGS ERA, GIN, OKA, UPIS.) 1,641,240-2910-188-B SK4NI (SM4S AIQ, DVF, FPF, M, SM6CJK, ODFS.) 2.104.4 (SA415-192-C	ISEVK (+136 F1Y,MAU,ÜN, IN3DYG) 4,825,410-6730-239-0 SK2IV (5M25 AGJ,CDF, pprs.) 51,242- 222- 77-B
OKZYN OKIKIR (I OKTON OKZPDE OKZABU OKIAWZ OKIDI UKIDCU DKIDKS OKIDDW	7(220, 286, 90-8 f, 925, 21.4, 75-8 28,830, 155, 62-8 0K1AWH, 067, 1746, 29-20-8 8,250, 625, 64-40, 462, 14, 11-8 62,75, 55-5 237,720,1415, 56-5 (19,290,1945, 64-6 19,311, 157, 41-8 3312, 48, 33-8 2394, 48, 21-8	YOUNT YOUNT YOUNT YOUNT YOUNT YOUNT YUNT Y	25,874-17, 21,042-17, 19,080-15, 5106-7, 2340-3, 25,736-18, 3500-5, 14,569-16, 15,500-20, 371,280-271,	3- 46-H-20 6- 42-B 6- 40-B 4- 25-B 9- 20-B 9- 20-B 50- 24-B 6- 26-C-80 7- 56-C-20 2- 56-C-20 2- 56-C-20	CA4AWU P42J (WII PP7ZDCI PY8ZBJ	179,592 150,096 1,203,384 BIH, opr.) 2,063,460 847,788	-1069- 56- - 944- 53- -1729-242- -2890-238- -1643-172-	6-10 6-AB 6-AB	EDE, F.2H., FOD, 0.205N., oprs.) 214, 190 - 670-119-C PAGGN (PAGS ERA, GIN, OKA, oprs.) 1,641,240-2910-188-B SK4NI (SM4S AIQ, DVF, FPF, MI, SM6CLK, oprs.) 2,043,616-4416-192-C SK4H S (SM4S F I HEP HMP.	ISEVK (+138 F1Y,MAU,ÜN, IN3DYG) 4,825,410-6730-239-0 SK2IV (5M25 AGJ,CDF, pprs.) 51,242- 222- 77-B
OKZYN OKIKIR (I OKIZPDE OKZPDE OKZPDE OKIAWZ OKITD OKIDK OKIDK OKIDK OKIDBW OKIDK	7(220, 286, 90-B 1,925, 21.4, 75-B 28,830, 155-62-B 0K1AWH, opt.) 1746, 29-20-B 8,250, 525-46-40 462, 14-11-B 237,726-1415-56-C-20 17,540-105-54-C (19,200-1050-64-C 19,311-157-41-B 3312-48-33-B (0K10WA, opt.) 405,612-372-57-C-15	YOUNT YOUNG YOUNGSE YOUNGSE YOUNG YOUNG YUJAPR YUJAPR YUJAPR YUJAPR YUJAPR YUJONG YUJONG YUJONG YUJONG	23,474-2-17 21,042-17 21,080-15 5106-7 2340-8 23,736-18 3600-5 14,569-16 371,280-221 269,136-160 207,075-160 13,050-86	3- 46-B-20 6- 42-B 9- 40-B 4- 23-B 5- 43-B-10 0- 24-B-10 0- 26-C-20 2- 56-C 2- 56-C 2- 56-C 7- 50-C	LUIVA LUSECD OA4AWU P42J (WII PP2ZDU PY8ZBJ 2YINEZ F57KM F57KM	179,592 150,096 1,203,384 BIH, opr.) 2,063,460 847,788 209,718	-1069- 56- - 944- 53- -1729-242- -2890-238- -1643-172- -573-122- -473- 83-	S-10 S-C-AB G-AB C-AB	EDE, F.P.H., FOD, DZ 95N., oprs.) 214, 190 - 1/01.19 C. PAGGN (PAGS ERA, GIN, OKA, oprs.) 1,641,240-2910-188-8 5K4NI (SM4S AIQ, DVF, FPF, MI, SM6CLK, oprs.) 2,943,616-4416-192-C. KRHH (SM6S FLI, HEP, HMP, LZT, MLZ, NBC, oprs.) LZT, MLZ, NBC, oprs.) UKAFAV (UA4FCM+1 opr.)	ISEVK (+138 F1Y,MAU,ON, IN3DYG) 4,825,410-6730-239-0 SK2IV (5M2s AGJ,CDF, pprs.) 51,282- 282- 77-8 North America JJAV T (WBUVT,WBBLDH, opts.) 5,214,856-6192-281-0
OKZYN OKIKIR (I OKITN OKZPDE OKZPDE OKZPDE OKIAWZ OKIID UKIDKU OKIDKW OKICKRA OKIOWW OKIKRA OKIOWW	7 (220, 286, 90-8 4 (922, 21.4, 75-8) 28,830-155-62-8 0K1AWH, 0pr.) 1740-29-20-8 8,250-525-46-40-40 462-14-11-8 237,720-1415-56-C-20 17,540-1045-54-C (19,200-1045-64-C 19,311-157-41-8 3312-48-33-8 (0K10WA, 0pr.) 405,612-372-57-C-15 17,820-165-36-19-8	YOURH YOUREH YOURER YOURES YOUANTW YOUANT YUUANTW YUUANTW YUUANTW YUUNG YUUNG YUUNG YUUNG YUUNG YUUNG YUUNG YUUNG YUUNG YUUNG	75,874-17, 21,042-17, 19,080-15, 516-7, 23,736-18, 36,00-20, 36,136-160, 371,280-221, 3691,36-160, 37,050-86, 38,050-86, 38,050-86, 38,050-86, 38,050-86,	3- 46-H-B 9- 42-B 9- 42-B 9- 42-B 9- 42-B 9- 42-B 10- 26-C-20 2- 56-C-20 2- 56-C-2	LUIVK LUBECD OA4AWU P42J (WII PP7ZDU FY8ZBJ 7YINEZ FS7KM PY3HT PY5CIG PY5XFR PT7WA	179,592 150,096 1,203,384 BIH, opr.) 2,063,460 847,788 209,718	-1069- 56- - 944- 53- -1729-242- -2890-238- -1643-172- -573-122- -473- 83-	S-10 S-C-AB G-AB C-AB	EDE, F.P.H., FOD, 029SN, oprs.) 214,190 - 470-119-C PAGGN (PAGS ERA, GIN, OKA, oprs.) 1,641,240-2910-188-B SK4NI (SM4s AIQ, DVF, FPF, M, SM6CLK, oprs.) 2,943,615-4416-192-C SK4HS (SM4s FL., FEP, HMP, L2T, MLZ, NBC, DPs.) 115,472-568-68-B UKAFAV (DA4FCM+1 opr.) 6,49,53-1345-161-B UKAHBB (6,0 prs.)	ISEVK (+138 F1Y,MAU,ON, IN3DYG) 4,825,410-6730-239-0 SK2IV (5M2s AGJ,CDF, pprs.) 51,282- 282- 77-8 North America JJAV T (WBUVT,WBBLDH, opts.) 5,214,856-6192-281-0
OKZYM OKLIN OKLIN OKZABU JKLAW JKLAW JKLOW JKLOW JKLOW JKLOW JKLOW JKLOW JKLKG GKZGK GKZGK GKZGK JKLKG JKLK JKLK	7(220, 286, 90.8 7(220, 21.4, 75.8 7(830, 155, 62-8 7(830, 155, 62-8 7(80, 155, 62-8 7(90, 155, 155, 155, 155, 155, 155, 155, 15	YOUGHT YO	75,874-1,17 21,042-1,7 19,080-15 51,06-7 2340-3 25,736-18 3000-5 14,569-16 311,280-2;1 269,136-160 270,075-125 100,050-86 29,988-3 29,988-130 240,045-130 240,045-130 240,045-130 240,045-130 240,045-130 240,045-130 240,045-130 240,045-130 240,045-130 240,045-130 240,045-130 240,045-130 240,045-130 240,045-130	3- 46-H-20 6- 42-18-B 6- 42-18-B 6- 42-18-B 6- 24-B 6- 24-B	LUIVK LUBECD OA4AWU P42J (WII PP7ZDU FYSZBJ FY7KM PY3HT PY5CIG PY5XFR FT7WA ZYJEKA	179,592 150,096 1,203,384 8HH, opr.) 2,063,460 847,788 209,718 117,264 17,535 17,535 267,964	-1069- 56- 944- 53- -2890-238- -1643-172- -573-122- -73-123- -290-67 -234-71- 167-39- -11-8- -452-55- -1584-57-	8-10 8-AB 6-AB 6-AB 6-8-8-6-8-8-8-8-8-8-8-8-8-8-8-8-8-8-8-8	EDE, F.P.H., FOD, 029SN, oprs.) 214,199 - 670-119-C PAGGN (PAGS ERA, GIN, OKA, oprs.) 1,641,240-2910-188-B SK4NI ISMAS AIQ, DVF, FPF, MI, SM6CLK, oprs.) 2,943,616-4416-192-C SK(HB (SM9s FCI, HEP, HMP, L2T, MLZ, NBC, oprs.) 115,872 - 568-68-B UKAFAV (UA4FCM+1 opr.) UK4HBR (5,94),51-1345-151-B UK3BBG (UA34PP+1) opr.) 478,174-1177-138-B	
OKZYM OKLIN	7(220, 286, 90.8 7(220, 21.4, 75.8 7(320, 21.4, 75.8 7(320, 21.4, 75.8 7(320, 20.8) 7(320, 20.8	YOUNT YOUNT YOUNT YOUNT YOUNT YOUNT YUMAN	73,874-1,1 21,042-1,7 19,080-15 5106-7 2,340-18 36,00-5 15,600-20 3,286-21,8 15,600-20 3,286-2,8 13,050-86 13,050-86 13,050-86 13,050-87 1078-2,3 259,050-157 (VIIPKC, pp. 1978-1,2 246,345-147 (VIIPKC, pp. 1978-	3- 46-H-26 9- 42-18-B 9- 42-18-B 9- 20-8-B-1 0- 24-B 0- 24-B	LUTYK LUBECD OA4AWU P42J (WII PP2ZDU PY3ZBJ ZYINEZ FS7KM PY3HT PY5CIG PY5XFR PT7WA XY5EG PY1HKA PY1HKA PY1HKA PY5OC	176,595 150,096 1,203,384 BIH, opr.) 2,063,460 847,486 209,218	-1069-56-944-53- -1729-242- -2890-238- -1643-172- -173-8- -173-8- -290-67- -11-167-39- -11-167-39- -11-167-39- -11-167-39- -11-1684-52- -11-1684-52- -1584-52- -1584-52- -1584-52- -1584-48-	8-10 8-10 8-10 8-10 8-10 8-10 8-10 8-10	EDE, F.2H., FOD, 029SN., oprs.) 214,190 - 670-119-C PAGGN (PAGS ERA, GIN, OKA, oprs.) 1,641,240-2910-188-B SK4NI (SM4S ALQ, DVF, FPF, MI, SM6CA(K, oprs.) 2,043,616-4416-192-C SK4HS (SM4S FL., HEP, HMP, L2T, MLZ, NBC, oprs.) L2T, MLZ, NBC, oprs.) UK4FAV (UA4FCM+1 opr.) 649,635-1345-161-B UK4HSR (s. oprs.) UK4HSR (s. oprs.) UK3HBU (UA34P+1) opr.) 418,176-1172-136-B UK4HAL (3,075.) UK4HAL (3,075.)	ISEVK (+138 F1Y,MAU,ON, IN3DYG) 4,825,410-6730-239-0 5K2IV (5M25 AGJ,CDF, pprs.) 51,242- 222- 77-B North America JJAV T (WBUVT,WBBLDH, oprs.) 5,214,556-6192-281-C KP4DX (+KP45 BO,CC,EGF,O, NP45 A,DU,WP4CBB, 5,085,315-6255-271-C Oceania
OKZYM OKLIN OKLIN OKZMEU OKLIN	7(220, 286, 90.8 7(220, 21.4, 75.8 7(830, 155, 62-8 7(830, 155, 62-8 7(820, 155, 62-8 7(820, 155, 62-8 7(820, 155, 156, 156, 156, 156, 156, 156, 156	YOUGHT YOUGHAN	75,874-1,17 21,042-1,7 19,080-15 51,06-7 2340-3 25,736-18 3000-5 14,569-16 311,280-2;1 269,136-160 270,075-125 100,050-86 29,988-3 29,988-130 240,045-130 240,045-130 240,045-130 240,045-130 240,045-130 240,045-130 240,045-130 240,045-130 240,045-130 240,045-130 240,045-130 240,045-130 240,045-130 240,045-130	3- 46-H-22 6- 42-18-B 10- 42-18-B 10- 42-18-B 10- 10- 10- 10- 10- 10- 10- 10- 10- 10-	LUIVK LUBECD OA4AWU P42J (WII PP7ZDU PY8ZBJ ZYINEZ FS7KM PY3HT PY5CIG PY5XFR PT7WA XY5EG PY1HKA PY3HKA PY5CC PY4BOU YY4BOU YY4BOU YY1CD	176,542 150,096 1,203,384 81H, Opr.) 2,063,466 844,488 117,777 26,294 12,264 17,264 17,264 17,264 17,264 17,177 18,24 17,177 18,24 17,10 18,24 17,10 18,24 17,10 18,24 17,10 18,24 1	-1069-56-944-53- -1729-232- -1643-172- -173-122- -173-83- -290-67- -234-71- -167-39- -11-8- -452-52- -11-8- -1584-57- -13-17-	8-10 8-10 8-10 8-10 8-10 8-10 8-10 8-10	EDE, F.P.H., FOD, UZ 95N., oprs.) 214,199 - 670-119-C PAGGN (PAGS ERA, GIN, OKA, oprs.) 1,641,240-2910-188-B SK4NI (SM4S KIO, DVF), FPF, MI, SM6C, KL, oprs.) 2,943,616-4416-192-C KGHB (SM9S FL.I, HEP, HMP, LZT, MLZ, NBC, oprs.) 115,872 - 568- 68-B UKAF AV (LA4FCM+1 opr.) 649,633-1345-191-B UKAHBB (6 oprs.) 109,053-126-1-16-B UKABO (LA3APF+1 opr.) UKAHAL (3,043-349-1) opr.) UKAHAL (3,043-364-1082-143-B UKELAZ (LA6E LHK-LIG, oprs.)	ISEVK (+138 F1Y,MAU,ON, IN3DYG) 4,825,410-6730-239-0 SK2IV (5M2s AGJ,CDF, pprs.) 51,282-282-77-8 North America JJAV T (W8UVZ,WB8LDH, oprs.) 5,214,856-6192-281-0 KP4DX (+KP4S BO,CC,EQF,O, NP4s A,DU,WP4CBB) 5,085,315-6255-271-0

W/VE - CW Single Operator

Connecticu	t
AA22/1	939,072-1168-268-C-AB
KIJX	800,664- 914-292-6
KING (KII	G, opr.)
	624,492- 913-228-4
WIXY	611,478- 966-211-C
WIKKE	3/5,060- 658-190-C
KIWA	327,600- 546-200-C 314,820: 530-198-C
KIMIL	314,820; 930-198-C 239,454- 502-159-C 237,312- 618-128-C
KE.IF	239,454- 502-159-C
KIVOF	237,312- 618-128-C
KIBY	215,820- 545-132-C
KAIFGH	170,478- 451-126-C
KIDD	170,478- 451-126-C 157,896- 408-129-C 142,857- 333-143-B
RIBM	142,657- 333-143-B
WIEM	113,184- 288-131-C
WIAB	98,490 - 245-134-C
WIVV	89,310- 229-130-C 88,920- 247-120-C
WICNU	76,230- 231-110-B
KIŘM	75,480- 340- 74-C
WIGNE	73.950- 290- 85-0
WIVH	45,390- 178- 85-C
NIBLL	45,390- 178- 85-C 39,590- 150- 88-C
Wallins	7656- 58- 44-C
WIEWD	3552- 37- 32-8
WIZM (K12	M. opr i
	2M, opr.) 48,768- 254- 64-C-80 287,712- 864-111-C-20
KIKI	287.712- 864-111-C-20
KIEFU	113,252- 439- 86-C
WATECN	71.832- 292- 82-B
KIXA	183.762-747-82-C-15 135,171-653-69-C
KIEM	135,171- 653- 69-C
KATEVH	10,692 - 81 44-H
M1MEE.	145,044- b12- /9-C-10
NIBMV	40,356- 228- 59-B
KA1UZF	53,088- 158-112-A-QRP
K8CH	15,900- 100- 53-A
WLED	1026- 19-18-A

Eastern Massachusetts

	MANUAL IN SECTION
KIDG WITHN WIFT KGIE WIKM KIMEM	1,133,088-1276-296-C-AB 922,320-1220-252-C 594,711897-221-C 458,298738-207-C 301,348688-146-C 280,948459-264-C
KCIX	117,780- 302-130-C
NIEM	115,542 294-131-B
KAICLY	95,976 258 124 C 93,654 242-129 B
KIED	32,292- 138- 78-B
KBIG	14,820 95 52-6
WIOPI	6993- 63- 37-B
ROTU	6660- 74- 30-B
WITUU	6300- 50- 42-C
KIZZI	5555- 5J- 35-B
WIPLJ	714 17 14 C
MIBB	624- 16- 13-B-160
KIPT	39,936- 208- 64-C-80
KIVUT	912~ 19- 16-C-40
WIWAI	137,445- 539- 85-C-20
KIGSK ()	MBIEPE, opt.)
	132,912- 524- 71-0-15
W81CNM	
WIBET	2376- 33-24-B

Масле

KIJB WBIGI H KBIU KAIMP KEIH	6264- 3969- 13,680-	80- 57-A-GRE
NIAFC	7965	59- 45-A

New Hampshire

KIGQ	1,665,912-1693-328-(:-A)

135,720-	290-156-C
129,600	320-135-C
	328-127-8
	114. 58-C
	87- 55-B
243-	9- 9-6
45,360-	240- 63-C-4

Rhode Island

WIRFQ WIRFQ	526,851 50,505- 4869-	185-	91-6
KiJA	30,240-	168-	60-C-4D

10,710- 105- 34-C-10 WIKO

Western M	lassachusett	\$
WIZT WIGG	545,642-	763-243-C-AE 862-211-C
KIBW AIIS KBIW	441,408-	701-235-C 704-209-C 456-166-C
KAIT WIAUT	85,680-	240-119-6 208- 66-C

2

Eastern New York

1,298,151-1487-291-C-AH
E.E., opr.)
768,996-1042-246-C
602,070- 954-235-C
447,834- 739-202-C
4.45.420- 615-236-C
219,294- 393-186-B
1251145- 309-135-C
103,452- 233-148-C
84,942- 242-117-B
84.132- 028-123-C
65,508- 212-103-C
44,370-174-85-0
25,530- (15- 74-0-
3456- 3C- 32-B
3198- 41-26-C
2028- 26-26-8
1872- 26- 24-B
161,730- 599- 90-0-20
79,278- 176- 51-B
64.155- 329- 65-B-15
20,339- 137- 49-B

New York City-L.I.

N2GC	889,314-1102-259-C-AB	1
K2LE	870.480-1040-279-C	
WZGGE	480,240- 696-230-0	- 3
K2MFY	398,682- 621-214-6	Ų
KK2E	318,060- 589-180-C	3
KAZAEV	289 962- 543-178-B	ļ
WZGKZ	160,881- 329-163-C	,
K2SHI	100,215- 25b-131-C	
W2LPA	88,665- 257-115-6	
KGZA	88,665- 257-115-B 27,864 108- 86-C	
WEAFM	26,136-121-77-8	
Watti	6630- pp. 34-C	
K2CNF	5733- 49-39-B	
K2CMV	5520+ 4h- 40-B	
W4215H	148814 J4-B	
WZNZ	7214- 41-18-C	
W25GK	1083- 19- 19-C	
WAZICX	240- 10- 8-B	
N2RQ	27 3- 3-B	
WZER	12,168- 104- 19-0-80	
Naka	330- 11- 10-C	
K 25X	39,420- 219- 60-C-40	
NZUN	25,560- 142- 60-C	
K2PA	13,332- 101- 44-0	
K2OB	7128- 72- 33-0-20	
N2RO WZAYJ	36- 4- 3-0	
RCSDH	88,800-400-74-C-15 2277: 33-23-B	
Waczz		
WESAMU	75- 5- 5-8- 28,875-175-55-8-10	
WH2DI A	4320- 48- 10-8	,
WHAL NW	44.892- 177- 87-A-ORF	, .
17177 1178	AARMAN TONE SCHOOLS	

WERE	1,292,484	1517-	2044.	WINA	150,876
WZVJN	1,015,839-	1023-	331-C	WASSZV	127,530
K3OX	544,320-	810-	224 C	W3KFQ	125,244
K2NJ	456,210-		210-C	W3OV	109,626
K2BK	109,266		198-C	NBVV	95,937
WIGD	312.696-		202.C	WALN	95,937
N2FT	40,950		91-B	K3WGR	94,860
KG2O	24.765-		65.€	K3II	79,200
K2BLA	22,374	113.		HELA	75,210
N2CKF	11.715-	71-		K3NL	63,450
WAZASO	8601-		47 B	W3SÖH	60,500
KTZD	2139-		20-8	KIVYA	60,375
W2ÜL	. 75-	· 5.		WXLLAW	43,440
KO2I	39.240-	.18-			42,024
KJZN	3520-	40-		KJEME	19,800
KR2J	84.864	442-			14,442
₩82ËGI	60.030-		58 C	WASIMY	12,831
KSEL	24.108-		49-C	W3HMR	4045
KAZLEB	10.578-		41.C		5100
AC2U	272.766-		169-A		4968
KAZQ	219.762		74-A	AF 3Z	4257
K2RF	546-		13-A	WA 3ZG L	3267
W2JE,K,	147.	7-	7.0	KA3GRC	1311
				WB3KII	6.30

Southern New Jersey

	541.343	
W2YC	749,580-	961-250-C-AB
N2MR	298,035	555-179-C
MSEV	163.680	341-160-B
K2QIL	159,210	366-145-C
WZPAU	93,093-	217-143-C
KZHPV	52.650	195- 40-B
W28LV	29.016-	124- 78-8
WA2VYA	24.072-	118- 58-8
WH25JA	16.356-	94-58-8
N2BCF	14.877-	87- 57-B
WB2VFT	2046-	31 22 8 80
W2BHK	17.856	124 48 C-40
WZCN	2622	38- 23-C-20
KARKS	<u>1935</u>	43 1 6 10
WE2GES	436.	32 20 B
	- W. A WAREN	W2 L U . D
3,54.52	Territor 1, 2775.	57 - TT - 17

Western New York

1000 17. 0	Constitution of the second
Waltz -	659,097- 321 237-B-AB
	225.710 158-165-C
	32.40 . 10. 415.100.C
Internal Property	313.300-450-158-C
	173,304-348-166-B
K2NV	. 1.03 875 - 277 125-C
K2SPO	86 376 244 TEC
MSE OL	67,380 220-103-8
KQ2N	49,551- 199- 83-8
KB2SG	46,800- 150-104-B
WZPHI	43,362- 146- 99-B
KB2NU	
	26,130-130-67-C
KAZIBT	23,760+ (10+ /2-t)
AKPO	15,210 78 65 B
KA2FLW	8100- 60-45-B
WASLEZ	2016- 28-24-B
K2UAN	945- 11-15-B
W2ABM	45.369- 213- /1-C-20
WZHG	25,311- 142- 59-0
K52F	12,000- 80- 50-C
WH257Y	13,806- 118- 39-8-15
KZKIR	
	76,296 374 68-C 10
WAZABN	29,700-180-55-B
KA2CGV	20,286- 98- 69-A-UR
N2US	16,335 99 55-A

3

Detaware			
KJHAP AA (K KJJ	192-	8-	84-C-AB 8-B-160 33-B-15

Eastern Pennsylvania

Naes	1,407,504-1652-284-C-AB
N3AU	1,373,568-1568-292-0
N385	1,158,948-1323-292-0
WEAR	1.050,195-1321-265-0
N3FD	1,004,256,1268-264-0
K.3(31)	612,306 782-261-C
W3ARK	356,562- 639-186-B
M SIE.	277,533- 541-171-C
W3K1	250,974 438-191-C
W3GK	249.975 505-165-0

Northern	New Jersey		W3KV K4JLD/3	225,675-	425-177-C
N2L Y	1430514	1578-321-G-AB	W3FVW	201,279	397-169-C
WŽŘQ	1,019,014	1517-284-C	W3MA	164,820	335-164-C
WZVJN	1015 030	1023-331-6	WASSZV	150,876-	381-132-C
K3OX	544.320	810-224-C		127,530-	327-130-C
K2NJ	456.210-	724-210-C	W3KFQ	125,244	2940142 C
KZBK			M3OA	109,626-	302-121-C
Wigh	310 506	689-198-C	M3AA	95,937	283-113-C
N2FT	312,696-		WALN	95,937	283-113-C
KC2O	40,950		KBWGR	94,860	255-124-B
	24.765-	127- 65-C	K3H	79,200	550-150-R
K2BLA	22,374	113 b6-B	AJ3H	75,210-	218-115-B
N2CKF	11,715-	71- 55-B	K3NL	63,450-	225- 94-C
WAZASQ	8601-	61 47 B	W35OH	60,500-	200-101-B
KTZD	2139-	31- 23-8	KIVYA	60,375-	161-125-B
W2UL.	75-	5 5-B	WALLAW	43,440	18J- 80-C
KO2I	39,240-	218- 60-C-40	W3GRS	42,024	136-103-C
KJ2N	2520-	40 21 13	K3FMF	19,800-	100- 66-C
KR2J	84,864-	442- 64-C-15	W3E.QA	14.442-	83- 58-C
WB2EGI	60,030-	345 58-C	WASIMY	12,831-	91-47-0
KSEL	24,108-	164- 49-C	W3HMR	4045-	67- 45-C
KAZLEB	10,578-	86- 41-C-10	WBCET	5100-	50- 34-B
AC2U	272.766-	538-169-A-QRF	WB3.121	4968-	46- 36-B
KHZQ	219,762	421-174-A	AF 3Z	4257-	43- 33-B
K2BF	546-	14- 13-A	WA 3ZGL	3267-	39- 28-8
W2JE,K	147.	7 7 A	KA3GRC	1311-	23- 19-6
			WB3KIL	6.30-	15- 14-B
			KC3N	31,549-	211- 53-C-
Southern I	versey wer		1.62 312	5568-	64- 29-8-
				2000-	2.9.0.

Maryland-D.C.

MARIE					
NAFB	1.049,760			South Card	ilina
K3SA N3AM	799,290-	(0.70-)	444.0	N4AH	3144
	586,845-		20 <i>7-</i> C		312,0
M3UJ	548,886-		227-0	K4CSB	12.7
N3BI	398,790.		?11-C	A.A.IV	12,4
K3Z2	398,772		228-C	N4LL	- 9,5
K3TC	365,148-		207-0		
W3GN	328,830-		194-U		
V-34-2	273,780-		(69-C	Southern F	lorida
WRICM	240,408		L59-C		
KBNCO	101,928-	248-	137-6	W4BV	3.36,9
K7JBQ	19,788	97.	68-B	WI:4AHZ	214,8
W3E E	10,920-	65-	56-B	KD4F X	128,4
W31 OX	741-	19.	(3-B	K4PB	82,1
W3HVQ	38,016-	264-	48-C-40	K8UNP/4	76,4
NIAUE	18,054-	iis.		W4YN	69,6
KC3H	29,241-	177.	57-B-20	K4JRE	.4
K3TW	43,176-	257		K47A	53,1
WASVEL	16,272-	113	48-H	KA4YAF	34,3
K4CGY	2520-	15-	2- 1 -B	KAZUIV	26,5
KD3U	5508-	68-	žž Ã QRI	P N4DMI	18,8
				WAAKKO	10,0
				K4KUZ	21
Western P	enosylvania			KNSD KAROS	ĺò
	***************************************			NAIN	17
KJLR	1,288,056-1	394.	14 44. 3.8(1)	N4AW	
WB3KKX	192,270-	3//.	70-B		25,9
WORTP	5 (,360-		97.6	WA4LLQ	
KG3W	27,594		73-6	W25D8/4	55
W31W	20.862-		57 C	&841 DH	113,7
KASHGR	960-	^2ö-	lb-B	K4:40U	93
K 31 1 4	58 860.		40.0 10		

Mestern 1-	enasyivania
K3LR	1,288,056-1394-308-C-AH
WB3KKX	192,270- 377-170-13
W9KTP	51,360- 160-107-0
KG3W	27,594- 126- 73-8
34.31W	20.862- 122- 57 C
KASHGR	960- 20- le-B
KBUA	58,860- 327 60-C-10
KA3P	14.784- 112- 44-B

Alabama

KR4F	291,057-	439-221-C-AB
Georgia		
W87F/4 N41Z K44R K48AI N84K W44AHD N4RJ K4V1 W4JFI W4DX1 W4GES	741,402- 548,856- 344,760- 129,168- 92,352- 20,160- 84,888- 9393- 15,486- 13,776- 5040-	962-257-C-AB 756-242-C 520-221-C 312-138-C 208-148-C 11260-8 19372-C-40 10131-C 8958-B-15 11241-C-10 5630-B

Kentucky WA4QMQ 221,544- 408-181-C-4B

			i entressee	
			W4XJ	638,820 819-260-C-AB
			K4JC	450,920 568-230-C
			W4V8H7	V4DW. ppr.)
				220,038- 403 182-C
7a			NAIR	214.008- 482-148-C
			KA4RJC	200 070- 390-171-C
	291 057-	439-221-C-AB	644K	101.592 249 136 C
	* p. a. 4. a.	7477471 07747	K4CXY	
			W40GG	46,818- 153-102-6
				23,712-104-76-B
•			WERUH	18,527 9K 6.1-B
4	131 400	962-257-C-AB	840 AG	/56- 18- 14-C-80
₩		756-242-C	W4JD	40,710-230-59-C-15
	240,000	920-221-C	N4/2	169,092 732 77-6 10
		312-138-C		
		208-148-C		
11)		(12- ED-B	Virginia	
		393- 72-C-40		
	9393-	101-316	K4GKD	728,064-1024-237-C-AH

Tennessee

K4GKD	728,064-1024-247-C-AF
N4UA	710.184- 932-254-C
7/4HW	7 (b) h / (l - 466- (65-C
AAAFE	204,309 423-161-C
WRYV	105,200 295-120 C
7/4 Y E	78,660 - 230-114-C
N4RA	62,400 - 200-104-B
W4KMS	35,470 (31 90 C
K4FPF	3 5, H64 - 1 Mr 8 5 B

125,235- 363-115-C 54,054- 198- 91-B 3180- 42- 30-B 50,820- 242- 70-40 3000- 40- 25-B 44,385- 285- 86-C-20 108- 6- 6-C 21,445- 133- 50-B-15 58,904- 348- 66-C-10

416,016- 648-214-C-AR 45,936- 132-116-B 7,14- 1,7-14-C-0 585- 15- 13-B-160 10,908- 101- 56-680 8811- 89- 34-C-40 11,356- 156- 64-C-20 6450- 50- 43-A-GRP

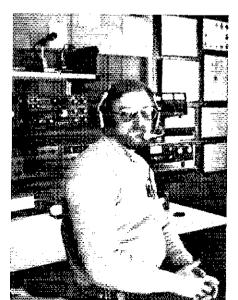
312,075- 475-219-C-AB 42,720- 160- 89-C 12,408- 94- 44-C-40 29,583- 173- 57-C-15

NIGL/4 NW4P WA4SAC K4FU KA4HWG WA4GHO ND4Y KA4JM? WB4PRU

North Carolina

Northern Florida

N4AA W1F LX/4 W4ZZ N4SU N4SF N4FD K4JLX WB4YZA



KO8T made the top phone 15-meter monoband and number two cw all-band scores from Michigan.



Part of the multi-single; WB8DQP (I) and AA4NC of VP2E fame throw themselves into fray. Two weekends later, VP2E has amassed over 16,000 QSOs (both modes combined) and holds the world multi-single records on both modes in the DX contest. Chief organizer K8ND isn't in the photo 'cause he's taking the shot and overseeing the operation.



Eduardo, CT2CM, gave the 1982 ARRL International DX Contest a go on 15-meter phone.

K4OD 94EI KA4RLJ	27,360- 120- 76-4 29,400- 100- 68-4 15,876- 98- 54-1	: N6M	H 152,53 ≬U 147,36	2∈669- 0-614-	76-C-1\$ 80-C	Myoming	24254	65	in-8-AB	Курца Мумап	44,014- 48,00h-	214- 6 254- 6	/-c,-20 /-8-10	Alberta VENOU JOL442- 319-	lus c-As
N 615 K2E KM/4 N.14Q		Sacra	amento Valley		177-C-AB					Ø				VESCNV 7308- 58- British Columbia	42·C
MAXO MAXO MAAM WANM	106,110- 393- 90- 46,695- 283- 554 18,000- 125- 484 8892- 78- (84	. WAN : K6D	NKR 204,79 XR 193,66 SH 180,71	2 424 8 519 1 621	161-C 174-C 97-C	8				Colorado				AENDEM 48'egt- jaj-	\$ <i>7-</i> 6-20
KH2P/4 SY4HHK N4MM	5184 48 361 46,260 257 504 95,752 148 584	B-15 NGJ C WAG	V 87,15 M 66,96 66,97 240	5- 259- 0- 24 0 - 0- 50-	108-C 93-B 16-B	Michigan WASTBQ	74,084-1	1028-2	51-C-A8	Katglica	96,051-	317-10	1	Yukon-N.W.T	10.00
WHADNI WAKI C	147 25 564 544	B-IV. NAD	JM 367 ZMH 82		18-C-80 11-C-40	KOST AISO WASUQK	758 [50-] 481,800- 424,710-	803-2 605-2	00-C 34-C	KIØJ KØZEI KØEZW KØEZW	71,086- 77,586- 44,823- 1800-	193-14	4-B	VYIDD (44- 12-	4-8-80
r		San W60	Diego	U	162-8-AB	KáPUJ WBWVII KOSP KSáG	109,062- 93,264- 83,160- 67,704-	268-1 252-1	ь6-B 10- B	WAGIYJ	1083-	19. j	9-C 4-C-80		
5 Arkansas			91:76 21(5,78 10 53,59	4- 444 2- 203	162-6	KBLJG WBTW WDBCRY	67,200 46,248 13,629	200-1 188	12-C 82-B 59-C	06.05	13,295- 99,752- 63,744- 55,986-	301-6	d	W/VE - CW	
N5DX WSEIJ	57,354- 211-138- 10,710- 70-51-	C-AB NAN AA6 AA6	6EÉ (3,92 40 (4,13 6OBC 116,68	0-116- 6-152- 0-460-	81-C-80 86-C-20	KO85 KNOWG WBEEM	13,572- 7308- 2340-	87- 84- 10-	52-8 29-8 26-0	WD9BZA Iowa	3520-	4 2 .	0-8	Multioperator Single Transmitter	
KSUR	in sio is the	K 16D K 167 1767	ki 133,72 Zi 765	4- 468 0- 85 0- 100	- 81-C - 30-C - 34-A-GRI	WATWA WATWA PKSYWI NAUM	42,815- 18,000- 4959- 184,464-	120- 57-	50-C 29-C-20	WaWP E	62,726-1 31,808-	968-25	2-C	&1227##1s CC TO WICN	Ċì
Kottisiana Koku i Koku a	003.008-1306-256- 575,44b- 845-277-		Francisco			WASARS KNSP WSVSK	11 6 16.	427.1	44-8 61-4-09P	Vágu. VASSAW	143,475* 117,852* 76,788* 74,925*	636-21 237-10	9-C 8-B	K12Z (+K1s CC,TO,W1GN 2,327,805-2005- N1TZ (+K1s FIR,IU,KNQ, KA1U,N1ACU)	F,
Whosigh Whos Whos	185,438- 485-161- 121,380- 289-140- 22,896- 144- 53-	C K6A C W6V C-80 K6A	WH (53,87 ZUR 14,02	3-369 4-149	57 B	N8CGA	#808-	36-	26-A	KMOQ WOMJN WOJA WOJA	25,527- 19,170- 11,100-	128- 7	5-L 1.R	1,4/3,942-14/1-	
DMW#W) 8,144- (26- 48-	C KEL KDE	6HT ' 315	9- 64 9- 34	- 27.C	Chie ESNA	666,645-	907-2	45-H-AH	NGHOW REBY WAVX	17,100- 10,716- 35,226-	100- 5	7-13 7-0	KIXM (+KIS FW) PR.MAI 466,962-698- KGID (+KAIS AN,VC) 461,439-669- WIOP (NIAKO WIS EYH, WA (NZR, opp.)	17-C-CT 35,
Mississippi MASOYU	113,424- 272-139- 66,420- 205-108-	AFE NAC L-AH KRE	67 37	8- 21	- 23-8 - 6-C - 15-8-10	WSEN WSLNO KOBM NBBJQ	473,526- 124,983- 357,696- 288,990-	641-2	21-C 92-C	NØBB WØSR KØJSY (KJØ	27,300- 13,200- D. obt.)	100- 4	5-H 4-C	2017,576+ 506-	
WSAW KASDWI	66,430-205-108- 1296- 27 16-	san San	Joaquin Valley			WBELE NBBC WBZCG	262,656- 197,370- 191,520-	456-1 387-1 399-1	92≑0 70-4 60-0	KSSKI KCGQ Welz	107,640- 2205- 95,157-	35- 2 291-10	(-C 19-A-QRP	182,952-462- KATUE (K12ZI,KG1K, op 102,951-279- WATTZV (+WA15DR)	
New Mexico	115,752- 364-106-	CAB HU	67H 49,59	0 174 8- 153	· 92-C	ADSO (NBI	DGJ, opt.(188,901- 150.282-	417-1	51-C 38-C	W@!# Kansas	8 4490-	545-11		65,3/6- 227- KUYM (+KA1GGW) 41,444- (56-	
KISX KNIM AASH	28 305- 185- 51- 755 448- 508-102- 186 993- 789- 29- 10,206- 126- 27-	C-20 K1-6	6C. 277	0- 80 5- 42 6- 14	- 26-C - 22-B-26 - 3-C-10	WORMOV NRTN WRNPF	131,868- 91,866- 75,590-	-297- -291- -230-	48-C 22-C 11,C		923,716- 55,998-	18.1-10	2.0		12-C-EM
WS1VX AG55 KN5D	10,200- 126- 27- 7395- 35- 29- (20,736- 347-116-	H- III	ta Barbara			W8GOC WBUPH W8GOC	75,936- 69,690- 58,740- 57,195-	- 200-1 - 220-	16-B 89-C	KASMMD	(4,193- 44(6- 2829-	83- 5 46- 3 41- 8	7-8 2-0 3-0	2 WYYV (+KATR,KZEK,NZN	IT)
Northern To	exas	Web Neb	SWM 124,73 HK 57,0	2- 368 2- 232	42 C	WATER WADWP WESO	39,990- 36,720- 36,480-	155 136 160	86-C 90-C 76-B	WOCHU KADIKO	1122- 5742- 16.104-	32: 3 63: 8 116: 4	7-6 8-6-40 8-6-15	t,961,416-1806- N2ŘM (+N2A1 x,8431N) 981,483-1273-	3634∴ENA
KSRX (KM KSNW	644,280- 825-260- 641,604- 842-254-	C-AB W80	BNO 54,39 6TGD 84. GAU !80	in- 259 15- 113 10- 40	- 70-8 - 25-8 - 15-8	KBEF KBKR W8V7E	35,280 11,544- 4128-	104	105-8 37-6 32-0	KADECD Minnesota	24,600-	200- 4	i B-10	W2UI (+N3KR) 384,928- 616- K2T⊡ (+ Net)	rit-c-sna
NSJB KASW WHSVZL	587,946- 899-218- 227,484- 534-142- 82,200- 274-100-	C We/ C We/ C KD:	VR (80 U.IX 1 [₂ 9] 160Q 34!	14- 102	- 15-C-80 - 39-C-20 - 22-A-QR		1/80- 2451- 1404-	26	28-C 14-C 18-C	MINNESOCA WINNESOCA	67,932- 66,12 6 -	204-11 206-10	1-H-AH	*56,3/3- 591- Wazi go (Kzuób,Kczbł Wabkii, opraj	l.
Mari Mari Mari	77,028- 262- 98- 61,845- 217- 95- 44,956- 178- 84- 44,114- 173- 85-	C B San	ıta Clara Valley			WASWEX KSMN AOSC KCSJH	48- 6520- 2331-	71.	4-5 40-C-80 21-C-40 58-C-20	WARKE Ware Wale	45.090	167- 9 152- 7 170- 8	10+C 18-C 12-C	15,74en- 140- 103,883- 5AT-	
NSUA KTSQ KYSB KZSCU/S	38,400-128-100- 33,180-140-77-	r 1499	AN .40,3 5D 336.8	70- 704 72- 769	- 46-H	KROZ MRE A	(2,549- (452- (84) (4. or	89. 44.	21-C-40 58-C-20 47-C 11-C	WA2HF1/# KA#JXD K#IR	17,054- 3780- 126-	45- 4 45- 2	19+4, 18-13 14-0:-80	_	
Wid KP Wid KP Wid O	26,520-130-68- 27,276-116-64- 5967-51-39- 5508-54-34-	C+50 \/\1€	RU 299,9 BR 191,8 6V 140,5	98- 641 35- 435 92- 404	-156-0 -147-0 -116-5	WELKEW	154,998- WB8DQP, 148,482-	7654 701.1	/9-C-1≥	W∲HW N∳DBG	126,618- 18,084- 5850-	137- 4 50- 3	4-C-10	3 wangin (+kahmi kcax'n	AZZKY)
W5CGX WB5UDX KA5GEJ	81,024- 422- 64- 16,294- 263- 46- 10,080- 112- 30-	B Wa B Wan	เล้าหา 1 (8.3 ประม 96.6 เมนี 30.0	1- 349 8- 262 0- 100	-123-C -123-C	WESTERN (I WASSECH WAS	. 49,530- 50,40- 50,949-	254 56 333	.65-8 -30-8 -31-6-10	Missouri	11,1 41-	7 O- p	3-A-GRP	7.183.454-1806- W3GRF (+K3AO,W3ZZ,R- 1.337.652-1527- W3YG (+K3GMR,W3HV,W	REJJ 292-C-MDC
Oklahoma		NG K6! W6 KJ6	MA 52 ORK 28	?6. u.∂ 98. 42	- 30-6 - 26-8 - 23-6 - 16-8	West Virgin	er refer			NGCKS KMGR	52,530- 40,34 8 -	206- 8 166- 8	65-8-AB	KARGCID WHEPAVI	268-C-WPA
KW2H K2MF	5747- 53- 33-	C-AH W6 C-20 KA W6	SFOF 12 66NG 4 588 123.7	50- 71 83- 21 95- 655	- 20-6 - 7-8 - 63-6-40	KROOL WERZ	151,146- 94,530- 14,400-	- (1 j. - 30-,	INT.C.AB	WARREZ Kagp	14.685- 9126- 2220-	39. 5 78. 3 37. 3	-5-13 i9-6 '0-13	K3FD (+KG3Z,N3BPY) 571,449, 797- W3YFV (+N35 HR,RW) 437,340-740-	
Southern T		KE NGI NGI	.6PG 17.6 NF 94.3	04. lb:	1- 40-C-20 1- 35-B-15 1- 62-C-10	KB8FJ W8LRL	14,400- 720-	· 16-	48-C 15-C-160	WOULD KAHF/O NOTI WOOAUT		2.8~ (N3ARK (+KB3MM) 349,866- 558- K2ITG (+ Net)	
NEAW REVNI	un, opr.) [479,392-1552-307 - 709.686886-767 - 489,840785-208	C-#8 B _	ne pe och	47.	50-0	9				Nebraska	30, 400	2 1/20- 1/	-W-1-3	1/7,917- 353- WHENQ (+ Net) 1H,876- 396- NBGB (+ Net)	
W5ASP W5JC W5BE	176,664- 431-136- 134,784- 312-144- 53,562- 158-113	B C	izona			llinois					139,851- 35,025-	3/9-12 139- 6	3-C-AH 14-H	62,652- 227-	924:-MDC
WSKGP WSPF WSMMD	48,786- 173- 94 40,365- 117-115 52,760- 156- 70 27,939- 139- 67	-С -В уул	AZIYG (WAMH	35, opr 40- 319) 5-105-6-AH	WB94KI	(44,850-	· 550-2	25-C-AB 209-C	North Dakei				4 k×45 (+k3R/8,N4ND,W4	MYA,
W5NR W5PWG W5DDD	21,924- [16- 64	-ra 977 -t. 607	'GGL/7 87.1 'EMD 77.6 'FGT 25,5	20- 240 60- 14:	5-105-C-AH 3-121-C 1-89-C 260-C	Kakak Mara Mara Kawel	298,320- 159,694- 144,144- 81,648-	364	141-C	KØQQ KIØE KEØA	88,140- 10,716- 6027-	260-11 /6-4	3-8-AB	W844 8VY, URW) 1,767, 816-1713-1 NAME (ARTIMINADE)	344-C-V-4
WSEUI NSDX NSHR	15,480- 86- 60 12,432- 74- 56 7434- 59- 42 6138- 66- 31	-ξ W/ B Ko	70 70 25 2 5 70 7 2 5 6 4	04-100. 24- 18- 80- 6-	2- 60-C 2- 84-C-15 4- 37-B-10 0- 21-B	W9GSB W41NZ K9AB	45,360- 44,772- 37,867-	144-) 164-	105-0 91-8 73-0	Wozz	18,354-	133- 4	e-R-10	1,374,120-1320- K2BA (+W4FOA,KB8MF) 1,175,070-1310-	347-G-ML 299-C-VA
ICABA VASIYX KAGGVW NSBA	990- 27- 15 378- 14- 9 5124- 61- 28	-6s -B 1da -C-80	aho			AK9Y W9BJN U9BEC	27,951- 15,840- 15,399- 9750-	121-	77-0 60-8 59-8	VE				N4UM (+N4BP) 943,415-1705- NG4I (Multiop) 713,654-944- WA4I,ZR (WA1NDJ,WB2L	261-0-5FI. 252-0-GA
KSTA (KV:	900- 70- 15 5H, opr.) (81,152- 593-107	-C KN -C-20 K7	17W 47,6 7CRV 18,4	28- 18 05- 50- 15	9- 84-C-A6 7- 5-8-40 0- 41-8-15	KYZO	9114- 4860-	62- 54	50-6 49-B 30-C	Maritimes-N				KA4RPD,W4ROA,WB4YU	C,W5MH,
K5WA K5SF AD5Q	124,650 554 75 35,680 408 70 84,485 996 71	-C-∫5 -C Mo -C Mo	ontana			WOULC WOULC ALBI WOELC	9958- 2784- 630- 53.616-	39- 16-	29-8 79-C 14-C-80 69-C-40	VETAEG VOTMP	408,915- 119,601- 114,500-	291-13 382-10	37∙C 20-B	-109 -2.2.5.05 KANDH (WBJLUL,KA4s N NEAH,NJ4P,WB4GAH,K5G	WS,YGR, GU.
WB5WHR K5RF K55NO	184,342, 568, 73 27,924, 174, 52 5220, 60, 29	-C-10 (₩7	7JYW 119,5 7OB 11,4 77X 78	00- 39 24- 6 84- 14	7-100-0-AL 856-B 618-B-L0	TABLE 14	30,975- 116,565-	- 175. - 409. - 355.	99-C 95-C-20 95-C	VETAIH VOTAW VETAXT	57,770• 5076• 501•	185-10)4-C 36-C (1-B-160	WLIACP, oprs.) 442,953- 623- 66340 (4NAFBO WINAIMO)	237-C-VA
6			evada	- •		KK9A W9NUD K9QVB	73.048- 130,974- 112,080-	. 704-	06.6	ALIFM ADI O O	11,760- 31,104-	197- 5	4-8-15	472,984- 698- KC4UQ (+N4MO) 255,645- 437- N4AU (+K4IZN,WA4MIG	132-C+0 w
ti East Say		W// W//	AZUEC 247,2 AZUM 219,4	12- 65 17- 67	4-126 B-AF 1-109-C	KARN MD4IIX MABM	108,225 55,380-	- 481 - 260	75-C	Quebec VE2AYU	3.38.148-	558.20	0 2 -0-AH	157,413- 383- 157,413- 383- 117- 117- 117- 117- 117- 117- 117-	L37-C-AL
	1,478,711-1637-301 145,115-417-116 31,672-129-56	147	AZUEM 62/3	20- \$5	0- 83 H	W9OA W9YYG	91,770	- 43/-	70-C-10	AESMA AESMA AESMA AESMAAA	338,148- 159,198- 38,613- 12,000-	338-19 211- 1	57.Ē 51.C-40 40.C-10	5	
K6CSL KÁBUSW	21 672- 129- 56 14/703- 169- 29 29/370- 178- 95 51/030- 315- 54		regon F 72 (90,0 210 86,	32. 61 (46- 16	1-104-C-A8 9- 78-U	KR9I	13,398-	- 77 - 74-	72-A 58-A 51-A	Ontario		-		N5CDO (+N5JJ,WD5ABH) 1,272,162-1423	293-C-STX
Wehsy Kevi Wholer	39,900+ 266+ 50 9261+ 147+ 21	Herio St	07T 227 28N 31,3	.44- 10 .93- 9	2- 74-8 1- 41-8 3- 18-8-20	WD9FGW	1575	· 25-	217	V£3DZV V£3DAP	358,146- 207,726-	389-1	78-B	N5R2 (+K5MR) 1,134,315-1385- N5W5 (+K5EE,KJ5W,KV5	
K56Q	806V4- : es	, , ,	tah			Indiana NKDF	476,405	• 655-	ATVB-AB	AE3CDI AE3CDI	100,098- 36,378- 9108- 6435-	141- 1 92-	86-8 33-6-40 39-8-20	878,940-1028 878,940-1028 AASY (+K5TU,KG5U,NS)	285-G-NTX (QL2W,UC
NJof NEGI	44,517- 209- 71 (6,092- 149- 36	CAB N	7OF 907.	37-130 28-14	9-231-C-AF 2 28-B	WAADA WAADA WAADA WAADA	135,224 5115 2208 1254	e hh	(24-8 31-8 23-0 19-8	AE3HIM AE3HIM AE3HIM	201,051- 25,896- 6138-	166. 66.	31-B 95-B 88-0-19	/37,424-1138- - V/BSDDI (Multion) - 416,760- 755-	
WHOMW WHOMW	3/2 4- 3 145,637- 696- /2 918- 18- 18	HC FC-15	ashington			MANE	672	- 15-	14 B-20	VESKKB VESKKB VESAEJ/3	2829- 94,185- 17,787-	41* . 455- i 121- i	23•C 69•E•10 49•C	6	
Orange		N e	/NE 41.4	(5b 1	8- 64-6	3 Wisconsin W9OP	401,59B	- 656 -	301- ₽ ∙48	AE3NBM	11,094-	96-	+ \$=L;	NGG (+W]ARR,N6NE) 1,407,244-1534 WKKUT (+KAGHUX)	306-C-SCV
HALJAN UMTAW 11 JAAW	438,758-831-170 2-4,595-465-16 102,258-299-174	5-C-AB W. I-C K(I-B W.	71EU 41, 07H 36, 7ERH 11.0	182- [8 185- [1	ふ 55 日 2- 57 日 1- 35 日	WAKAS WKAS WAKAS	366,912 100,048 74,180	- 637- - 249- - 124-	192-C 134-B 65-C	Manitoba VE4ADV	13,417	141-	HAP4	775 094-1104 W6BIP (+AA6GM,WA6DJ 659,000-1000 74 44 661,000 000	714-C-50G 723-C-5F
K6US W6HA Au 6H	98,226- 321 10, 62,008- 268-10, 44,919- 217- 69	gar Ki 9-c	JELLANDAMA ST	160- J	6- 10-8 4- 57-2-46 3- 46-0	W96XR W9HE D9HPG DAGN	18,180 18,180 14,535 16,428	10 to 85-	61-C 7 60-C 57-C 44-C	VE4YO Saskatchew	3042-	39-	χ⊎-С	626,400-1044 1761 PH (+ Net) 199,751- 873	229-C-5V
Kelet F Nehr Well	7,300 140-65	513 NO 1-C-80 AC	G2M 96.	141- 4	id- 46-6 4- 73-6-20 6- 64-6	MAACA	10,428 1998 2652	J. 44.	34-C 26-C	VESRA		93-	41-0-40	Ketic (+AA6AD Kekom, 50s./30-889	WEBJH



K5GN operated K5RC to a fourth-place (W/VE) finish on cw. (K5RC photo)



EA9IE, Juan, posted the top 40-meter monoband ohone score from Africa

JHIMTR JRICEG JAIKE JAIOHP JKIVXH JA6LDD JAJB5U JRJSU JRJSV

ARYKM JA9F1 JA9F1 JA25ABJ JKITLP JKITLP JKITLP JKITLP JKITLP JKITLP JA16C JKITLP JA16C JKITLP JA16C JA

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LA6ZV, operated by Ole, made the top cw score from Norway.

FAEGV

GZQI G3ESE G3ESE G3EXE G3EXE G3EXE G3EXE G3EXE G3EXE G3EXE G3EXE G3EXE G3EXE

GM3LYY GM3EJR GM4EDM GM3RAO

GUSDSD

GW3JR GW3NYY

HH9AFI

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LA6ZV LATEL LA6VM LA4YW LA3LI

LZIGC LZIEP LZIMS

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OHIGHA

7410- 95- 26-8-10 39-270- 187- 70-A-QRP

294,478 - 581-146-8-AB 199,939 - 531-123-8 2947 - 53 - 33-8 144 - 8 - 6-A-(50 105,327 - 474 - 478-40 105,227 - 474 - 478-40 105,227 - 474 - 478-40 154,744 - 116 - 53-8-20 154,744 - 116 - 53-8-20 154,744 - 116 - 53-8-20 12,660 - 190 - 38-8 129,156 - 916 - 47-8-10 11,253 - 121 - 31-A-GRP

353,721- 751-157-8-AB 56,276- 263- 84-8 5100- 58- 25-8-40 (1,346- 122- 31-8-10

128,016- 381-112-8-AB

162,000- 450-120-B-AB 97,953- 317-103-B

HB9LF (HB9BOQ, opt.)
173,664 - 536-108-C-AB
HB9KC 87,300 - 291-100-B
189GIP 52,116-224-78-B
HB9AVZ, 40,392-704-66-B
HB9GW 28,905-157-55-B
HB9GOW 5550 50-37-8

DJ#UY/HH# 53,799- 227- 79-C-AB

128,202- 929- 46-C-10 40,698- 577- 38-C 14,445- 107- 45-A-QRP

69-300- 185- 50-H-AH

97,776- 336- 97-C-5B 28,050- 170- 55-C

81,972- 297- 92-C-AB 17,340- 170- 34-C-40 2448- 48- 17-C 11,232- 177- 12-C-20 240- 10- 8-C-15

16,290- [81- 30-C-80 25,488- 177- 48-C-15 [45,824- 997- 49-C-10

64,308- 235 92-B-AB 18,408- 118- 52-B

W6GO (+ Net) \$01,216- 736-227 C-5V KJ6V (+ Net) 396,390- 730-181-C-SCV AA6OP (+W6s JLTSE) 159,315- 849-145-C-ORG #6,155- 181- 85-C-SCV W6ERS (+ Net) 46,155- 181- 85-C-SCV W6SZ (+ Net) 22,176- 112- 66-C-SCV 27,175- 144 K6FO (+ Net) 18,312- 109- 56-C-SV R6SMH (+ Net) 9516- 61- 52-C-SCV

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KBLX !+K8\$ GM,MD,NBEA,WA8\$ YVR,ZDT,WN8PEE,WD9HFWI 2,710,848-1912-368-C-MI N8II (+K3ZJ,KB8MF,KC8C,KD8G, N4MM)

YBV1 [88,27] 367-171-C-4A KBUR (+WAQIK)] 180,564-367-154-C-45 KBUK (+KBQNF, KDQM,W7YCO, WDQEHI)

WIDEEH) 156,972, 508,103,0-00 W#NA (W#S AH C.B.F. NO. 1005.) 125,280-348-120-0-MO W#QGQ (KA#EGP|W#IPV,WB#S JIQ,GFV, 5015.) 91,948-269-114-H-KS

W/VE - CW

Multioperator, Multi Transmitter

WA9BWY, WB9L TY)
3,239,392-2624-411-C-IND
K9GL (+K95 BG KM,HMB,NO,PW,
RS,VV KJ9W,W9TM,W99 CAS,
TTY,WD911C)
4,090,204-2556-403-C-IL
K2VV (+K25 GI, VV,N25 AIT,
J,W2NC,1204-2592-3-3-4-C-WNY
AIGV (+A44KB,K65 KLY,X1),
N65 TV, X1,NBGG,W65 DE,NY,OWQ,
W65 DIL,OTU,VET)
2,737,396-2653-344-C-5V
K4PQL (+CX1EK,K3IU,W3FG,
K4PQL,K75V)
183-2183-412-C-VA,
W3GM (+WB2Y-OF,K35 GM,NT,OA)
RL,WW,N3AMK,W3-2183-410-C-FPA
KNSM (+K8bY+Kh6T-N65 BP)
FI,W65,YN,W65 AV5,SCO,
W85KN,U 2,374,740-250-5-316-C-EB
K3ZUF1-K3NZ,KF JR,W35 MM,
RJ1
2,158,163-1896-379-C-EPA

K32UF (+K3NZ,KF3R,W3s MM, RJ) 2,159,163-(899)379-C-LPA W1YN (+Astl.,AK1U) 1-97/2884-2034-323-C-1 M NSRM (+N4QS,AASC,KSs HM,MM, KMSX,NSBQQ) 1,506,240-1569-329-C-5T X WWAIH-9 (+KS9S,KC3A, K9S FVF, PK, 1G, KM60,N9S BG,NO,W9UO, W4QRBW! L405,242-1473-318-C-WI K6ZM (+AK6S,PT,KH6S,NB6L) 909,040-129-7-240-C-E-B W4CN (+K4TX),KC45-HB,MK,WQ, KD4U,MS-TR,TY,XM,MA4D,NF4R, NM4K,NO4R!

NM4K,NO4R) 669,123- 903-247-C-KY K3CY (+W3GU) 377,096- 608-204-C-EPA

DX - CW

Single Operator

Africa

EA8ZS EA8BF EA8ZZ EA8EY 187,758- 513-122-C-AB 92,250- 410- 75-B 26,460- 245- 36-B-15 1485- 33- 15-A-QRP 113,679- 743- 51-B-40 EA9EU EL2AV EL8H 931,476-1706-182-C-AB 1050- 25- 22-0 128DM 36,919- 307- 39-0-20 -309,213- 799-129-B-AB 1581- 31- 17-B 7452- 92- 27-B-40 ZS6ME ZS6BCR ZS6APS 18- 4- 4-B-AB /PRCC 206,310- 598-118-C-AB 9U5WR (SP6FFR, opr.) 30,600--200--51-8-AB

A21AE 2970- 55: 18-8-40 HL9ER 151,767- 511- 99-C-AB

HZJAR (K5KG, opt.) 587,286-1239-158-C-AB 587,286-1239-158-C-AB
737,667-1301-189-C-AB
737,667-1301-189-C-AB
657,580-1210-186-C
657,695-149-188-B
407,737-899-51-4
561,228-738-138-B
307,164-736-143-B
307,164-736-143-B
207,164-307-128-C
257,664-671-128-C
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JEIGER JE2MEE 7- .5-A 4- 1-A 312-354-274--5.3 -5.1 JE2MEE UA95GL UA92P UA92BP UA95AU UA95ACL UA9BHI UA9ABHI UA9ABV UA9ABV UA9ABV UA9ABV UA9CAE UA9CAE 28,200 200 47.8.AB 6318 54 39-8 139-97 880 538-20 17,952 482 47.8 10,381 247-418 13,492 118 38.8 7088 76 31.8 6384 76 28.8 JR4ISK JA1KXT JR7TJP JA1HZM JA7KCO/L JA7ARW/I JA1BGW 14/6- 41- 12-8 37,992- 281- 44-8-15 3060- 51- 20-8 1440- 32- 15-8 9300-8976-7029-44529-15339-5528-3168-3168-3168-3168-34-8 33-L 28-B 13-H UD6BW 1881- 33- 19-B-20 UF 6CX UF 6F F F 1482- 26- 19-B-AB 20,541- 229- 43-B-20 UL7CT UL7CBM UL7QF 79,388- 604- 99 B-AB 21,000- 175- 40-B-20 936- 24- 13-B-15 UIBBI 3525- 17 25-8-AB VS6JR (WA4UAZ, opt.) 60 162- 221- 74-C-AB 144,000- 275-128-C-AB 9K2BE (G4BWP, opt.) 47,525: 405: 35-C-10 81,432- 348- 78-B-AB Europe CLIADZ 68.244- 517- 44-C-40

360- 15-349- 23-319- 21-180- 15-101,472- 604-73,440- 480-52,932- 401-12,48- 131-12,576- 131-7905- 85-7812- 84-5508- 68-4-B 56-B-20 51-C 44-C 41-B CTSDP 42,978- 247- 58-C-AB 109,710- 795- 46-8-20 DL ZON (AE 9YC DL ZAEN DJ ZEN DJ ZEN DJ ZEN DL 6WD DKZ ZT DL 1 LOM OJ ZOP DJ ZOP DL 1 LOM OJ ZOP DJ 5508-140,454-

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30- 12-B 32- 7-B 19- 7-B 15- 3-B 8- 3-B 66,024 524 42-B 55,470 430 43-C 34,060 290 38-C 22,572 209 36-C 22,572 206 34-C 42,70 103 30-B 101,745 103 41-A 12,669 103 41-A 48 4 4 A DK3QN DX/MG DX/AX DX/AAB DL3MAB UL4QP QRP IGIGGE JGTXLV JATOP 31-8 31-8 30-8 24-8 25-8 27-8

JA10P JE 1808 JE 105P JAINER JENIC JAIVZW JAIVZW JAIVZK IJA2 JA961 173 10 51,465 42,802 41,428, 20,295 194 JHZQAY Jacker JACKEX

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119,880- 370-108-B-AB 4104- 72- 19 B-20 499, 395 - 985 - 159 - H AB 63, 339 - 491 - 43 B-10

53,334 537 71 R AB 27,746 162 55 B 27,680 140 54 B 49,29 53 31 R 49,27 58 28 R 49, 15 98-160 50,155 245 41 B-40 (2,060 14 30 B-20 (2,060 278 49 B-20 (2,060 278 49 B-20

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143,010-454-05-CAB
91,344-145-38-8
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1050-15-16-18
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October 1982

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OK3ZMV OKIAVD	679,978-1474-199-B-AH 307,020- 731-140-B	UP2BAO 119,952- 784- 51-B-20 UP2PBM 1530- 30- 17-B	КН6ND 2,408,679-2941-273-C-АБ КН6IJ 8736- 91- 32-C		Oceania
ÖKPBÖL ÖKPOL ÖK(ZP	257,829-601-143-0 110,595-365-101-8 106,857-383-93-8	UP2BAS (0,560-125-16-B UQ2BEC 104-14-12-B-40	АН61 4455- 55- 27-В КН6ЈЖК 44,979- 319- 47 В-15	1,030,722-1771-194-C HAGNLE (6 oprs.) 1,025,586-1506-227-C	AH6BK (+K7TI) 3,345,775-3956-282-C
DK3PG DKTAWC DKTKZ	102,672- 372- 92-8 70,440- 331- 80-8 76,950- 285- 90-8	UG26GP 23,995- 303- 44-8-15 UG26GP 2305- 49- 15-8-10	VKSAYD (NAFU, opr.) 889,386- 699-138-8-AB VKJAEW 143,865- 417-115-B	HA6KNB (HA6s ND,NF,ON,OU, oprs.) /B4,215-1413-185-C	P29PS (P29s KK,NPL, oprs.) 227,700-660-115-8
OKTAOR OKTAOR OKZKYU	37,149- 203- 61-C 25,295- 181- 65-B 34,869- 197- 55-B	URVRKS 23,283- 199- 39-B-15 URVRCU 2679- 47- 19-B-10	VK4UR 49,536-258-64-B VK4XA 69,264-481-48-B-19 VK8BE 1680-40-14-B	HA5KKC/7 (HA55 BV,LV,MO, OG, oprs.) 7.33,055-1472-166-B	South America
OKSTCF OKSBA OKSPBG	17,289-113-51-8 13,416- 86-52-8 8647- 77 37-8	UOSOWC 91,632- 332- 92-8-A8 VO9HP 34,776- 164- 72-8-AB	2K28GD 139,842- 914- 51-8-15	HA1KSA (HA11J+J oprs.) 343,440- 795-144-C	FY@FOL (FY7s BW,YE,W6s KG,
OKIDVK OKZEC OKIÁHQ	8064- 64- 42-B 7548- 68- 37-C 7533- 81- 31-B	YOYAOT 20,838-151-46-B YOYARY 6324-62-34-B YO3AS 825-25-11-B	2L1BHQ 252,702-606-139-8-A8 2L3AG1 30,537-261-39-8-20	HA3KNA (HA3NU+3 oprs.) 236,270- 635-124-B HA8KUX (HA8UY+5 oprs.)	ીધા, uprs.) ટ.,રક્ષ્યુ,ક્ 44-3 051 -248-B
OK3FON OK1DOC OK2YN	3276- 39- 26-8 2220- 32- 20-8 2070- 30- 23-8	ÝÖ2ČĞZ 1938 34 19-8-40 YO4ATW 936- 26- 12-8 YO5BRZ 3111- 61- 17-8-20	South America	165,600- 480-115-B HA4KYH [HA4s XX,YK,YQ, oprs.]	P42C (P32s PP,PS, oprs.) 1,769,922-2554-231-C
OKTÁLA OKZKVI OKTMMW	1377 27- 17-B 315- 15- 7-B 18- 3- 2-0-160	YO4CEM 2905- 44- 22-8 YO4BEX 1170- 30- 13-B YO8B5F 270- 10- 9-8	HC2SC 238,095-1443- 55-C-10	161,109- 459-117-B HA8KAX (HA8B1+1 opr.) 150,000- 500-100-B	DX - CW
OKIDAZ OKIDAZ OKIDAZ	7245- 145- 25-H-80 4218- 74- 19-0 1152- 32- 12-B	YO3ALW 16,800-140-40-8-15 YO7AWG 1260-28-15-8 YO4XF 15,642-158-33-8-10	HK3A (K3ZO, opt.) 3,575,758-4602-259-0-AB LUSDVO 258 318- 752-114-0-AB	HA8KUK (2 6prs.) 138,672- 432-107-B HA5K8M (6 oprs.)	Multioperator
OKIOKR OKIIN	336- 14- 8-B 21u- 10- 7-B 77,328- 537- 48-C-40	YO25B 2940- 49- 20-A-QRI	EUIEWI 235,248, 676-116-8 EU7CW 26,019-147-59-8 L1140T.L 103,284-604, 57-8-20	125,388- 387-108-8 HASKD8 (HASWE,HA7UX, oprs.)	Multi Transmitter
OKIXI OKILAY	19[482- 19]- 34-B 14[454- 146- 33-C 3016- 76- 22-B	YU/NGO 90,450-335-90-B YUINYY 29,646-183-54-C	LUSOQ 302,280-1832- 55-C-15 (JA4AWD	100,230- 331-101-B HABKAZ (Multiop) 28,371- 193- 49-B	Asia BATYAA DEZIGEJIG UGWJH7s
OKZABU OKZBGR UKIMGW	2160- 45- 16-C- 17,538- 158- 37-C-20 13,230- 147- 30-8	YU25BO 19,278- 126- 51-6 YU70BO 10,710- 85- 42-C YU25DX 1428- 34- 14-8	1,307,784-1879-232-C-AB PY1ZFO 380,940- 907-140-C-AB	HA3KGS (4 opts.) 8892- 114- 25-8	JOTY OR (JETIGE JG 115W JH7s REF, CUC GFO, LIS, LUN, WTC, 1875 OMD, SEI, 1983, J12-235-C JOYKA 1, 980-2712-235-C JOYKA 1, 1875 CHT, SH, JH2GMC, 184UPP, JH4VBC, JH6RPZ, JASS NEO SSY OULS
OK LIPH OK25LL OK2BGP	13.056- 135- 32-B 10.974- 118- 31-8 4788- 76- 71-3	YUPCQ 9204- 118- 26-C-80 YUPBCO (YUPAD, opr.) 117,450- 783- 50-C-40	PYSKER 249,210- 923- 90-8 PRICM 133,371- 604- 73-B PYPURP 124,260- 436- 95-8	HASTKU (HA@DY+1 oprs.) 8160- 85- 32-8	JAZYKA (ĴĠĴĠĬŔĴĴĴŖĬŔ. HZOXU JEZ: ROT SKEJRZGMC, JAZUDPJH4VBOJH6RPZJAS:
OKLUM OKITW OKIMZO	4422- 1/2 27-18 780- 20- 13-18 648- 27- 8-18	YU1EW 106,050- 707- 50-C YU1AJW (YU1PXM, opr.) 30,537- 201- 39-C	PY1EFA 44,010-326-45-B-20 PY1BUL 47,655-353-45-C-15 PY1BOA 107,484-626-53-B-10	OH2TI (OH5BA,OH6s DD,GJ, opis) 25,116- 182- 46-C	1,651,587-2537-217-C
OKŻSGW OKJKŁO OKJYK	216- 12- 6-6 59,561- 421- 47-8-15 51,840- 384- 45-0	YU4GD 189,126-1106- 57-C-20 YU1KQ 191,475- 615- 55-C YU1CQ 60,417- 417- 49-C	PYTBOA 107,484-676-53-B-T0 PYSZLC 468-13-12-A-GRF P42J (WIBIH, opr.)	POKIKSO (OKIS AMF,JCW,JJB, JWA,WT, GDIS.)	JI (PYO, IRIRNO, dars.) 1276, 240-2239-190-0 10.7745 (JA75WR, JE7HLZ, JR/s
OKIDMI OKIAOV OKSKEX	74,054- 711- 38-8 19,530- 186- 35-8 8526- 98- 29-8	YU7AF 48,636- 386- 42-C YU5XFC 13,440- 128- 35-C YU2RRI 5256- 73- 24-B	1,008,184-3434-292-C-AB	1,222,980-1870-218-C OK1KQJ (OK1s AYP,BY,ICM,IMR, oprs.)	GGO,HMS,QWW,1 RW,DOW,343, oprs.} 314.685- 777-135/B
OKIDZD OKIAXB OKIAGN	7560- 90- 28-8 631- 23- 9-8 88,573- 671- 44-0-10	YUZAY 115,250- 769- 50-8-15 YUZGW 105,693- 719- 49-0 YUZGG 91,045- 585- 51-0	2,824,392-3436-274-C-AB YVINX 2,228,310-2751-270-C 4M5ANT	292,151- 702-139-0 OK1KPA (OK1s AFC,MH1, oprs.)	JAGYAI (JEĞÜWÎ JRGS ÉZÉ, (ZV., opri 10,881- 93- 39-8
OKIALS	86,856- 616- 47-B 52,116- 404- 43-B 9744- 116- 28-B	YÜZSF (6480- 80- 27-8 YÜZCAB (YUSTBA, ogr.) 96,462- 698- 46-C-10	(,149,438-2006-191-C YV4BOU 305,608-1608-167-B YV7PF 64,107-419-51-8-20	241,554- 634-127-B OK3KEE (OK3s CGG,CTL, oprs.) 98,553- 361- 91-8	Europe
OKSBIK OKSBED OKSBED	9540- 105- 30-B 7371- 91- 27-B 9825- 91- 25-B	YT3L (YU3BC, apr.) 90,684- 687- 44-C	ÝV 2BE 410,496-1069-128-A-URS YV 5HUJ 4620- 70-22-A	POK3KYP (DK3s DT,RC, cprs.) 93,183- 349- 89-8 OK3KXI (OK3s CDZ,CQI,CTB,	LA40 (LA6EV LA8UU,LA9HW, LA9BS, opt6.) 84,036- 298- 94-8
OKŽŠWĎ OKŽŠVĎ OKŽŠVĎ	3654- 58- 21-8 0760- 40- 23-8 2448- 51- 16-8	YU3EM 8/,696- 609- 48-C YUIPZT 2025- 45- 15-C YU3TMJ 6000- 80- 25-A-QRI	∍DX - CW	oprs.) 87,633- 321- 91-8	OHIAF (OHIS BO, CH, EH, HS, KA, opra.)
UKZBSA UKBCSP UKZBMA	210- 10- 7-H 18,444- 116- 55-A-QRP 7068- 76- 31-A	Y34UK 1,487,016-2174-228-C-AB Y31XF 105,141-347-101-B Y241F/P 102,723-353-97-6	Multioperator	OKIKYS (OKIS DEY, FRF, opis.) 48,807- 187- 87-0	688,896-1472-156-C SK2IV (SM2s AGJ,CDF, oprs.) 21,296-163-64-B
OKIDKW OM6FI	561- 17- 11-A 402,402-100 ₃ -134-8-AH	Y44YK 81,954- 114- 87-C Y22EO/A 73,692- 276- 89-C Y41ZH 49,770- 237- 70-8 Y54ZL 49,248- 228- 72-C	Single Transmitter	OZSEDR (OZIHET,OZSQN, OZSO, opis.)	21,296- 163- 64-8 North America
ON4XG ON5CW ON7BX	224,028-588-127-8 6633- 67-33-8 2280- 40-19-8	ÝSÁŽÍ 49,248- 228- 72-C Ý25TG 36,864- 196- 61-C Ý36UE 34,515- 195- 59-B	Asia JASYBA (JASS LJIJENJ, LWB, OTX,	105,294- 719-142-C PAØGN (PAØS ERA,GIN,OKA,	Kt. /QT (+KB7s B;G;KC7t,N7AYF) 1,459,006-4469-259-0
ON7BV OY2J	90- 6- 5-8-40 9480- 79- 40-8-AB	Y36YM 32,885-174-63-6 Y38YE 25,758-154-54-B Y21YH 20,349-119-57-B	UAO_H@CAZ, oprs.) 1,183,710-1870-211-C	797,496-1414-188-C	VOAMK (N9PI,K9s DX,LA,MK, opis.)
ozito i	1,530,852-2407-212-C-AB -275,850715-130-C	Y3871 15,372-122-42-8 Y31ZE 14,883-121-41-8 Y32ZF 14,097-127-37-8	1A3YBF (JF 3PGA JG38 GKK,QH, JI3BPR JH4CES JH4AGT, oprs.) 99,990 - 505 - 65 C	SM5GMG (+SMØGNU) (,513,194-2357-214-C	4,405,167-4911-299-0
ÖZÍFGS ÖZÍW ÖZÍW	220,206- 686-107-8 182,709- 603-101-B 40,356- 177- 76-B 38,295- 185- 69-B	723LM 13,230- 98- 45-6 Y52ZC 12,753- 109- 39-8 Y22DK 12,546- 102- 41-8	JAIYFG (JGIVCZ, JIIs JMH, LLA, JUHZR, JNITTY, JH2PRZ,	SKIBL (SMIs ALH, IED, JBM, opts.)	SPENW, ACOE, CX / BU, DITX I.
ÖŽÍČCB OZZRH OZ4UC	11,340+ 84+ 45-B 5208- 56- 31-B	Y719H 12,408- 94- 44-8 Y2 (4B 12 084- 106- 38-B	JH4CQQ, opis.\ 	800,316-1551-172-C SKIPLISM7: IUN,JRJ,KNM, KNW, opts.)	8P5NW,ACOE,CX/BU,DJIXI, DK3OI,DLGCS,DL/AAD, DL9CC,EASAR,EA7BYM, EA9EU,EL8H,F5AI,HA4XX,
074HW 025KU 071DKG	3510- 45- 26-8 7050- 94- 25-8-20 996- 119- 28-8-10	Y42ZB 9675- 75- 43-8 Y22HF 8880- 80- 37-8 Y23CM 4860- 46- 36-8	JH\$CTW,JR2sTPD,UWX, obrs.) 51,876- 247- 76-0 JR3ZTI (JA1QXX-JEITBD,JN101R,	52,140- 220- 79-C UK6LEZ (UB5s ILW,MGZ,	HASNR HASPOHASVG, HAZLCHA MYHAZSU, HZIAB IAPSB HIJIZ INWS, IASF YM JH / PWS, JM I RFT
OZSKS OZSAŁ OZICAH	4140- 50- 23-B 3024- 48- 21-B 1125- 25- 15-B	Y48WO 89,964-612-49-C-40 Y24XD 6240-80-26-C Y54UA 720-20-12-8	opts.) 31,434- 169- 62-8	UASLJE, oprs.) 946,275-1705-185-B	IRAMTO KBBI,KINAN,KIDR, KABA,KAFM,KIXI,KAIZD, KABA(M KAMIK KARAG.
OZBE OZBE	2508 48- 22-M	Y514C/Y47UG 264- 11- 8-8-20 Y55XG 42,504- 308- 46-8-15	JA1YCL (JE2RQU,JG1GQB, JH6TMQ,JK1JSS, opts.) 38,61321161-8	UK6LAZ (UA6LIG+4 oprs.) 497,475-±005-165-B UK6ARA (EZ6ACB,UA6ARX,	IABE YMILHI MYSJIMIRET, IRAMTO KBBLIK INNAN, K3DR, KNAR, K6FM, K9XI, KAIZD, KNAR, K6FM, K9XI, KAIZD, KAZAVYM, KAZAVEM, KAZAVYM, KAZAVEM, KAZAVYM, KAZAVEM, K
PAGLOU PAGASC PAGINA	701, 760 -1360-172-B-46 67,914- 231- 98-B 54,675- 225- 81-B	Y455A 14,652- 148- 33-B Y22UB 14,478- 127- 38-B	JA7YOX (JH7s HOD,JRH,THS, opis 38,106- 219- 58-0		KÜĞÇE,KÖ3W,KO4LA, KUSJY,KETB,KK9L,KL7JEE, KNSM,KO4D,LATK,LA\$YEA,
FASAUK FARCE FASAUG	17,172- 108- 53-B 14,350- 89- 50-B 12,900- 86- 50-B	Y345E 2.5,100+ 220+ 35-8-10 Y46XF 18,900+ 180+ 35-8	UK@QAA (UA@s QAS,QBB, oprs.) 901,824-1952-154-B	17],q/2- 5/6- 99-8 UK1AFA (UA1AAF+2 oprs.)	LA4RQ,LA5KO,LA751,LA75P, LA8CJ,LA8NO,LU1EAT, LZ1CW,LZ1KPZ,N2BNB.N2CD1,
PAGUV PASAGO PAGGI	16,836- 85- 42-B 5859- 93- 27-B 2160- 36- 20-B-40	Y54XA 11,340-126-30-B Y24SG 6399-79-27-B Y41VL 6240-80-26-C	UK9FER (UA9\$ FAJ,FAL,FDW, FGO, oprs.) 412,242-1082-127-8	145,440- 605- 96-B UK3AAC (UA3AMW+1 opr.) 61,248- 232- 88-B	NZIN,NZRT,NSCPO,N6UW, N6UX/5,N9CTS,OH1XX,OH2AA, OH3UJ,OH6CS,OK1XX,OH2AA,
TOAÇAR XAHSME ULAÇME	8307- 71- 39-A-ORP 629,458-1589-174-C-AB 672,840-1260-178-C	Y62XG 2280- 40- 19-8 Y213H 2106- 39- 18-8 Y38VL 540- 18- 10-8	UKUFAD (UAU's FAY, FER, oprs.) (45,137- 479-101-B UK9YAZ (3 oprs.)	UK5QAV (6 oprs.) 294,462- 861-114-B	ON INCLUMENT ON YOUNGERA, PAREIC PARTIES AND
SMSALJ SMSDAC SMSBDS	138,006- 451-102-C 114,600- 362-100-C 109,500- 365-100-C		P. UK#KAB (UA#IZ+1 opr.)	UKSMAH (UBS MDC,MNY, UYSLK, opts.)	OHIOLORGIA AND AND AND AND AND AND AND AND AND AN
SKALM SM5RE SMØ8TS	59.274- 222- 89.0 31,356- 156- 678 28,497- 161- 59.0	Z82EO 362,400-800-151-8-AB	41,478- 223- 62-B UK6FAH (3 oprs.)	DKSCBB (5 obte*)	LIANCON UNACCES UNAL EN
SM7KIL SM2LIY SM7TV	18,630- 138- 45-8 13,724- 104- 44-8 10,152- 94- 46-8	North America	2394- 42- 19-B UK6FGZ (UF6FCZ+10PR.)	936- 24- 13-B	UABUCA,UAGSBU,UAIAWU, UAICAX,UAIOCI,UAIAWU,
SMEDJI SMEJY SMZCZO	5940- 60- 43-0 4146- 49- 28-8	HH2VP 715,530-1037-230-B-AB HI8LC 8613- 94- 29-C-40	462- 14- 11-B UK5FAF (UF6FDE+1 opr.) 324- 12- 9-B	UK2PCR (UP2s BBT,BCR,BCT, BDF,BFL,BFN,BIO,OU,PAV, PCI, oprs.)	UA3DEV UA3DHH, UA3DLD, UA3DEV UA3DS, UA3DEV, UA3DEK UA3DS, UA3EFV,
SM4CAN SM6EAN SM5DQC	1725- 25- 23-8 4845- 85- 19-C-80 2109- 37- 19-C-40 101,808- 606- 56-C-20	HIBCH (K\$2V, 5pr.) 131,664- 844- 52-8-20		1,355,316-2131-212-B UK2BCR (3 oprs.) 441,450- 981-150-B	UASHKN.UASJAD,UJSJAWK UASLHU,UASJACK,UASJAG, UASJAK URSTES LIBSES
SK6OH (56 SM3D&C	M6t WH, opr.) 85,680-595-48-C-15 25,828-255-34-H-)0	KN2M/J6L	⁹ CT2BQ (+C12s CB,DV, oprs.) [,118,676-1846-202-B	UK2BBK (UP2PX+3 oprs.)	ANNH. JANCH. JANCH. JANCH. JAYCAX.UA.IDCT.UA.IDEV. JAYCAX.UA.IDCT.UA.IDEV. JAYCAX.UA.IDCT.UA.IDEV. JAYCAX.UA.IDCT.UA.IDEV. JAYCAX.UA.IDCT.UA.IDEV. JAYCAX.UA.IDCT.UA.IDCT. JAYCAX.UA.IDCT.UA.IDCT.UA.IDCT. JAYCAX.UA.IDCT.U
SM&LAZ SM&LAZ SM&DXY	21,696- 226- 32-C 10,500- 125- 28-B 4914- 63- 26-B	970,459-1807-179-8-AB	DK230,DK3SN,DLIYD,DL38K,	UK28CO (2 aprs.) 3000- 40- 25-8 UK2GDZ (UQ2GAE+Z aprs.)	OFGEN, UFAFFF, OHGOC, UIBIAJ, BROAGE UKINAD, UKIZAS, UKZECO, UKZGAR, UKROGOV
SM5AFE SM6LRR SM6AWA	7770- 74-35-A-QRP 1776- 37-16-A 360- 10- 8-A	K4FW/VP2K 347,424- 696-148-8-AB		938,574-1638-191-B	UKSIAA,UKSIAB,UKSXAM, UKSIDI,UKSGEE,UKSWBG, UKAIRK UKSI ISTILIKSWBG,
UA (LR UA IDE	12,096- 112- 36-B-20 2205- 35- 21-B	VP2MM 14,688- 153- 32-B-AB	DL6FAL., aprs.) 563,238-1131-166-0	UK2RDX (UR2s RCN,RNA,RRJ' oprs.) 960,400-1800-176-8	UKSCEY, UKSUAA, UMSMCY, UPSEDW. UPSEY, UPSOU, UQSPM,
UASSED UASSED	2205- 35- 21-8 264- 11- 8-8 4680- 65- 24-A QRP 576- 16- 12-A	VPSVET IWIJP, purd	EA3MM (EA3s CRX,CVO,LC,OG, EC3s AEF,AFM,AT, opis.)	YORKWE (YOR AALCEE, open)	URGETY, URGURA, UMBREY, URGETY, URGUETY, URGURA, UMBREY, UPZOTI, URGZPM, URGURA, URGUR
UYSUI UHSUW	20,736- 128- 54-H-AH 5589- 59- 27-B	48,108- 211- 76-8 K8WW/VP9	250,793-1751-181-C	36,180- 180- 67-8 YUBBBC (YUBS TEY,TIN,TPZ, TOR, oprs.)	WSELL, WEIN, WEINOS, WEVN, WSELL, WSEVZ, WORCH, WEISO, WSELL, WSEVZ, WORCH, WEISO, WSELN, WSWB, WALLZY, WAZELL,
UHSUKO UBSGDU UBSUCR	4992- 64-26-8 105- 5-8 50,619-259-47-8-40	1,625,013-2451-221-B-AB K82H/VP9 1,245,009-1861-223-B	F3TV (F6s ARC,BEE, opts.) 2,039,040-2880-236-C	1,405,560-2212-212-C YU4FRS (YU4s VQT,WMM,WPF,	WAZEGN,WAZEKO,WAZIPE, WAZEGN,WAZEKO,WAZIPE, WA4BTG,WA8UNP,WBJONA, WB4BBH,WB4CKY,WB7RYC,
UBSEID UBSVK UBSLAE	4488- 68- 22-5 2496- 52- (6-6-20 5[216- 788- 44-6-15	V 3MS (W&CP, ор!) 4,006,002-4466-299-н-АВ		0975.) 1.300,215-2135-203-C North America	WD9CH, Y21CF, Y223D, Y22TO, Y22YH Y21HA Y23HC Y24FA
DH5WCW DB5UK DB5UKW	14/452- 251- 44-8 29,704- 492- 54-8-10 30,771- 264- 49-8 (4,445- 142- 34-8	XE28C (N6TU, opt.) 252,450-1530- 95-C-15	WRR, opis.) 732,732-1342-182-8	KL/HEV (+N6IV)	Y24MI, Y24WL/A, Y38TO, Y26IH, Y26JD, Y27VH, Y31SK, Y21ZE, Y33TA, Y33ZB, Y33ZI, Y35NM, Y44YI, Y46BD
UBSIFN UBSQGD UBSIPJ	14,040- 156- 30-8 12,006- 138- 29-8 11,571- 133- 29-8 922- 106- 99-A-988	XE2BC (NbOP, opr.) 240,048-1431- 56-C-10	G31BK (G36SYH,YCT) 280,692- 678-138-B GW4BRS (GW3ZIY,GW46BV1,	508,680-1080-157-C WP4BDS (+KP4EQG,NP4s C.N.)	Y44XI, Y45RA, Y47XN, Y49RO, Y51XE, Y57ZL, Y66ZN, Y78WN, YUIMM, YUZOQ, YUZOG, YUZAD, YUZAJO, YUZOW, YUZFN, YUZORS,
UBSINO UBSZŁO (ICZAC)	1440- 32- 15-A 1 caut- 100- 45-8-AB	W1HHV/8P6 309,276- 852-121-8-AB	- ベラビ レンバーにはに ロンプ ぬがりき カバルト	2,122,224-1864- 247-8 FGZART (+PA#VDV)	AASBGS, AASIDB, AA4BOO
DC2AFZ	168- 1- 7-8-40 11,187- 113- 33-8-20	Oceania NVE 170006	HG6V (6 oprs.) 1,595,832-2245-236-0	3,440,997-4053-283-C	Disqualifications: Phone-
UP2BAS UP2BBF UP2NK	21,648- 164- 44-B-AB 240- 10- 2-B-80 108,120- 680- 53-B-40	E7,687- 287- 67-B-AB KG6DX 118,440- 705- 56-C-20	HG5A (HA\$\$ FM,FN,GF,JI,LN, i.2,MK,OM,HA7RY, oprs.) 1,470;312-2269-216-C	VP2F (AD8J,K\$s CV,MR,ND, W@RLX,WB6SHD, oprs.) 5,672,070-6094-3) 0-C	HABVH,NBUM,NP4AT,YCGKWJ (excessive duplicate QSOs)
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0.0	F13-7				

Public Service

Crisis in Northern California

The month of March, true to its reputation, slammed into Northern California like a lion. High winds, torrential rains, heavy snows (at unusually low elevations in the mountains) and colder than normal temperatures raised havoc with highway travel, communications and commercial power transmission. Highway closures in the Sierra Nevadas became the rule rather than the exception.

Though true to character at the beginning, March was to be no lamb in departing. Like a mean, hungry, snarling bear, the end of the month saw a reprise of the conditions experienced earlier. Snow fell in areas as low as 500 feet above sea level. By April 5, more than 35 feet of snow had accumulated in the High Sierras, with as much as 18 feet reported at the 6000-foot level. With highway closures, severe avalanche dangers and just too much snow, even the ski resorts were forced to close. As much as 3 feet of overnight snow blanketed normally snow-free areas.

Unaccustomed to driving under such conditions, motorists found the going extremely difficult; many of them became hopelessly stuck or stranded, or slid into the ditches lining the many rural roads of the area.

The Sacramento Valley SKYWARN Network, operating through N6AUB/R, Grass Valley, California, went into almost continuous operation, receiving updated forecasts from the National Weather Service and transmitting ground-truth data to both the forecast center in Redwood City, California, and the local NWS office in Sacramento. More than 20 amateur stations were active during the period from March 26 through April 6. Though normally meeting only Monday through Friday, this group gathered during the weekends as well to share their data.

When the power failed at the NOAA Weather Radio Transmitter, W6CFQ, in Carmichael, California, used his phone patch to call NWS and broadcast the latest forecast information to the embattled foothills, Several emergency agencies and the broadcast radio station in Grass Valley tuned their scanners to

receive N6AUB/R to keep up with what was happening.

Conditions such as these result in many stories, and we were not to be an exception. K6CTU left his home in a blinding blizzard to go and care for the livestock belonging to an individual who had been injured when a barn collapsed on him from the weight of the snow. Walking more than two miles, through three to five feet of snow, he finally managed to reach his destination. Upon arrival, he found that the home had no heat, no wood and no electrical power or telephones. Fortunately, he had taken his 2-meter hand-held transceiver with him, but he was unable to access the repeater from the house. He found that by climbing a steep hill, however, he could establish a contact. He set up a schedule for three times per day. During his 6 P.M. contact the second day, he suddenly disappeared from the air and no further contacts were made with him. Because of the extreme exertion of climbing the hill in the snow. his breathing was labored and he sounded very distressed. Concerned for K6CTU's safety. KD6GY mustered the assistance of the Nevada City Rescue Squad. Their journey to find K6CTU took two hours each way, though only covering a distance of 10 to 12 miles. Everyone listening was relieved to hear them report that everything was well, aside from being a little cold and that K6CTU had refused transportation out of the area.

W6HSY found his car deeply mired in the snow while attempting to return home from a trip to town. Through assistance gained on the local repeater, he was able to notify his motorclub of his predicament.

WA6OIU's father suffered a severe stroke in Sacramento and, after trying several repeaters, KD6GY located him and gave him the emergency message. OIU lives in an extremely remote location, without commercial power or phone, and the Sheriff had been unable to make contact with him.

Many residents of this rural area live far from paved roads and, when commercial power is interrupted, often find themselves without heat, power to pump water from their wells, and light. Reports of stranded residents frequently were handled by Amateur Radio operators throughout the foothills and mountains. Amateur Radio operators from Nevada manned an emergency command post in Truckee, California. This came about as a result of highway closures, making Truckee inaccessible from the California side.

KC7IW/6 found himself sick and totally snowed in near Sheepranch, an extremely remote location in central Calaveras County. Through an almost nightly 2-meter contact, he maintained contact with his concerned family in Nevada County. A brief, unexpected break in the weather allowed his vehicle to be freed from the snow and towed to plowed pavement.

Seven deaths directly related to the weather were recorded in northern California during this period. Those occurred in an avalanche at the Alpine Meadows Ski Resort. No avalanche had ever happened at this location before, and none was predicted then. Total precipitation in some foothill locations exceeded 100 inches almost twice the annual average of 50 to 60 inches. With continuing colder than normal temperatures and a forecast of higher than normal precipitation, the threat of additional snow at low elevations continued. In addition, should a warm spell suddenly develop, the threat of flooding in the Central Valley would exist. Rivers were carrying maximum amounts of water, and a flood warning had been issued.

The winter of 1981/82 will be remembered for many years as the season that broke almost all of the records. The presence of Amateur Radio, however, made surviving it less difficult for some and was a life saver for others.

As the ARRL section emergency coordinator for the Sacramento Valley Section, I would like to extend my heartfelt thanks to all amateurs, too numerous to mention, who gave so generously of their time, talents and equipment during this difficult and dangerous period. This exemplified the highest standards of Amateur Radio. — Ron Menet, N6AUB

SPORTS CAR RALLY COMMUNICATIONS

"A real-world emergency communications drill under the worst conditions!" That was the comment of WØCZE, after he and KØSFI had served for 14 hours as net control operators for a day-and-night weekend pro rally held March 6 and 7 by the Sports Car Club of America in Missouri's rugged Ozark forestland, 100 miles southwest of St. Louis.

Using 2-meter fm mobile transceivers, magnetic-mount antennas and cigarette-lighter power connectors installed in rally officials' vehicles, 25 hams provided primary communications for a 10-stage rally along 300 miles of winding gravel roads and deep-rutted logging trails spread over 1000 square miles of rolling mountainous terrain. The 1982 event marked the fifth year in a row that St. Louis-area hams provided communications for the sports car rally in the

wilderness. The hams included members of five radio clubs affiliated with the Gateway Amateur Radio Association.

Starting with a simplex operation, the 2-meter fm NCS went on the air at 1 P.M., March 6, using a 160-W amplifier feeding a beam antenna atop a nine-story hotel in Salem, Missouri, which served as raily headquarters. By 9 P.M., when the rally activity had moved to its farthest point in a river valley 40 miles southeast of the hotel, communications were relayed back to the NCS through a portable 144-MHz to 220-MHz repeater set up in a 125-foot-high forest fire watch tower on a mountaintop. The relay station provided virtually 100% communications while the roving hams were operating from the river valley — even while walking along the roads with 2-meter hand-held radios

The portable 220-MHz link was installed and operated by KB@EA, president of the Gateway Amateur Radio Association and recently appointed ARRL district emergency coordinator for eastern Missouri. He was assisted by hams from Explorer Seout Post 599, with which he serves as advisor.

Also working with the hams on the road was a Civil

Air Patrol crew driving a crash-rescue truck. The CAP crew was called upon at night to use the winch on their vehicle to remove two large trees that had fallen across a road in the rally course a short time before the contestants arrived. As in past years, the hams' contribution was applauded by rally officials. One of them called it "a professional job," which gave the sports car club reliable instant communications in remote

Another comment came from several of the 49 rally drivers and their navigators, who said they felt more secure knowing that the hams were nearby with the proven capability to get help fast in an emergency. Although some accidents and vehicle breakdowns occurred, no serious injuries were reported.

For the hams, the rally communications effort was a grueling, fast-paced test of themselves and their equipment. It was a simulated emergency drill under strict net discipline, taking place in daylight and in darkness. In most cases, the hams were able to hear only the net control station. It was a test of makeshift low-power mobile installations, with both operators and their equipment crammed into small vehicles bouncing over rough roads through snowy winter

weather in a wilderness surrounded by ore-filled mountains and swirling rivers. It also presented a communications problem, challenging the hams to learn and translate quickly a specialized technical language spoken by the rally officials.

Despite these problems, the messages got through day and night for a solid 14 hours, thanks to the ingenuity, skill and dedication of all the ham volunteers. In short, it was a highly successful test of Amateur Radio under the most difficult of conditions. — John J. Waldmann, W&VDU, ARRL Public Information Assistant

PUBLIC SERVICE DIARY

1 Leavenworth, Kansas - May 1982. The Pilot Knob ARC teamed up with local police to provide "extra eyes" at night. Parked cars had been occasional victims of vandalism during the early morning hours, and club members were assigned to various points around the city to watch for any unusual activities, which were then reported to the police over the WONYG repeater. Then, on May 16, communica-tions were provided for the St. John Hospital 10-K "Run for Your Life." Several hundred runners were involved. Communications via 2 meters were provided at all official checkpoints around the course, with a base station at the finish line. Two of our club members, WB0MMK and NOCWK, entered the race and won medals in their divisions. May 22 brought on a bigger job — communications for the Kaw Valley Chapter March of Dimes 23-K Walkathon, Again, 2-meter communications were established at official checkpoints and at a control station. Finally, with most of our club members enrolled in ARES, and our city being located in a very severe weather "alley," the Zone 5 Emergency Coordinator called our 2-meter net into action several times. We are directly affiliated with civil defense and SKYWARN. (WDØDOT, president, Pilot Knob ARC)

□ Near Catalina Island, California — August 8. WA6WSI and his seven-year-old son were sailing in moderately choppy waters off Catalina Island when the engine on his recently purchased powerboat quit. The vessel was also taking on water through a leak at a rate of about a gallon per minute, but the bilge pumps were fully operational and were handling the pumping adequately. WA6WSI contacted WD6FWE on the mainland, who assumed control of the net established on the W6NWG machine. WD6FWE also contacted the Coast Guard, which sent the cutter Point Camden to assist. Several amateurs along the southern California coastline provided direction-finding measurements to the Coast Guard and were instrumental in determining WA6WSI's precise location. Using the amateurs' coordinates, the Point Camden effected the rescue and towed the stalled powerboat back to port. (WA6WSI)

AMATEUR RADIO EMERGENCY SERVICE REPORTS

Li Kanawha County, West Virginia — July 17 - 18. A hydrochloric acid gas leak from a railroad tank ear forced the evacuation of many residents of South Charleston and Dunbar, and the closing of two highways and one rail line for many hours. The Red Cross set up temporary housing centers for the evacuees, some of whom were patients brought in from a local hospital. EC KB8ZM activated the ARES system, establishing a net on the WB8CQV repeater, and dispatched ARES members to the two evacuation centers and to the state Red Cross headquarters in Charleston. When South Charleston police realized that their manpower was required to maintain security and to man barricades, 12 local amateurs were assigned to patrol the unprotected areas of the town. These amateurs were linked together with police headquarters by a second net initiated on WB8GDY/R, and they remained on the streets for seven hours, until the crisis had passed. (KB8ZM, EC Kanawha Co.)

COMMUNICATIONS SERVICE OF THE MONTH

LI New River Valley Virginia, Amateur Radio operators proved recently that they can respond quickly and efficiently to an emergency when two Virginia Tech "cavers" were injured in an underground accident. Late Saturday afternoon, April 17, a four-man expedition from the Virginia Tech Cave Club was exploring a cave in Bland County when a 30-pound rock fell 90 feet and injured two of the group. One man, Robert Ulfers, was knocked unconscious and suffered a fractured skull, a fractured neck and a broken foot. The other man, Pete Sauvigne, sustained two broken arms, An uninjured member of the team climbed out of the cave and summoned the Virginia Tech Cave Club.

WB4NGC notified Blacksburg amateurs via AB91/R on Brush Mountain that he was on his way to the accident scene. Within 15 minutes, members of the Virginia Tech ARA set up an emergency response center at the club station, K4KDJ. Manning the center at first were WB2OMZ, WB4FDB, WA4LTO and KA4ZOI.

KA4ZOI.

When WB4NGC and the rescue personnel arrived at the cave, they determined that experienced cavers would be needed to assist in the rescue. Unfortunately, the squads discovered that neither the Bland County repeater nor the Brush Mountain machine had sufficient coverage for reliable communications from the accident site. N4AZL, who was able to hear both repeaters from his Giles County location, monitored both frequencies and relayed information until an II-element beam was set up in Blacksburg. N4AZJ, caretaker of the Bland County machine and EC of Bland County, supervised communications from his QTH in Bland.

A number of other New River Valley amateurs assisted during the 16-hour rescue mission, including AB9 (EC Montgomery County), WD4LNN (assistant EC Montgonery County) and WA4QVE, WB4TGT and WD4MUO.

After midnight the VTARA emergency response center was moved to the center set up by the VTI Cave Club, where WB2OMZ, WB4FDB, WA4LTO and KA4ZOI worked through the night. Within minutes the club had assembled a base station and a beam antenna, and had gathered several 2-meter hand-held radios and a police-femergency scanner. Thanks to the assistance of these operators and N4AZJ, experienced cavers from Virginia, West Virginia and Tennessee were summoned to the rescue site. Ulfers was placed aboard a rescue helicopter early Sunday morning, 16 hours after the accident, and Sauvigne was transported for treatment by ambulance shortly thereafter.

As a direct result of the role played by the Virginia Tech ARA operators and other local amateurs, the Virginia Tech Cave Club has decided to have an ARES member accompany all future cave rescue operations. (Seth Williamson, WB4WQY)

ARRL SECTION EMERGENCY COORDINATOR REPORTS

(i) For July, 42 SEC reports were received, denoting a total ARES membership of 21,550. Sections reporting were: AL, AK, AB, AZ, AR, CO, CT, ENY, EPA, IN, KS, KY, ME, MI, MN, NE, NH, NLI, NC, NFL, NNI, NTX, OH, OK, ON, OR, PAC, RI, SDG, SIV, SCV, SK, SC, SFL, STX, TN, VA, WY, WMA, WNY, WPA and WNY.



Meet Darlene, WB7DZX, section traffic manager for Montana. (W1YL photo)

REPEATER LOG

According to reports received between July 21 and August 21, the following repeaters were involved in the delineated public service events.

Meaning City	Medical Congression	Terden	de.	_^2 ₈						
The Chin	. O. O.	143	- 14	13	2		S	to, S		
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*	(G) (J)	, T	ω 	h. 1	7	w.	B. J.	100	()	Copp
	5,000	-	.2.	12.	40,	.04	A. A	.05	43	
WIAFA				1						1
KA1C W1HTG							1			1
W1XJ				3			1	4		8
W2AET	1						1	1	1	4
WR2AGH N2CHH	1						1			1
KC2CY	i			2				1		4
KC2CY WA2PAV				9				4		13
K2QIJ KF2S	1						1	5		15
WB2ZII							5	5		10
NJAIA				2						ž
N3BFL			1	2				4		- ?
W3EUP WB3JOE	1						1			i
K3PSP	•						t			1
K3RZR		_		194			1			1
W3UER NN4N	1	1	1	2	2		1		1	8
WB4QES			2	3 15					1 2	19
WA4SWF	1								1	1
W5GIX W5RVT	t		1	12					1	14
W6ASH	,			4	2					6
WD6AWP				4 7 5	5					9
WD6FGX KH6H		1		5			1			1
KH6HHG							1 2	1		3
W6IYY				4			ī	1 5 4	1	11
WB6PVS W6VY			1	1				1		7.
WR7ABX				1						ŧ
K7CC		1		3				4		7
KC7FA W7HSG			1	27			1	4		8
K7OMR				1221454				3 30		ż
WR7TPV				5	3		1	30		38
W7WGW N8AG				4	3		1			8
WRSARB				2						ż
WR8ARB K8DDG				5 5			2	3		6
WA8ULB W8VTD				2			4			2
KSVXH							1 1 1			i
WB9DGO							i			1
W9KXQ W9MQD	4						1			5
WASTHE							2			ż
W9VCF WRØACZ	_						3		_	3
WROACZ	2 3					1			2	5
WBOCMC	3	1	1	4						ĝ
WRØAFT WBØCMC WBØHAC		-		4						1
WOILO WOMME	3			1					2	3
WBOSBH	6 1 29			1					*	1118441143610271111844914169613118117817388126211151235291391280
Total	29	4	ន់	103	11	t	35	79	11	280

NATIONAL TRAFFIC SYSTEM

De WB4PNY: "This past month has been one of the worst on record for terrible band conditions. A special thanks to all who served as a rep to EAN/c2 and had to sit through an hour of sometimes never being able to hear the net control station, having to have all traffic relayed and being frustrated when you can hear the other station who can't hear you because of one-way skip. A super job by all."

the relayed and being trustrated when you can hear the other station who can't hear you because of one-way skip. A super job by all."

Welcome to new members-at-large on the Pacific Area Staff: KN6C and KN7B. The new chairman of PAS is W7GHT, replacing W7DZX. Thanks Jack, for all your hard work as PAS headman.

De WBTWOW: "The convention held at

De WB7WOW: "The convention held at Yellowstone, Montana (Northwestern/Rocky Mountain Divisions), was very successful, with about 500 people attending. It was indeed a pleasure to have our president in attendance; Vic, W4KFC, was well received by all. His presence and participation in our trafficofficials meeting was a sincere boost to all of those attending."

July Reports

1	2	3	4	5	6	
Cycle Two						
Area Nets						
EAN	31	832	26.8	530 9	5.7	
CAN	31	719	23.2	.414 10	0.0	
DAM•	55	599	10 9	303 9	ŭ N	

Region Nats						
1RN	57	203	3.6	.210		_100.
2RN 3RN	62 31	323 167	5.2 5.4	.250 .321	90.0 86.3	100. 93.
4RN	59	480	8.1	294	52.0	
RN5	31	378	12.2	.339	96.8	100.4
RN6 RN7	60. 63	558 634	9.3	.321 811	90.3	100.
ann	u.	034	10.1	.011	17.2	100.0
9RN	60	382	6.4	.406	96.0	100.0
TEN ECN	31	236	7.6	.211	73.5	100.0
TWN	52	239	46	.362	46.8	87. 98.
TCC				.002.	40.0	30.0
TGC Eastern	991	760				
TCC Central	731	289				
TCC Pacific	911	402				
Cycle Four				*		
Area Nets						
EAN	31	1426	46.0	1.079	95.2	
CAN PAN	31	1100	35.5	.956	99.5	
	31	1137	36.7	.997	97.3	
Region Nets 1BN	***	004	40.4			
2RN	53 91	694 522	13.1 5.7	.415	91.5 96.9	100.0 87.1
3RN	62	255	4.1	.410	96.0	100.0
4HN						90.3
RN5 RN6	62 62	763 658	12.3 10.6	.636	95.2 100.0	100.0
AN7	62	650	10.5	.856	96.3	96.8 100.0
8RN	60	405	6.8	.362	88.0	93.5
9RN TEN	62 62	493 353	8.0	.426	98.0	98.4
ECN	62	162	5.7 2.6	.336	72.2 70.0	100.0
TWN	61	480	7.9	428	84.8	95.2
TCC						
TCC Eastern	130 t	635				
TCC Central	56	633				
TCC Pacific	981	717				
Sections ²	6908	22,944	3.3			
Summary Record		41,228	5.0			
URCOLL	0036	45,072	15.2			

*PAN operates both cycles one and two.

'TCC functions not counted as net sessions.

*Section and local nets reporting (238): APSN ATN
(AB), ASN MG SSN (AK), AENB AEND AENH AENJ
AENY ATNM (AL), ACN ATEN HARC (AZ), NCN NCTN
(CA), CN CPN NVTN RTN WCN (CT), DEPN DTN SEN
(DE). FAST FMSN FMTN FPON FPTN GN NFPN PEN
OFN OFNS SEFTN SPARC SVTN SWFTN TPTN (FL),
CGVHFN GCN GSN GSSBN GTN (GA), IARES 175PN
(CN ITEN TLCN (IA), ABY IMN MSN (IDMT), ILN (IL),
ICN ITN QIN (IN), CSTN KPN KSBN KWN QKS OKS-SS
(KS), 3ARES 4ARES 5ARES I TARES BARES CARN
CCEN KNTN KRN KSN KTN KYN KYPON LCARES
MKPN PAEWTN PAWN SEKEN TSTMN (XY), LAN (LA),
EM2MN EMR! EMRIPN EMRISS HHTN NEEPN
RIEM2MN (MA/RI), CTN MEPN MMN MTN WRIN (MB)
AEN CMEN MPSN PTN SGN SPSN (MS), MACS MITN
MNN QMN UPN (MI), MSN MSPN MSSN (MN), ACE
NEMOE (MO), MTN (MS), 4CARES CFARS CMN
CNCTN JFK M2MEN PCTN RARS THEN (NG), CN CSN
(NG/SC), MNARES NCHN NE40 NE75 NMPN NSN
PARC2MN PVTN WNN (NE), GSPN MCEN NHN RCEN
(NHJ, JSARS MCN NJN NJPN NJSN NJVN OBTTN
SOCTN TCETN (NJ), NSN (NY), BAVTN CON CNYTN
EPN HVN NCVHF NL: NLIPN NLS NYPON NYS
SCHHE SON STAR WDO (NY), BAVTN CON CNYTN
EPN HVN NCVHF NL: NLIPN NLS NYPON NYS
SCHE SON STAR WDO (NY), BAPR BN BRTN
COARES HCARPSC LCNOARES MCTN NEON O6MN
OSN OSSN OSSN (OH), OFON OLZ OTWN (OK), KPN
LN OLN OPN OSN OSND (ON), BSN LBLARES
ORARES PA EPAEPTN PFN PTTN WARCVTN (PA)
WOUVARES (PO), GPD2MN LC2MN SCNTN SCSSBN
(SC), PWN RARA SATN (SK), TNCW TNPN TNNN TSRN
(TN), BARCEN DFW HATN TEX TSN TTN (TX), BUN
UCN (UT), STRARES SVEN VEN VN NYN TYNN TSRN
(TN), BARCEN DFW HATN TEX TSN TTN (TX), BUN
UCN (WY).

1 — NET

5 — RATE

2 — SESSIONS

ESSIONS AN operates both cycles one and two.

t — NET	5 — RATE
2 - SESSIONS	6 - % REP.
3 — TRAFFIC	7 - % BEP, TO AREA NET
4 — AVERAGE	

Transcontinental Corps

% SUCCESSFUL

De WA2SPL: "I think WB8YDZ set a new single-sked TCC record (at least off-season): 101 received on a Kilo sked and, better yet, cleared next cycle!"

1	2	3	4	5
Cycle Two				•
TCC Eastern	124	79.8	1502	760
TCC Central	93	78.5	578	289
TCC Pacific	124	73.4	837	402
Summary	341	77.2	2917	1451
Cycle Four				
TCC Eastern	155	83.9	1289	635
TCC Central	62	91.9	1228	633
TCC Pacific	124	79.0	1417	717
Summary	341	81.6	3934	1985
1 AREA		4 TRAFF	ic	
2 - FUNCTION	S	5 OUT-O		RAFFIC

TCC Roster

TCC Roster

The TCC Roster (July) Cycle Two — Eastern Area (N2YL, Director) — Kis CE EIC, NIBHH, Wis OYY XX, AH2M, K2S KIR PH, KB2PH, KO2H, N2S CER YL, W2S CS XD ZOJ, WB2S IQJ MCO, K3JSZ, WB3GZU, WA4CCK, WB4PNY, AFBV, W8PMJ, WB8YDZ, VE1WF, VE3S GOL HTL, Central Area (W9JUJ, Director) — KA4MYZ, W4OGG, WD4HIF, W5S CTZ KLV TFB URN, N5AMK, WB5YDD, K5S 8NH KJN, W9S JUJ NXG, WB9WGD, Paclific Area (W9HXB, Director) — KV5U, W5JOV, K6S HAP OWA UYK, KN6C KT6A, KU6D, N6GIW, NI6A, KA7CPT, KF7R, N7CSP, W7S DZX GHT TGU VSE, WA7BZY, WB7S DZX TOF WOW, W9OBV, W9MXB, K\$\text{W}DAY, KB\text{W}MYS, CS FR GKZ XD ZOJ, WA2SPL, N2YL, AH2M, KF2T, W3S ATQ FAF PQ, WB3GZU, W4PMJ, K8JO, WB8MTD, AF8V, N8XX, VETWF. Central Area (W3GHP, Director) — W4S WXH ZJY, K5S GM TL, N5TC, W5S RB TFB, KB5W, W9CXY, W8BUYU, AB4V, K\$\text{K}DAY, KBS, CS FR KGX XD ZJY, K\$\text{K}DAY, KBC, WB8MTD, AF8V, N8XX, VETWF. Central Area (W3GHP, Director) — W4S WXH ZJY, K5S GM TL, N5TC, W5S RB TFB, KB5W, W9CXY, W8BUYU, AF8K, K\$\text{K}DAY, KBC, WB5 ED TYT, KN6C, KT6A, K7S HLR KSA, KN7B, W7S AK DZX EP GHT LYA V5E, WA7GYO, WBTNHR, N7AKX, K\$\text{S}S BN DJ, KC\$\text{D}D, W\$\text{S}S GMO HXB OGH, WD\$\text{M}AIT, VE7ZK.

Independent Nets (July 1982)

1 — NET	3 - TRAFFIC
2 — SESSIONS	4 - CHECK-INS

Public Service Honor Roll July 1982

This listing is available to emateurs whose public service performance during the month indicated qualifies for 60 or more total points in the following nine categories (as reported to their SCM). Please note maximum points for each category: (1) Checking into cwents, 1 point each, max, 30; (2) Checking into phone/RTTY nets, 1 point each, max, 30; (3) NGS cw. nets, 3 points each, max, 12; (4) NGS phone/RTTY nets, 3 points each, max, 12; (6) Delivering a formal message to a third party, 1 point each, no max; (7) Handling an emergency message, 5 points each, no max; (8) Serving as emergency coordinator or net manager for the entire month, 5 points, max, 5; (9) Participating in a public service event, 5 points, max, 5. This listing is available to Novices and Technicians who achieve a total of 40 or more points. This listing is available to amateurs whose public ser-

193 WB7WOW 165 WD4COL 136 KA3CDQ 134 WØHOJ WD4HIF 133 KATGBS NG4J 129 WA4PFK 122 KB5W 121 K8KQJ 120 KC7WX WØOYH 118 WA1TBY 117 WBVPW WB7TQF 115	KM9B W9JUJ 114 WATUAX K2ZM 112 WB4WYG 111 K8OZ W4CKS WA4JDH 110 KK58 WA4EIC WB2IQJ 109 KE4QZ W5DTH WA4QXT 108 K4SCL WB3GZU WB2EAG 107 W2MTA 106 KA1ON KD4PJ	W1EOF WB1HIH 105 N8DSW W4WXH 104 KV5X NI6A W1TN W2XD W04ALY WD4GNQ 103 KA3GJT KI1M W2AHV WAØTFC WD8RHU 102 AG2B KA3OLY KA5HDT WA3WIY WBBLRT 101 KA3WIY WAWK KAYWK NBBOK W2AET	W7VSE WD9ESZ 100 WØLAE W1IDK 99 AFBV N5EFG WA4CCK WB1GXZ WB7DZX 98 KC5NN KC9CJ W1UD W6NTN 97 K6YD 98 KA4AUR KA4GFU WA2FJJ N7AKX 95 K7GXZ KA9IKR N2CER 94
KB2HM	KT6D	W7LNE	KA5KRI

WØOTF WD4AWN WB2PKG 93 K3JL K4IWST K2SF N2XJ N3CKQ 92 W4GPL W5CTZ WB4WII 91 AG9G KT6A N6AWH W8GGX 90 KT6A W9CVV WD8MIO 69 K78V W9VOV WD8MIO 69 K45DPO W9YCV WD8MIO 69 K45DPO W9CV WB7OEX 88 K2VX N4ELP N7DNG WA4YPQ WA5TOEX 88 K2VX N4ELP N7DNG W4COGG 87 N4PL W5JOV W6COGG W4COGG 87 N4PL W5JOV W6COGG W4COGG W4CO	W8HUJ W9NXG W83FKP 83 KY4K 82 KB4LB W3VA W59ZJF 81 KA3EJG N2NOP W9TLU 80 AC3N N4EDH N9BKLV WA7LGN 79 B6QBZ 78 KB3CQ W2ZQJ WB6QBZ 78 KB3CQ W2ZQJ WB6QBZ 78 KB3CQ W2ZQJ WB6QBZ 78 KB3CQ W2ZQJ WB6QBZ 78 KB3CQ W2ZQJ WB6QBZ 78 KB3CQ W2ZQJ WB6QBZ 78 KB3CQ W2ZQJ WB6QBZ 78 KB3CQ W2ZQJ WB6QBZ 78 KB3CQ W2ZQJ WB6QBZ 78 KB3CQ W2ZQJ WB6QBZ 78 KB3CQ W2ZQJ WB6QBZ 78 KB3CQ W2ZQJ WB6QBZ 78 KB3CQ W2ZQJ WB6QBZ 78 KB3CQ W2ZQJ WB6QBZ 78 KB3CQ W2ZQJ W8ZQD W6ZQJ W6ZQD W7ZQD W6ZQD W7ZQD W6ZQD W7ZQ	KA4BCM KE4XA WA4SRD 72 CXW KA7ELW WSVMP 71 KA5CXW KA7ELW WSVMP 71 KA5CXW KA7ELW WSVMP 71 KA3ECW WA3EYB KA3ECW WA3EYB KA5DJLV WA5CM WA3EYB KA5DJLV WA5CM WA5C	N2BNB WØOUD W3DKX WA1VRL WA8PIM 63 KD4OZ KK9N AA2H 62 W4HON WA3WQP WA4JTE WA8PIB WBØGOB WB4ATT WD9FRI 61 KA2NMA K53U N3ADU W8EK WB2OWO 60 KA52ZK KC2ZQ KC4LA N4UF WB2DW 58 K1LCQ/T 55 KA1BBU/T 52 WD4FTK WD8PUH N2BDW 58 K1LCQ/T 51 WA1DXT/T 50 KA8GGZ/T 44 WB2ANK/T 43 KA9GBG/N N2DPV/T
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Brass Pounders League July 1982

The BPL is open to all amateurs in the United States, Canada and U.S. possessions who report to their SCM a message total of 500 or a sum of originations and delivery points of 100 or more for any calendar month. All messages must be handled on amateur frequencies within 48 hours of receipt in standard ARRL form.

1	2	3	4	5	6
W3CUL	727	910	1306	44	2987
KA9CPA	38	1139	168	865	2210
NØBQP	36	1208	241	707	2189
WAØHJZ	28	963	30	680	1701
Majut	4	532	569	14	1119
WA2SPL	84	382	416	45	929
WA4JDH	2	470	428	10	910
WØACH	2 27	387	414	ō	828
WAITBY	10	330	369	22	731
WØACD	Ó	386	92	217	695
W7VSE	0 2 7	337	330	9	678
KCØAS		511	138	12	668
W3VR	229	101	138 322	12 7 3 5 28	659
W5TFB	0	304	303	3	610
KBNCV	32	257	284	5	578
N7AKX	54	236	258	28	576
WB7WOW	31	235	227	67	560
W7DZX	10	276	262	6	555
W4ZJY	371	85	95	1	552
W1EOF	1	191	335	10	537
WB7TQF	37	220	257	15	529
KS6T	86	176	262	4	528
NG4J	151	98	232	31	512
KT6A	2	247	252	10	511
WB5YDD	. 4	244	234	22	504
W4ZJY (June)	409	5 9	69	0	537
BPL for 100 or more	e originat	ions nia	is defiv	erios.	
	· ····	pr	ACTIV	on oa.	

кнев WD4COL KA2KVZ WA6WZO

Dar-

Operating News

Confessions of a DX Policeman

Ring . . . ring . . . ring . . .

"Hello?"

"Good evening, Tom. This is Bob, WF5ABC, editor of your radio club newsletter, ORM."

"Oh, hi, Bob. Didn't we have an eyeball OSO at one of the recent club meetings?"

"Yes, we sure did! I thoroughly enjoyed talking with you about your special activities in Amateur Radio. And that's why I've called. I'm planning to do a series of articles for the newsletter about members' radio activities. I'd appreciate it if you'd share some of your experiences with us."

"Certainly. I'd be happy to discuss my activities with you."

"Great! I'd like to interview you right now if you don't mind. And, if it is okay, I'd like to tape our conversation?"

"No problem. Fire away."

"Okay. I remember from our previous conversation that you are heavily involved in policing DX pileups. Is that correct?"

"Yes, Bob, I am proud to admit that I am an ARS policeman."

"ARS?"

"Yes, ARS is an abbreviation dreamed up by the government to stand for Amateur Radio Service."

"Okay, thank you for clarifying that point. Are you also a licensed Amateur Radio operator?"

"Yes, I am a fully qualified and licensed Amateur Radio operator."

"Would you mind if I use your name and call sign in the newsletter article?"

"I'd rather you didn't. I prefer to remain anonymous and conceal my identity to protect myself from harassment by groupies and other hero-worshipers."

"That's fine. I'll certainly respect your privacy. Now, would you please explain the function of an Amateur Radio policeman?"

"Yes, certainly, Bob. An ARS policeman is an Amateur Radio operator who is dedicated to preserving the continuity of Amateur Radio communications. Individual amateurs like myself help to control the DX pileups. We provide a service to the caller and the callee alike. We help the DX station by ridding his frequency of errant callers who have not yet determined the DX station's modus operandi. And we aid the calling stations by alerting them that the DX station is actually listening somewhere else, not on his own frequency. Okay?"

"Yes, that was fine. However, I personally have observed some problems with this procedure. Often one or two callers and a policeman appear to disagree. Would you care to elaborate?"

"Yes, Bob. I would be glad to. I can honestly say that, to the best of my knowledge, no one in the ranks of the ARS policemen has been guilty of any indiscretions; however, there are always a few callers in each pileup who just do not recognize authority or decent behavior. We always attempt to treat everyone in a

courteous manner. Unfortunately, even *our* professionalism is sometimes taxed beyond human endurance."

"Okay, thank you for your candid remarks concerning the role you play in helping to make Amateur Radio a better hobby. Now can you describe any special equipment or techniques that you use to perform your special function?"

"Oh yes, I can talk at length on that subject! Each ARS policeman is, of course, a fully qualified Amateur Radio operator with advanced technical knowledge. And many of us, particularly those who are really interested in enhancing communications, have specially equipped stations."

"Very good, Please go on."

"In my station, I utilize amplifiers capable of putting out maximum power into a sophisticated omni-directional antenna system. This is necessary to get the message to the maximum number of listeners. My antenna system consists of a separate 160 foot tower with stacked, monoband antennas for each 45 degrees of azimuth. In other words, eight separate antenna arrays. My system radiates real well! Oh yes, each array can operate on each of the four hf bands, 40 through 10 meters."

"Wow!! Please go on."

"In addition, since I operate exclusively with cw pileups, I have my home computer system programmed as a super-keyer. My super-keyer is preprogrammed with appropriate messages, such as: L(D, PLS QSY, BUZZ OFF, UP 2, UP 5, etc. Each of these messages can be repeated any number of times, at any speed, just by pressing the proper key on the computer keyboard. But what is really neat about my system is its ability to handle several pileups simultaneously."

"You can actually monitor more than one pileup?"

"Oh yes! My home computer system can keep track of up to 16 pileups on each of the hf bands, and automatically or manually switch between each. Since I use only the latest state-of-the-art, broadband, no-tune equipment I can rapidly switch from one pileup to another—without retuning. The invention of the digital interface for Amateur Radio equipment has revolutionized policing."

"But how do you find these pileups?"

"Very simple. My computer system is capable of scanning the cw portion of each band for pileups. It samples each frequency segment for a high population of stations. A high population indicates a high probability that a pileup is on that frequency."

"Sounds very sophisticated. How effective is

"Oh, it is highly effective now. When I first started using the scanning system it kept finding a pileup that was actually the Woodpecker."

"Ha-ha... oh, I'm sorry. Was it difficult to avoid the Woodpecker?"

"Yes, at first it was, but I finally developed a simple and foolproof Woodpecker-detection method. Whenever the scanning system detects a suspected pileup, it automatically causes

strings of dits to be transmitted in the known direction of the Woodpecker. If the suspected pileup moves, uhh, changes frequency, then it is the Woodpecker; not a real pileup."

"Wow! That's really super."

"Another unique feature of my computerized system is my Lid Data Base."

"A lid data base?"

"Yes, Bob. My computer system keeps very accurate dossiers on those poor operators who just cannot seem to become educated. Neophyte types are automatically mailed a very polite letter. Hard-core mavericks, and there are several dozen, are automatically called by telephone. Their phone numbers are automatically dialed by my computer system. The system is lovingly called MABEL, MABEL dials the offender's number and plays an appropriately worded computer-generated message. Unfortunately, many of these people have resorted to having their telephone numbers changed periodically or to using telephone answering devices. They can be very uncooperative."

"Wow! Wow! This is really interesting. Tell me more."

"There is a lot more to describe, but most of it is really beyond the grasp of the average Amateur Radio operator."

"Are there any problems associated with this sophistication?"

"No, not with our side of the effort. The real problem is with the DX station. The average rare DX station fails to realize our importance and, in most cases, just ignores us. This apathy makes our job very difficult."

"In what way?"

"Well, the greatest problem exists with scheduling. The DX stations just don't keep us informed about their operating schedules. It is difficult to schedule our time around their haphazard operating periods. I had some very sophisticated computer programs written especially for this application by a PhD from an Ivy League college, but no one has used them yet. But, basically, the real problem is with the DX station's mode of operation. The DX station just does not bother to coordinate his activities through us. Invariably, the DX station will be listening up 2 while we are telling the callers to listen up 10. It's a waste of resources. We've even considered offering a college-level course in 'pile-up coordination' through local community colleges."

"This is very interesting, and it ought to make a tremendous article for the newsletter . . "

"Uhhh, Bob. I've got to run now. The DXpedition to Bouvet Island is scheduled to come on in about 5 minutes, and I must keep the guys in line."

"Very good. I've really enjoyed this session with you. I'm sure the club members will also enjoy this topic. Thank you very much for enlightening us. Perhaps we can continue this discussion at the next club meeting."

"Anytime. Glad to help. But now I've really got to run. See you in the next pileup!"

"Good night and thanks again." - Bob Winn, W5KNE

Amateur Radio Satellite Schedule

	AMSAT-0	SCAR	8	Sovie RADIO		Sovie RADI		Sovie RADI		Sovie RAD	
Date (UTC)	Ref. Orbit, Mode		EQX W. Long. (Deg.)	Time (UTC)	EQX W. Long, (Deg.)	Time (UTC)	EQX W. Long. (Deg.)	Time (UTC)	EQX W. Long. (Deg.)	Time (UTC)	EQX W. Long. (Deg.)
1 Oct.	23,306A + J	0124	96	0055	261	0001	250	0003	248	0101	261
2 Oct.	23,320J	0128	97	0050	261	0144	277	0153	277	0058	262
3 Oct.	23,334J	0133	98	0044	261	0129	275	0143	276	0055	263
4 Oct.	23,348A	0137	99	0039	261	0114	272	0133	275	0053	264
5 Oct.	23,362A + J	0141	100	0034	261	0058	270	0124	275	0050	265
6 Oct.	23,375X	0002	76	0028	262	0043	268	0114	274	0047	266
7 Oct.	23,389A	0007	77	0023	262	0027	265	0104	273	0044	266
8 Oct.	23,403A + J	0011	78	0018	262	0012	263	0055	272	0041	267
9 Oct.	23,417J	0015	79	0012	262	0155	291	0045	271	0038	268
10 Oct.	23,431J	0020	80	0007	262	0140	288	0035	270	0036	269
11 Oct.	23,445A	0024	81	0002	263	0125	286	0026	269	0033	270
12 Oct.	23,459 A+J	0028	82	0156	293	0109	284	0016	268	0030	270
13 Oct.	23,473X	0033	83	0151	293	0054	281	0007	267	0027	271
14 Oct.	23,487A	0037	85	0145	293	0038	279	0156	296	0024	272
15 Oct.	23,501A + J	0041	86	0140	293	0023	277	0146	296	0021	273
16 Oct.	23,515J	0046	87	0135	293	8000	277 274	0137	295	0019	274
17 Oct.	23,5293	0050	88	0129	294	0151	302	0127	294	0016	274
18 Oct.	23,543A	0054	89	0124	294	0136	299	0118	293	0013	275
19 Oct,	23,557A + J	0059	90	0119	294	0120	297	0108	292	0010	276
20 Oct.	23,571X	0103	91	0113	294	0105	295	0058	291	0007	277
21 Oct.	23,585A	0107	92	0108	294	0049	292	0049	290	0004	278
22 Oct.	23,599A + J	0112	94	0103	295	0034	290	0039	289	0002	279
23 Oct.	23,613J	0116	95	0057	295	0019	288	0029	288	0158	309
24 Oct.	23,627J	0120	96	0052	295	0003	285	0020	288	0156	310
25 Oct.	23,641A	0125	97	0047	295	0146	313	0010	287	0153	311
26 Oct.	23,655A + J	0129	98	0041	295	0131	310	0000	286	0150	312
27 Oct.	23,669X	0133	99	0036	296	0116	308	0150	315	0147	313
28 Oct.	23,683A	0138	100	0031	296	0100	306	0140	314	0144	314
29 Oct.	23,697A + J	0142	101	0025	296	0045	304	0131	313	0141	314
30 Oct.	23,710J	0003	77	0020	296	0030	301	0121	312	0139	315
31 Oct.	23,724J	0007	78	0015	296	0014	299	0111	311	0136	316
1 Nov.	23,738A	0012	79	0009	296	0157	326	0102	310	0133	317
2 Nov.	23,752A+J	0016	80	0004	297	0142	324	0052	310	0130	318
3 Nov.	23,766X	0020	81	0158	327	0127	322	0042	309	0127	318
4 Nov.	23,780A	0025	82	0153	327	0111	319	0033	308	0125	319
5 Nov.	23,794A + J	0029	83	0147	327	0056	317	0023	307	0122	320 -
6 Nov.	23,808J	0033	84	0142	327	0041	315	0014	306	0119	321
7 Nov.	23,822J	0038	86	0137	328	0025	312	0004	305	0116	322

Orbit predictions by Project OSCAR, K1HTV, KA1GD and W9KDR. To keep abreast of the latest developments, tune in the regular phone and cw bulletins over W1AW, or the AMSAT nets. Tuesday — East Coast and Mid States at 9 P.M. and West Coast at 8 P.M. local time on 3850 kHz. Saturday — International at 1200 UTC on 28,878 kHz. Sunday — International at 1800 UTC on 21,280 kHz and 1900 UTC on 14,282 kHz. OSCAR 9 orbits are no longer listed — because of its low altitude, long-range predictions are not always accurate. Use W1AW and AMSAT Bulletins for weekly updates. O8 modes of operation are Monday and Thursday — Mode A. Tuesday and Friday — Modes A + J. Wednesday is reserved for authorized experiments or recharge of the batteries. Do not operate through the OSCAR or RADIO satellites on Wednesday UTC. Do not use more power than is needed to operate through the OSCAR or RADIO satellites. Your downlink signal should never be stronger than the satellite's telemetry beacon. Reduce your uplink power to prevent overload causing 10 dB attenuation of received signals. Advise operators whose signals are stronger than the telemetry beacons.

Orbit numbers will not be used for the Radio satellites.

Sutellite	Period (min.)	increment (deg.)	Inclination (deg.)	Height (km)
OSCAR 8	103,1662	25.7941	98.79	919
RADIO 5	119,5555	30.0157	82.95	1682
RADIO 6	118.7174	29.8061	82.95	1632
RADIO 7	119.1966	29.9260	82.94	1654
FIADIO 8	119.7640	30,0679	82.95	1681

RADIO 3 and RADIO 4 orbital data will not be listed because these satellites are for Soviet experiments. QSLs and telemetry reports should be sent to Box 88, Moscow,

Spacecraft Frequencies

OSCAR 8	Uplink	Downlink	Beacon
Mode A Mode J RADIO 5 RADIO 6 RADIO 7 RADIO 8 RADIO 5 ROBOT RADIO 7 ROBOT	145.850-145.950 MHz 145.900-146.000 MHz 145.910-145.950 MHz 145.910-146.950 MHz 145.960-146.000 MHz 145.860-146.000 MHz 145.826 MHz	29.400- 29.500 MHz 435.200-435.100 MHz 29.410- 29.450 MHz 29.410- 29.450 MHz 29.460- 29.500 MHz 29.460- 29.500 MHz 29.331 MHz 29.431 MHz	29.402 MHz 435.095 MHz 29.330/450 MHz 29.410/450 MHz 29.340/500 MHz 29.460/500 MHz

RADIO 3 and RADIO 4 are for experiments only to be announced by USSR.

OSCAR 9

Mode J Club: Become a member of the Mode J Club. Complete eight Mode-J contacts. QSL cards are not required. Just flist the call sign of each station worked, date, orbit number and station equipment used. Send this information along with \$3 in U.S. tunds, a one-time charge to cover the certificate and newsletter costs, to Mode J Club, c/o Larry Roberts, W9MXC, 3300 Fernwood, Alton, IL 62002.

OSCAR 8 QSL: To receive an OSCAR 8 QSL card, send a copy of the telemetry from the 29,402- or 435,095-MHz beacons. Please send your report, along with s.a.s.e., to ARRL Hq.

Further information on the radio amateur satellite program can be obtained free of charge from ARRL Hq. The OSCARLOCATOR package is now available: \$7 U.S., \$8 elsewhere.

SCM ELECTION RESULTS

The following elections were conducted for a two-year term of office beginning October 1, 1982: Balloting Results; In the Minnesota Section, Helen Haynes, WBØHOX, received 581 votes, and Widmer N. Johnson, W9DM, received 224 votes. Ms. Haynes is declared elected.

In the Oklahorna Section, Leonard R. Hollar, WA5FSN, received 367 votes, and George W. Adkins, ADIS, received 196 votes, Mr. Hollar is declared elected

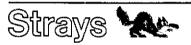
In the North Dakota Section, Dean R. Summers, KOOC, received 115 votes, and Lois A. Jorgensen, WAORWM, received 56 votes. Mr. Summers is declared elected.

SCM APPOINTMENT

In the South Dakota Section, Fredric Stephan, KCOOO, has been appointed to complete the term (until September 30, 1982) of Erwin Heimbuck, KØOTZ (resigned).

SECTION MANAGER ELECTION NOTICE

Notice of impending elections for Section Manager appears in Happenings column elsewhere in this



BELIEVE IT, OR DON'T

☐ The first time Seymour S. Schwartz, used his new call, KE6XS, he contacted K6LP, Seymour D. Schwartz, on 2 meters. — Seymour S. Schwartz, KE6XS, Los Angeles, California

QST congratulates . . .

- David Dodell, WB7TPY, of Boston, Massachusetts, who was appointed recently to serve as Red Cross Representative to the Massachusetts Department of Health Emergency Medical Services Communications Advisory Subcommittee.
- ☐ ARRL Technical Advisor Rick Olsen, N6NR, of San Diego, California, on being promoted to Manager, Field Applications Engineering, at TRW LSI Products.
- ☐ Bob Burns, N6ZH, of Sherman Oaks, California, on receiving the 1981 Reserve Officer of the Year award from the Los Angeles Police Department for his work as coordinator of Amateur Radio operators who participate in Crime Surveillance programs.
- ☐ B. Frank Borsody, K4EC/W2AYN, on being selected to have his biography included in Marquis's Who in America and Who's Who in the World.
- ☐ Joseph W. Hendrix, WØFCE, of Cameron, Missouri, on being elected president Communications Marketing Association.

STRAY HINTS

(3) "Strays" are those interesting fillers used when space allows in QST. Think you have an item with Stray potential? Here are some hints to help your submission become one. (1) Be sure the information will be of interest to most readers of QST. (2) Submit your material before deadline—the 8th of the second month preceding desired publication (i.e. arrive at Hq. before October 8 for December QST). (3) Any photographs you send should be good quality, black-

and-white glossy prints. Color prints, slides and instant photos do not usually reproduce well. Items submitted are normally acknowledged, but that doesn't necessarily mean that your Stray will be appearing in QST. We receive far more material than we can find room for. If you want your material returned, please include a statement to that effect and

an s.a.s.e. Follow the above hints and maybe your Stray will find a home in QST. - Andrew Tripp, KAIJGG

Conducted By Mark J. Wilson,* AA2Z

Contest Corral

A Roundup of Upcoming Operating Events



OCTOBER

2-3

California QSO Party, Sept. QST, page 85. SWOT Open QSO Party, Sept. QST, page 86. VK/ZL Oceania Contest, phone, Sept. QST, page 86.

5

West Coast Qualifying Run, 10-35 wpm at 0400Z Oct. 6 (9 P.M. PDT Oct. 5). W6OWP prime, W6ZRJ alternate. Frequencies are approximately 3590/7090 kHz, Underline one minute of the highest speed you copied, certify that your copy was made without aid and send to ARRL for grading. Please enclose your full name, call (if any) and complete mailting address. A large s.a.s.e. will help expedite your award/endorsement.

9-10

ARRL International EME Competition, Part 1, Sept. QST, page 77.

ARRL CD Parties, phone and cw. See the fall issue of OCD for details.

SWOT Open QSO Party, part 2, Sept. QST, page 86. VK/ZL/Oceania Contest, cw, Sept. QST, page 86.

Rhode Island QSO Party, Sept. QST, page 86. Worldwide SSTV Contest, Sept. QST, page 86.

21/28 MHz Telephony Contest, Sept. OST, page 86.

12

W1AW Qualifying Run, 10-40 wpm, at 0200Z Oct. 13 (10 P.M. EDT Oct. 12). Transmitted situatianeously on 1.835 3.58 7.08 14.08 21.08 28.08 50.08 147.555 MHz. See Oct. 5 listing for more details.

16-17

ARRL Simulated Emergency Test, Sept. QST, page 75.

AC-DC Contest, Sept. QST, page 86.

Jamboree on the Air, Sept. QST, page 86.

Pennsylvania QSO Party, Sept. QST, page 86.

RTTY Sweepstakes, sponsored by the Canadian Amateur Radio Teletype Group, from 0200Z Oct. 18 ontil 0200Z Oct. 18. Single ops operate no more than 30 hours. 80-10 meters. Classes: Single op; single op ASCII; SWL printer; multioperator, single transmiter. Exchange signal report, UTC time and CARTG zone. Count I point per RTTY two-way QSO with your own zone. Consult CARTG Zone Chart (available from sponsor) for other QSO point values. Work stations once per band. Multiply by total DXCC countries and W/VE/VK call districts worked. Multiply QSO points X countries X continents for final score. Add 200 bonus points for each VE/VO QSO on all bands. Mail entry (s.a.s.e./IRC for results) by Jan. 1, 1983 to: CARTG, 85 Fifeshire Rd., Willowdale, ON M2L 2G9, Canada.

Minnesota QSO Party, sponsored by the Paul Bunyan Wireless Assn., from 1700Z Oct. 16 until 2259Z Oct. 17. Single transmitter only; no crossband QSOs. No net QSOs. 80-10 meters, phone and cw. Work stations once per band and mode. Exchange signal report and QTH (county for MN stations; ARRL section or country for others). Suggested frequencies: phone — 3.933 7.233 14.300 21.433 28.633; cw — 33 kHz up from lower band edge; Novice — 33 kHz up from lower band edge. Count 1 point per phone QSO, 2 points per cw QSO. MN stations multiply by total MN counties worked; others multiply by total MN counties worked, Mail logs by Nov. 20 (include large s.a.s.e. for results) to: Steven Scott, KCØUJ, 801 6th St. North, Staples, MN 56479.

QRP CW QSO Party, sponsored by QRP ARC International, from 1200Z Oct. 16 until 2400Z Oct. 18 Operate max. 24 hours. Work stations once per band, Exchange signal report, QTH (state/province/country) and QRP number if member. Nonmembers send power output; Novices and Technicians add /N or /T. Suggested frequencies: 1.810 3.560 7.040 14.060 21.060 28.060 50.360; Novices try 10 kHz above lower band edge. No repeater QSOs. Count 5 points per QSO with ARCI member. Nonmember W/VE QSOs count 2 points; Novice/Tech. QSOs count 3 points;

*Assistant Communications Manager, ARRL

DX QSOs count 4 points. Multiply QSO points by states/provinces/countries worked per band by power multiplier (4-5 W output, × 2; 3-4 W, × 4; 2-3 W, × 6; 1-2 W, × 8; 0-1, × 10). If 100% natural power, multiply final score by 2; if 100% battery, by 1.5. Awards, Mail entry by Nov. 20 (include large s.a.s.e., for results) to: William Dickerson, WA2JOC, 352 Crampton Dr., Monroe, MI 48161.

WA-Y2 Contest, sponsored by the Radioclub of the German Democratic Republic, from 1500Z Oct. 16 until 1500Z Oct. 17. Phone and cw, single or multioperator. 80-10 meters. Do not use first 10 and last 25 kHz of each band. Exchange signal report and serial number; Y2-9 stations send signal report and z-digit number indicating "Kreiskenner." Count 3 points per Y QSO. Multiply by sum of different districts worked per band (max. 15 per band). Districts are indicated by last letter of the call sign (letters A through O; P = D, X = F, R = L, S = M, T = N, U = A, G = W, V = H, Q = I, V = J. Mail logs by Nov. 17 to: Y2ITL, RKDDR, Hosemannstr. 14, DDR 1055 Berlin, German Democratic Republic.

21 MHz CW Contest, sponsored by the Radio Society of Great Britain, from 0700 to 1900Z Oct. 17 Work RSGB members in the British Isles. Exchange signal report and serial number. Count 3 points per QSO and multiply by total British Isles prefixes worked. Prefixes are: G2-6, G8, GD2-6, GD8, G12-6, G18, G92-6, G18, GW2-6, GW8. Contacts with GB stations do not count. Mail entry to arrive no later than Dec. 31 to: Mr. J. Bazley, G3HCT, Brooklands, Ultenhall, Solihull, Warwickshire B95 5NW, England.

20-21

YL Anniversary Party, cw, sponsored by YLRL, from 1800Z Oct. 20 until 1800Z Oct. 21. Phone Nov. 3-4. YLs work YLs only. No net or repeater contacts. Work stations only once per contest. Exchange signal report, serial number and ARRL section or country. Count 1 point per QSO with own ARRL section, 2 points for different section. Multiply by total ARRL sections and DXCC countries worked. Multiply that total by 1.25 if running less than 150 W on cw (300-W PEP on phone). Mail logs by Nov. 14 to: Sandi Heyn, WA6WZN, 962 Cheyenne St., Costa Mesa, CA 92626.

23_24

ARRL Midnight Special, from 0300-0500Z Oct, 24 (11 P.M. EDT Oct. 23 until 1 A.M. EDT Oct. 24). First hour, 160-m cw; second hour, 160-m phone. Work stations once per mode. Suggested frequencies: cw — 1.805-1.820; phone — 1.855-1.870. Exchange antenna type (G = ground plane; V = vertical; O = loop; L = inverted L; W = wire, long or otherwise; D = dipole; I = inverted Y; use your imagination for others) and power input to final (1000 = kW). Score equals number of QSOs, no multiplier, Mail entries by Nov. 5 to ARRL Hq. Include s.a.s.e. for results; top scorers will be listed in QST.

Maryland-District of Columbia QSO Party, sponsored by the Columbia ARA, from 1800Z Oct. 23 until 2100Z Oct. 24. Work stations once per band and mode. Phone, cw and mixed categories. Single operator only. Exchange senal number, signal report and QTH (county for MD stations; Baltimore and Washington are independent cities; state, country or province for others). Count I point per QSO. MD stations multiply by sum of MD counties, states/provinces/countries. Others multiply by total MD counties and independent cities (max. 25). If running 200 W or less, multiply score by 1.5. Suggested frequencies: phone — 3.950 7.250 14.290 21.390 28.590; cw — 60 kHz from low end; Novice — 20 kHz from low end. Awards, Mail entry by Nov. 30 (include large s.a.s.e. for results) to: Robert Nauman, WA3VUQ, 4017 Font Hill Dr., Ellicott City, MD 21043.

24

W1AW Qualifying Run, 10-35 wpm, at 2300Z (7 P.M. EDT) Oct. 24. See Oct. 12 listing for more details.

30-31

CQ Worldwide DX Contest, phone, sponsored by CQ Magazine, full 48-hour period UTC. 160-10 meters. Single operator, single or multiband; multioperator (all-band only), single and multi transmitter. Multi-

single: only one transmitter and one band permitted during a 10-minute period. Exception: One other band may be used during the same period for working new multipliers only. Exchange signal report plus CQ zone. A station in a zone or country different than that indicated by its call sign must sign portable. Count one multiplier for each different zone and country worked on each band. You may work your own country and zone for multiplier credit. CQ Zone Map, ARRL DXCC list, WAE country list and IARU WAC boundaries are standards. Contacts between stations on the same continent but in different countries count 1 point; contacts between stations on different continents count 3 points. Exception: For North American stations only, contacts between stations within the N.A. boundaries count 2 points. Contacts between stations in the same country count zero QSO points, but can be counted for country/zone credit. Final score is total QSO points times the sum of countries and zones worked per band. Single ops must operate minimum 12 hours (24 for multiops) to be bligible for awards. Single-band logs eligible for single-band awards only. All transmitters must be located within a 500-meter-diameter circle or within limits of the license address. Transmitters must be directly connected to the antennas by wire. All entrants must submit dupe sheets for bands with more than 200 QSOs. Each dupe removed by CQ's Contest Committee carries an additional penalty of 3 QSOs. Entry forms are available from CQ for an s.a.s.c. with sufficient postage. Phone logs must be postmarked by Dec. 31, 1982, and cw logs by Jan. 15, 1983. Mail phone entries to: Bob Cox, K3EST, 6548 Spring Valley Dr., Alexandria, VA 22312. Cw entries go to: Larry Brockman, N6AR, 7164 Rock Ridge Terr., Canoga Park, CA 91307.

NOVEMBER

4

West Coast Qualifying Run, 10-35 wpm, at 0500Z Nov. 4 (9 PM PST Nov. 3), See Oct. 5 listing for more details.

3-4

YL Anniversary Party, phone. See Oct. 20-21 listing for more details.

6.

ARRL November Sweepstakes, cw. this issue, page 73.
ARRL International EME Competition,

Part 2, Sept. QST, page 77.

Corona 10 Meter RTTY Contest, Aug. QST. page 82. International Police Assn. Contest

10

W1AW Qualifying Run, 10-35 wpm, at 0300Z Nov. 11 (10 PM. EST Nov. 10). See Oct. 12 listing for more details.

13_14

European DX Contest, RTTY, July QST, page 84. Delaware QSO Party ALARA Contest CQ-WE Contest North Carolina QSO Party OK DX Contest

20 W1AW Qualifying Run

20-21

ARRL November Sweepstakes, phone, this issue, page 73.

27-28

CQ Worldwide DX Contest, ew. See Oct. 30-31

DECEMBER

4-5

ARRL 160-Meter Contest

11-12 ARRL 10-Meter Contest

Section Activities

A-1 OPR + EC + DXCC + RCC + WAS + STM + DES + ORS + NM + SCM + ARES + OVS + SEC + OBS + TCC + OO + NTS + WAC + CP

CANADIAN DIVISION

CANADIAN DIVISION

ALBERTA: E. ROY EIIIs, VESCO — SCM/SEC: VESCO.

ASCM: VESAMM. STM/NM (ATN)/ANM (ASPN): VESABC.

ECS: VESAGM. STM/NM (ATN)/ANM (ASPN): VESABC.

VESABC VESASC.

VESABC VESASC.

VESAMM VESAHC.

VESAMM VESAHC.

VESAHC.

VESAHC.

VESAMM VESAHC.

VESAHC.

VESAHC.

The ARRL/CRRL Midwest convention has come and gone. Believe all thought it was a good one to attend. Different summer activities are keeping the ham clubs busy supplying radio comms.

NARC contributed in this way for the National Bicycle Championships which are a pre-trial for Universiade '83 and also for the Klondike Bike Championships. Traffic: VESCHK. 32, VESABC. 21.

VESCHK. 32, VESABC. 21.

MANITOBA: SCM. Petr.

MANITOBA: SCM. Petr.

MANITOBA: SCM. Petr.

was a good one to attend, Dribbers, summers, and and are keeping the ham clubs busy supplying radio comms. NARC contributed in this way for the National Bioycle Championships which are a pre-firal for Universigide %3 and also for the Klondike Bike Championships. Traffic: VECHK 22, VECABC 22, VECABC 23, VECABC 23, VECABC 24, VECABC 24, VECABC 24, VECABC 25, VECABC 24, VECABC 25, VECABC 24, VECABC 25, VECABC 25, VECABC 26, VECA

ATLANTIC DIVISION

ATLANTIC DIVISION
DELAWARE: SCM, Harold K. Low, WA3WIY — STM:
W3DKX SEC: W3PQ. PSHR: WA3WIY K3JL W3DKX.
Thanks to all who worked so hard to make the Delaware
Hamfest a success, also to those who attended. Your
participation made it possible. FIELD DAY 1982. DARC,
with the call W3SL, was first in the multi-class, with
Glasgow Site ARC using K3NI being next. SARA using
the call K3JL was high score single-transmitter with
FIRST STATE ARC using K3QBD as runner-up. The
DARC also won the trophy for vhf with Glasgow runner
up. I am sure all enjoyed it as much as I did. DTN QNI
231, QTC 48. DEPN QNI 61, QTC 12. SEN QNI 30, QTC 11.
Traffic: W3QQ 85, W3NIY 50, W3DKX 48, WB3DUG 31,
K3JL 20, WA3DUM 17, W3MD 17, WA3PWT 14, N3AXH 5,
SZXP 4, KA5DIJ 2, WA3YTB 2. (June) W3PQ 97, (May)
W3PQ 110.

EASTERN PENNSYLVANIA: SCM, Karl W. Pfeil, W3VA — SEC: WA3PZO. STM: K3JSZ. DEC: AA3C K3QXC

KB3GW N3BFL N3CJP W3EEK.
Net Freq. Time GNI OTC Sess.
EPAEPTN 3917 6 P.M. Dy 482 186 31
EPA 3610 7/10 P.M. Dy 421 143 56
PFN 3958 5:30 P.M. Dy 245 261 31
PTN 3610 6:30 P.M. Dy 173 23 31
Local and vri nets reports (QNI) QTC, sess.): D3ARES
187, 27, 4; D5ESN 70, 5, 4; D6ARES 42, 7, 4; WARCVTN
49, 15, 5, OO reports. K3EBZ N3BFL W3FAF W3GTN
W3KEK. OBS reports. W3AVJ W3CL W3VA WB3FVJ.
OVS reports. N3BFL W3GOA. PSHR: KA3DLY KA3EJG
KA3GJT KB3XO KE3U W3GOA W3VA WA3EHD
W3WQP WB3FKP WB3FYT. New appts: W3AQN to NS; W3AOFD to NM for PTTN. Congrats. Many thanks to K3JSZ for the fine Job he did as NM for PTTN and good luck to him and his XYL, KA3CAT, in their new employment. Also thanks to KA3DLY for help with PTTN
during K3JSZ's absence. Recent upgrades: KA3GJT to Extra (awaiting new call sign); N3CRP to General:
KA3LP to Tech. Congrats. New gear: W3PYS a T15
beam and UT2000A linear; WN3CDW a ic 255A; W3BUR a F1902DM. WB3EFH received his DXCC cert. W3FCU
going to visit OK-land. WA3CKA only needs KH6 & KL7
for 6M WAS. WB3KUZ had excellent time at his very first
Field Day. W3KEK sez new Callbook big help for his OO
work. W3GOA is QRI. repairing his equipment. The Carbon ARC gave a very intersting demo on Amateur Radio
at the Carbon Plaza Mall. N3BAY, EC Plike Co., reports
Pike Co., ARES is in process of installing a rptr at the
150 ft. level on the co. tower. Nice to welcome back
W3AQN as ORS. He is a real. OT to traffic in EPA.
Anyone intersted in handling cw traffic is invited to QNI
the PTTN on 3610 kHz every nite at 6:30 P.M. local time.
NM WASOFD will be glad to help with a FB training
course. For the more advanced ham, try EPA at 7/10 P.M.
was a huge success, and it was nice to see so many appointess and net members in attendance. Traffic:
WA3COP 243, W31XY 242, KA3GJT 163, WA3CHD 31,
W35AF 101, A3B 92, KA3DLY 92, KB3XO 84, W3VA 82,
W3SDP 31, W3TWY 25, WB3FKP 22, KB3U 22, KA3EJG
17, W3CL 16, WB3FVJ 12, W3ADE 10, N3BFL 10,
WA3CRA 8, W31D 7, KB3CD 43, KB3LF 38, W3AOH 22,
KA3CPD 78, N3BAY 60, KB3UD 43, KB3LF 38, W3AOH KB3OW N3BFL N3CJP W3EEK. Net Freq. Time EPAEPTN 3917 6 P.M. Dy EPA 3810 7/10 P.M. Dy PFN 3958 5:30 P.M. Dy PTN 3610 6:30 P.M. Dy

17, WSCL 16, WBSFV) 12, WSADE 10, NSBFT 10, WSGL 48, WSID 7, KSQXC 7, WBSFVT 2, KSYD 2, AF3Z 2, KSYBZ 1.

MARYLAND — DISTRICT OF COLUMBIA: SCM: Karl R. Medrow, WSFA — SEC: WASTAI, STM: WBSGZU, DEC: WBSI-TA. NM: KA3CDC, MDD 3643 kHz daily 1900 and 2200 local time. MEPN 3920 kHz daily 1900 and 1900 an

16. W3LDD 12, KC3D 10, W83JRC'5. (June) W3CVE 240, KC3D 4.

SOUTHERN NEW JERSEY: SCM, Bill Luebkemann, W82LCC — STM: N2CER, SEC: W2HOB. ARES, the Amateur Radio Emergency Service, is the backbone of emergency comms in SNJ as well as the nation. Our ARES organization is under the capable guidance of our SEC W2HOB, and his crew of ECs. in W2HOB's system, each of our nine countles has an Ec, a local person with a good grasp of the needs, geography, politics and organization of his co. This person is responsible for developing an emergency comms plan for his co., and implementing it using resources within his co. The EC is appointed by the SEC for an Indefinite term of office, Presently several cos. are without ECs owing to resignations over the last several months, and those cos. that have ECs are always in need of more help. Are you involved? Why not contact W2HOB or myself or your local EC today. If you have no EC we'd be happy to consider anyone interested in the job. No pay, but fun and enjoyment and lots of satisfaction when you get the job done well! Traffic: N2CER 374, W82IQJ 152, W82ZJF 126, W82JCE 14, KA2KTR 13, KA2GSL 10.
WESTERN NEW YORK: SCM, William W. Thompson, W2MTA — SEC: W2BCH, STM: W2ZOJ, ASCM: W2GLH. ONMS: N2APB N2BLX W2FR KO2H KZKIR, new Vice Interest of Manney Company Contract of Manney Contract Manney Contract of Manney Co

DIRECTO! AL	INCIDE DE	VIBIOI).		
Net	Freq.	Time/Day	QN1	QSP QND
NYS/1	7077	1000/M-S	154	58 19
NYSCN	3677	1000/Sn	25	9 4
THIN	3913	1600/Sn	6	4
NYPON*	3913	1700/Dy	565	247 31
NYSPTEN ESS	3925	1800/Dy	671	89 31 23 29
ESS	3590	1800/Dv	285	23 29

OCTEN* Q Net STAR/E* WDN/E*	34/94 31/91 99/39 04/64	1830/Dy 1830/Dy 1830/Dy 1830/Dy	475 27 581	6 11 69 124	31 13 31 31
NYS/2*	3677	1900/Dv	561 338 46 663 83 52	124	31
SLVARES	31/91	1930/Sń	46		4
JCARCN	10/70	2000/Dy	663	13	28
OARCN	25/85	2000/W	83	1	4
VHETHIN	04/64	2000/Sn	52		4
WIN	04/64	2000/M	(SKYWAF	RN)	
WNYECN	3955	2000/Sn	(ARES)	•	
BRYRAN	055/655	2100/Dy	285	7	31
CNYTN*	90/30	2115/Dý	472	96	31
STAR/L*	325/925	2130/Dy	53	11	18
WDN/L*	04/64	2130/Dý	841	114	31
NYS/3* *NTS nets.	3677	2200/Dy	259	208	31
*NTS nets.	PSHR:	WZAET NZ	BLX WA2	FJJ W	B2ID

WINIL* 04/94 2130/by 841 114 31
NYS/3* 3677 2200/Dy 259 281X WA2FJJ WB2IDS
WA2KOJ W2MTA WB2OWO KC2QQ W2ZOJ. Reports:
OO-N2NW (2): OBS-K2KWK W2GLH: OVS-KA2LHO
WA2KXB K2QH (EME to Sweden). Note that ARRIL Beard
of Directors at July meeting in Minute 20 unanimously
adopted new rules and regulations of ARRIL Field
Organization to superseds "Rules and Regs for the
Communications Department", to be effective on or
before Jan. 1, 1985, dependent upon SCM's term of office. These new rules eliminate the OVB appointment at
that time. The Board also resolved that it expressed its
thanks to those who have served faithfully as OVB appointees, and invites their continued participation in the
ARRIL operating program. (Anyone for the resumption of
the Official Experimental Station appointment? Send
me your support for its recognition.) The Rules and Regs
have the force and effect of ARRIL By-Laws, including
details contained in referenced publications (e.g. OARS
and PSCM), and may be amended by the League's
general manager, New officers: Tompkins ARC are
KAZMKU KOZX WZCFP. Comms: RAGS 10K Race;
MORAVIS Bathtub Race-WA2REE W2ILO, Traffic: WZMTA
297, WZAET 279, WZZOJ 259, WB2IDS 244, WA2F-IJ 158,
WA2HSB 156, WAZOEP 139, WB2OWO 137, KG2D 84,
WZFR 72, WB2QIX 64, WA2OFV 62, KA2CLT 52, WA2KOJ
50, N2BLX 42, WB2OFU 38, WA2RXO 18, NZARD 17,
NZABA 15, KC2QQ 14, WB2FID 9, WB2DFM 8, WA2SMZ
6, KA2DBD 4, KZYR 3.

WESTERN PENNSYLVANIA: SCM, Otto L. Schuler,
KSSMB — ABM/STM: N3EE, MMs: AC3N N3ADU
WYSCAW, W331 155 31 3585 7:00 P/ID

K3SMB — ASM/STM: N3EE, NMs: AC3N N3ADU W3NEM W3MML SEC: AB3Q, DECs: & ECs on request from AB3Q.

Net ONI OTC Sess.kHz T/D
WPACW 331 155 31 3585 7:00 P/D
WPACW 331 155 31 3585 7:00 P/D
WPACWN 433 106 31 3983 5:05 P/D
WPACWN 433 106 31 3983 5:00 P/D
PFN 245 227 29 3958 5:00 P/D
PFN (June) 254 227 29 3958 5:00 P/D
PFN 245 261 31 3958 5:00 P/D
PFN 245 261 31 3958 5:00 P/D
RESIDENT Keys-WA3DNN WB3JGQ K315Z K3ELJ and N3ANB, N3NR has a very fine weekly Amateur Padio column in the Erie, PA Times newspaper. Congrats. The Breezeshooters ten-meter group new officers for 82-83 are K33DD, pres; WB3EHR, checker; N3MB, treas. Wind Gaugers W3YPH WA3DYF W3GVI W3UHM W3CVM & WB3DJ, pres; WB3EHR, checker; N3MB, treas. Wind Gaugers W3YPH WA3DYF W3GVI W3UHM W3CVM & WB3DJ, pres; WB3EHR, checker; N3MB, treas. Wind Gaugers W3YPH WA3DYF W3GVI W3UHM W3CVM & WB3DJ, pres; WB3EHR, checker; N3MB, treas. Wind Gaugers W3YPH WA3DYF W3GVI W3UHM W3CVM & WB3DJ, pres; WB3EHR, checker; N3HB, treas in the wB3DJ pres; WB3EHR, checker; N3HB, N3HB, treas in the wB3DJ pres; WB3EHR, checker; N3HB, N3CR 162, N3HB, WB3DJ N3HB, WB3DJ N3HB, WB3DJ N3HB, N3HB,

CENTRAL DIVISION

WITTN 5, W3LOD 3, AB3X 2, KA3ETC 1.

CENTRAL DIVISION

LLINOIS: SCM, David E Lattan, WD9EBQ — SEC:
W9QBH. STM: WB9JSR, ASCM: KGORP.
Net Freq. Times/Days ONI OTC Sess.
LN 3990 2330/0330/Dy 436 185 62.
LN 3990 2330/0330/Dy 436 185 62.
LN 3990 1230/Dy 599 105 31.
Hone 3915 2130/Dy 599 105 31.
HONE DAVID 180/100/Dy 120 21 26.
W9VEY Mem. 146.82 0130/M 58 8.
W9VEY Mem. 146.82 0130/M 58 8.
CD-210 to WD9EBQ at RR 1, Box 46E, Makanda, it. E3958, even if you radio your report in or if your appointment has an additional monthly report form. The CD-210 information is needed by about the sixth of the month at WD9EBQ for inclusion in this column. It is with sadness that i must report the passing of Phil Haller, W9HPG into the realm of the Silent Keys. He was the Grand Old Man of ARRL in Illinois and will be missed by all. WB9RLX EC Livingston Co., was interviewed on Radio WDOK and gave an explanation of ham radio, ARRL and ARES.
Lamoine Emergency ARC of Macomb has been testing with color ATV on the 432 MHz band using video from the new color radar there. Test transmissions have been received by stations up to 30 miles away. Hats off to the hams of Burbank for their swift organizing of the light to save ham radio from the Jaws of the city council. Congrats to new ARRL appointees: WD9CJB, OC; WABSHE, ORS, PR pays offf The illinois State Board of Education is planning a seminar on disaster safety in schools, and is planning on including Amateur Radio and providing school administrators with names of their ECs. KN9G has called some disruptive interference to the attention of Continental Cablevision in Belleville, IL. Communication has been friendly and the response indicates a willingness on the part of the cable company to work at solving the problem. Special thanks to K9ORP for helping make the transition of the SCM office a smooth one and congrats to him on his appointment as ASCM.



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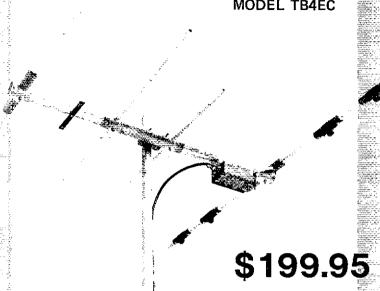
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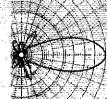
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W9KSU N9CNQ and WA9SHE should have a pretty good traffic total each month as they are working hard when I am away to make sure that the monthly reports get to me In time wherever I am to get the column in ARES members should mark their calendars now for the First Annual Illinois ARES Conyention to be held on the 23rd of October at the Urbana EOC. Officials from other agencies will be attending, and it is hoped that most all of our ECs will be able to make it. K9UKK, newly appointed EC for Williamson Co., has been working with the area hams to put together a cohesive emergency plan that includes interface with all of the local government agencies. They have held several meetings, and their efforts have been well received by officials in the area. Traffict W9HOT 303. W9NXG 2D7, W9TLU 99, WB9WGD 75 KD9K, 68; KN9BAM 64, W9OK 55, K9PNG 32, WelNQ 24, W9DR 15; WA9SHE 10, K9EHP, WD9CUB 7, WA9RUM 5, K9ORP 4.

WNN 3723 2300Z QNI 101 CTC 22 KA8HPQ. WSSN 36 2300Z QNI 117 CTC 31 N9BYK. WIN-E 3682 0300Z CNI 276 CT 31 W9VGV. WIN-L 3682 0300Z ONI 278, O' 136 K9LGU, XPO 3925 1731Z WA9YVC. NWTN 34/ 3230Z QNI 713, GTC 44 WB9YPY Gr. Bay, 23/ 12 014 Wed, QNI 6, GTC 0 WB9NRK WCWTN .37/ 91 2330Z QNI 713 GTC 44 WB9YPY Gr. Bay, 23/ 12 014 Wed, QNI 6, GTC 0 WB9NRK WCWTN .37/ 91 2330Z QNI 715 Stephanov Company Company

DAKOTA DIVISION

MINNESOTA: SCM, Helen Haynes, WB#HOX — STM: AD#S. SEC: KN#J. ASCM: KC#T. Congrats to WB#TDM on General tlocks; KA#JAQ & KC#T on new Advanced tickets. Tnx to Grand Rapids for nice hamtest. Park Rapids is coming in Oct. See you all at Dakota Division Convention in Sept. Summer is hot and tic is down.

MSSN 3710 7:00 P.M. 120 14
MNWX 3929 6:15 P.M. 120 14
Traffic: WA\$TFG 377, W9DM 156, KA\$EPY 113, KG\$T
110, KT\$0 161, AD\$G\$ 40, W\$GRW 37, WA\$AIN 31, N\$CLS
30, KA\$JUX 28, KA\$JAC 22, KT\$R 17, WD\$BGS 12, W\$PNE
8, K\$CSE 7, KA\$GDS 6, N\$DUQ 5, KA\$MZJ 4,
NORTH DAKOTA: SCM, Lois A. Jorgensen, WA\$RWM —
SEC: WB\$YEE OBS: W\$DM. ORS: W\$CAQ. NM: KR\$W.
The International Psace Garden Hamfest was well attended, with Dak. Division Director K\$TO giving a seminar. The Ham of the Year was WD\$GRC. The host for next year is BARK ARC, with WB\$TEE as chairman.

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15-3CD 3al monobander \$96,00
15-4CD 4ei monobander \$108.00
10-3CD 3el monobender , \$76,00
10-4CD 4el monobander \$89.00

A4 4el triband beam \$227,00
A743 7-10 mhz add-on kit \$62,00
A744 7-10 mhz add-on kit \$62.00
20-3CD 3el monobander, \$172,00
20-4CD 4el monobander \$240.00
15-3CD 3al monobander \$96,00
15-4CD 4ei monobander \$108.00
10-3CD 3el monobander , \$76,00
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TH5MK2S Set tribander	.\$312.00
TH3MK3\$ 3el tribander	.\$215.00
TH2MK35 2el tribander ,	\$135.00
TH3JRS 3el jr. tribander	\$157,00
HCI-2S 2el quad	\$265,00
402BAS 2el 40m	\$195.00
2058AS 5el 20m	\$295,00
204BA\$ 4el 20m	\$226,00
203BAS 3el 20m	\$132.00
155BAS 5el 15m	\$176.00
163BAS 3el 15m	\$74.00
105BAS 5el 10m	
103BAS 3el 10m	. \$55,00
DB1015A\$ 3el duobander	
548S 4el 6m	\$52,00
668\$ 6el 6m	\$99.00
18 HTS by tower vertical	
18AVT/WBS 5 band vertical	
14AVQ 4 band vertical,	
214 14el 2m	
2BDO 2 band dipole	
5BDQ 5 band dipole	\$98.00
BN86 balun	. \$17,00

Note: Part numbers with S on the end denote stainless steel hardware. Some small quantities remain of older stock:

KLM

KT34XA 32 ft. boom tribander,\$449.00
KT34A 16 ft, boom tribander, .\$309.00
7.2-1 40m dipole
7.2-2 40m 2ei beam,
7.2-3 40m 3el beam,
7.2-4A 40m 4al beam. , \$599.00
5el 20m "Big Sticker" mano\$429,00
6al 20m "Big Sticker" mono . \$610,00
6al 15m "Big Sticker" mono\$389,00
5el 10m "Big Sticker" mono \$225.00
144-148-13 LB 2m "Long-Boomer" \$75,00
144-150-16C 2m circular, \$95.00
437-16L8 432mhz "Long-Boomer"\$59.00
420-470-18C 450mhz circular . \$57.00
KLM antennas may be shipped from
California or Texas, Freight Collect.
Most require truck shipment, Call

for details. HUSTLER

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KWM-380



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CANT GET THROUGH? In their infinite wisdom, the phone people require that we have twice as many lines as people to answer them. Just be patient and try again later, we aren't going belly-up any time soon. Also, we can't keep someone down here to answer the phone at night or on weekends, and we're too busy to answer the WATS on Saturdays.

TEXAS FOLKS

Please note that we're open until noon on Saturdays just for you. Visitors are welcome, too. We're in Keystone Par Shopping Center, across from Texas Instruments, Look for us under our two towers.

TELREX ANTENNAS

WARNING: These untennas are not for They are large, They are expensive. They are large, They are expensive. They also work, These antennas require truck delivery and come in large boxes. WT. Area

	141' 6	e e e
10m523 Sei 10m beam	64lb.	4.5
10m636 6el 10m beam	85lb.	6.0
15m532 5el 15m beam	95lb. 1	0.0
15m845 6el 15m beam	140lb, 1	4.0
20m436 4el 20m beam	108lb, 1	2.0
This is a custom an	tenna.	
20m536 5el 20m beam	113lb. 1	3.5
20m546 5el 20m beam	n/a	n/a
This is a custom an	tenna.	
20m646 6al 20m beam	17615 1	7 /2

20m546 5el 20m beam	n/a	n/a	
This is a custom ant	enna.		
20m646 6al 20m beam	176lb,	17,0	
40m329 3el 40m beam	110lb.	12.5	
40m346 3el 40m beam	177lb.	13.8	
TBSEM Sel tribander beam	49lb.	7.0	
TB6EM 6el tribander beam	851b.	10.0	

Call for pricing - F.O.B. Dallas,

ROHN TOWER

25G 10 ft. section \$40,50
45G 10 ft, section
25AG4 top sec., req. bearing \$54.00
45AG4 top sec., req. bearing\$103,00
GA25G guy bracket with bars. \$22.01
GA48G guy bracket with bars \$43.00
SB25G short base section \$19,00
SB45G short base section \$43.00
EP 2534-3 3 hole equalizer plate . \$9.95

	*
HBX56 56 ft, self support	\$335,00
HDBX40 40 ft, self support	\$249.00
HDBX48 48 ft, self support	\$305,00

Our BX series towers include the base stubs. Beware those who charge extra for them. Also, freight collect from Dallas may save over freight pre-paid because of varying distances and routing. Drop ship or factory pick-up prices may be higher due to factory pricing policies. West Coast/Rocky Mountain prices may be 10% higher depending upon shipping point. Call for firm quote before ordering.

ROHN FOLD-OVER TOWERS

FK2548 48 ft, 25G foldover. . .\$699,00 FK2568 68 ft, 25G foldover. . .\$869,00 FK4544 44 ft, 45G foldover. . .\$981.00 FK4564 64 ft, 46G foldover. . \$1170.00 Freight prepaid on foldover towers. Sales tax may be applicable in some areas. West Coast/Rocky Mountain prices 10%

HY-GAIN CRANK-UP TOWER

HG-52 SS 52 ft, self support. ...\$874.00 HG-54-HD 54 foot self support. \$1414.00 HG-70 HD 70 foot self support, \$2187.50 Above shipped from Lincoln, NE. Sales tax required in some areas, freight paid on shipments in 48 states. Call for details on these and other Hy-Gain

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This is RF transparent, sun resistant, guy cable. Avoid those hours of putting insulators into steel cable. Enjoy the advantages of freedom from unwanted esonances that can soak up your radiated RF energy.

HPTG 4000 4000 lb. test cable \$.44/ft. HPTG 6700 6700 lb. test cable \$.60/ft. 9901LD potting head. 9902LD potting head for 6700 lb. \$5.49 Socketfast potting compound , \$9.00/ot.

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3/16" EHS steel guywire, \$.12/ft.
1/4" EHS steet guywire \$.15/ft.
3/16" ccm cable clamp \$.29 es.
1/4" ccm cable clamp \$.39 ea.
3/8 x 6" TBE&E turnbuckle \$5.39
1/4" th thimble \$.24 ea.
3/16" preformed guy grip \$1,75
GA\$604 screw anchor \$12.00
GAR604 concrete guy anchor \$12.00
M200H 2" x 10' steel mast \$37.00
SOOD guy insulator
502 large guy insulator \$1.80
Note: Some items too large for UPS
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HG 52SS Salf Supporting Tower
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COA
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HG 52-SS				,				,	52 Ft. Crank-Up
HG-10	,		,	,			,	,	. 10 Ft. Mast
HG-TBT .	,	٠	4	_		,			. Thrust Bearing
HG-COA.		,			,		,	,	(3) Coax Arms
Ham IV	-	٠	·		,				Rotor

ALL FOR ONLY \$1.190!!! Shipped from Lincoln, NE. Allow 4 to 6 weeks for delivery

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														\$192.00
HDR30	o	to	or	L	A	R	G	E	a	r.	d١	/3	,	\$419.00
Alliance	: 1	41):	7.3										\$94.00

CABLE

Saxton RG213 50 ohm coax ... \$ 31/ft, RG 11/U 75 ohm coax \$ 31/ft RG 11/U 75 ohm coax ... \$.31/ft LDF4-50 Andrews HELIAX \$1.48/ft Bloand, rator cable. \$ 18/ft 8 condHD rotor cable (for 150+ft, 1\$36/ft Mini 8 52 ohm small coax . . . \$,16/ft. Heliax @ cannot be shipped by UPS as it cannot be coiled tightly enough to conform to size restrictions without damate.

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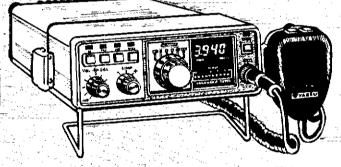
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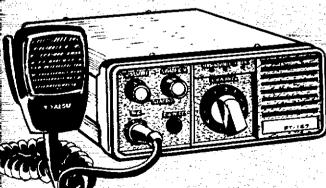
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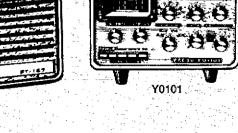
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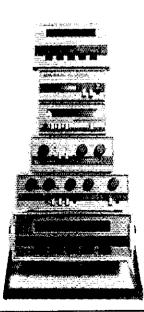
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report. KASNUG is now NSDZX. KASNIP is now NSDZY. Be sure to use the 510 that has Dec. 1981 instead of Aug 1981. Was happy to see ND represented at the National Convention in Cedar Rapids. Thanks guys and gels. ND YL Weather Net will start again on Nov 1st at 1330 UTC on 3996.5 kHz. Traffic: KASFSM 35, WASFRWM 20. SOUTH DAKOTA: SCM, Fredric Stephan, KC\$OO — Your new SCM will do his best to promote and maintain all Amateur Radio activities. Thanks to everyone for your support. Suggestions and advice are always welcome. Contact me snytime, anywhere, on any net. Also seeking volunteers for all official appts. Warhoops had FS meeting and elected WB\$MZB, chief; WB\$KUF, asst. chief; WA\$VEF, secy./trees.; W\$MZI, princess. Congrats. W\$RWE and Sloux Falls group were active at state tournaments. SoDak hamiest excellent, successful & informative. First class coordination and events by WB\$PWA K\$HF K\$CX K\$STF WD\$BJO AF\$O WB\$FWF KB\$HF W\$PUF W\$UFZ W\$OZC and many others. Great prizes were won by WA\$EYY and K\$CXL All FDs successful, All levels for radio classes starting now in Rapid City. Contact BHARC for details. SD Moming Net 113 OTC, 988 QTC; W\$NEO Net 31 OTC, 916 CNI. NJQ Net 26 QTC, 531 QNI; Sun Morning AM Erner. Net 4 QTC, 34 QNI. Traffic: WB*OX 154. WB\$OX 154. WA\$VRE 46, W\$KJZ 39, W\$MZI 34, WB\$OMF 32, KC\$OO 13.

DELTA DIVISION

DELTA DIVISION

ARKANSAS: SCM, Date Temple, W5RXU — SEC: WB5IGF. KC5JH reports he, W5FD K4GXV WD5APU & W5PYZ are active in packet radio and participated in the Tucson Amateur Packet Radio Beta lest Experiment. W5HYW reports W5BXJ WB5KFE W\$JZO and he enjoyed Ham-Com in Dallas. AR represented 94% DRN5 by WB5GQH W4AZJ W9YCE WA5TJJ & W5TJM. W5KL/R now has antenna at 130°. Net reports: OZK 107 checkins, 11 OTC; Mockingbird 614 checkins, 6 OTC; Razorback 1787 checkins, 48 OTC; Ark. Phone Net 328 checkins, 25 QTC. Although the wx has been rather calm the past few weeks, don't forget to check on 145.94/94, your local ptr., or 3.995 for severs wx nets, when wx threatans. Traffic: W5TUM 41, W5UAU 28, W5KL 19, W5QFU 18, WB5GQFU 4.

weeks, don't forget to check on 146,34/94, your local rptr., or 3,995 for severe wx nets, when wx threatens, Traffic: WBTUM 41, W5UAU 28, W5KL 19, W5CFU 18, WB5GCH 4.
LOUISIANA: SCM, John Meyer, N5JM — ASCM: KCSSF. STM: W5GHP. The moss draped cake and plantations of bayouland were visited by W1XX and W3XO of ARRL fame between sessions of the CSVHF Society contab, presided over by WB5LBT. Congrats go to three LA hams who work on the ARRL's Advisory Committees that generate the high standards of Amateur Radio: W5GHP chmn. of Emergency Comm., K4DPG, VHF ptr and WB5LBT VHF/UHF. Lots of midnight oil fellows! If your club isn't a member of the LA Council of ARC, though be Write W5CVF for details and info on benefits. BRARC brightened up a computer show at the Centroplex by putting on an RTTY demo. Coming up this month: Amacom, a ham-computerfest at the city park campus of Deligado College on Oct. 16-17th, featuring interesting displays plus the usual closet cleanouts. The same weekend will see W5GHP and his tireless traffic handlers take on the SET without summertime QRN crashes.

Deen getting all around, thought the net into should be included this time. TN CW Net TSN 3710 0000 Dy TN Slow Net TSN 3635 0100 UTC Dy TN Slow Net TSN 3710 0000 Dy TN RTTY Net TSRN 3625 0030 Dy TN RTTY Net TSRN 3625 0030 Dy TN EARLY Phone Net TEMPN 3980 1140 M-F TN Morn Phone Net TMPN 3980 1245 M-F 1400 SSn + Hol TN Even Phn Net TEPN 3980 0030 M-S TN Counsel Net TCN 3980 0030 M-S TN COUNSEL NET TCN 3980 0030 M-F EST TN 6M Net ETSMN 50.4 0000 TTh + S EST TN 2M Net ETSMN 50.4 0000 TTh + S EST TN 2M Net ETSMN 146.70 2030 M-F CHART TI ST FM Assn CTSFMAN 146.79 0200 M-F CHART TI ST FM ASSN CTSFMAN 146.79 0200 M-F CHART TI ST FM ASSN CTSFMAN 146.79 0200 M-F CHART TI ST FM ASSN CTSFMAN 146.79 0200 M-F CHART TI ST FM ASSN CTSFMAN 146.79 0200 M-F CHART TI ST FM ASSN CTSFMAN 146.79 0200 M-F CHART TI ST FM ASSN CTSFMAN 146.79 0200 M-F CHART TI ST FM ASSN CTSFMAN 146.79 0200 M-F CHART TI ST FM ASSN CTSFMAN 147.12 030 Dy Lakeway Emer Net LEN 147.12 030 Dy Lakeway Emer Net LEN 147.12 030 Dy TS EC Net TECN 3990 0130 T TECN 3

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A4

Broadband, excellent gain and 1/b ratio, 2-kw-power rating, direct 50 ft feed, boom 10 ft., 5.48 m., longest element 32 ft., 9.7m., weight 37 lbs., 16.8 kg., turn radius 18 ft., 5.48 m., mast dia. 1.4 to 2 in., 3.18 to 5.08 cm., material 6063-T832 seamless aluminum.



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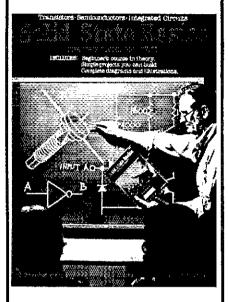
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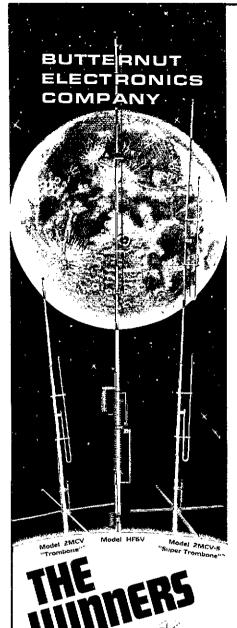
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KNTN* 3727 1900 DV 332 81 40 KYN* 3500 2000 DV 209 877 31 KSN* 3500 2000 DV 204 38 31 Local public service nets reporting: BARES CCEN CARN KYPON LCARES PAWN PAEWTN SEKEN TSTMN 3ARES 4ARES 5ARES 11ARES. Total local net activity: 128 sess., 1415 GNI, 127 OTC. 4ARES June reporting: 4 sess., 52 ONI, 3 OTC. PSHR: KA4BCM WD4BSC N4ELP 4 sess., 52 ONI, 3 OTC. PSHR: KA4BCM WD4BSC N4ELP N6AGFU WA4JTE KA4BAK KD4TY WA4YPO. New Novice: KB4BRR. Congrats. Good 2-meter openings all month reported by WA4SWF. Stations reporting activities: WD4AGH WD4BSC, OBS, N4GD, OO, WA4SWF. OVS. The annual Simulated Emergency Test will be held October 16 & 17. Net operations will be handled by Kentucky Emergency Net. Traffic: (*ORS) KA4SAA* 127. WA4JTE* 110, KA4GFU* 98, KA4MZY* 98, WD4BSC* 88, NW4P* 80, WD4IYI* 78, KC4WN* 68, KA4BCM* 67, KAMHL* 58, WB4APO* 50, KAHOE* 45, WB4WC* 24, KA4BC* 28, N4GD* 25, KD4TY 22, WA4JCB* 19, WD4COF* 19, WA4YPO* 19, WA4YVO* 14, WA4DCB* 19, WB4YDO* 14, WA4YPO* 19, WA4YVO* 19, WA4YWY* 13, KA4MTX* 12, KA4GBZ* 10, NN4H* 9, KA4SKV* 9, WD4IYH* 5, K4AXE* 4, WA4SWF* 4, KU4A* 2.

MICHIGAN: SCM, James R, Seeley, WB8MTD — ASCM: WA5DHB, SEC, WA8EFK, STM: WD8RHU, DECS: K8BTH NBCUH WD8IXZ WD8MBB W3VWY, NMs: WA8DHB NBDSW KBINE K8KMQ WD8HRT WA8PIM W6SCW KVBU WB8YDZ WB9IO K8ZIU.

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MITN* 3953 1900 Dy 590 373 31

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**NTS nets. Times local. **QNN late net, 2200; MNN late net, 200; MACS Bn 1300. Vhr nets 6 fpts, QNI 309, ftc 12, sess. 25, mgr WDBRHU. 3932 Is MI emer, 1req. AHES net Sn, 3932, 1700. Traffic Workshop Sn 3953, 1800. Another great U.P. Hamfest. My first visit to one in Kingsford. Hospitality definitely up to U.P. standards, and it was a well-organized, lively affair. WDBIXZ, EC for Delta Co, has been appointed DEC for the U.P., a worthy replacement for retiring KBRCT, who has served well in that post for two years. Thanks Ernle, welcome Bandy. WABDHB was given the "U.P. Net Amateur of the Year-award. New officers for GLETN: WDBISY, mgr.; WDBESZ, AMM; NBCWU, seey. ARES is back in Celhour Co., with DEC WDBMBB assuming the EC duties on an interim basis. Many thanks for 18 months of line service as NM for vhr activities to WDBNKT, who now has to step aside because of increasing work commitments. STM WDBRHU is filling the gap until a permanent replacement is found. Traffic this summer was at its lowest ebit never a long of for KL7-land had much to do with it, as some have suggested. They're back, wiser but poorer, Eight bucks selving tomer members currently out of touch 10 come forth prior to the 50th anniversary celebration banquet for a plain hamburger? Wowl KBBGT visited the NOHA asserting former members currently out of touch 10 come forth prior to the 50th anniversary celebration banquet bec. 4. Contact WBMPD. OO reports: WBBIKJ. WBCG. Traffic. AFey 428. WBBYD 37, MBBNZ 95, KABCPS 194, KBKQJ 183, WBBMTD 148, WDBRHU 144, WBWPW 139, KTBY 112, WBBMD 148, KBKQM 103, WBBNZ 96, KBSDB. 148, WBSDR 174, WBSIU 48, WBSDR 175, WBBNZ 187, WBBNZ 97, WBSIR 198, KBBZ, WBSW 198, KBBZ, WBSW 198, KBBZ, WBSW 198,

Turon Co. ARC CNWOARES MASER Medina Co. NCTW

TSRAC Traffic: K8NCV 578, K8DZ 469, WD8FKN 320, WD8MIO 317, W88MZZ 300, W8GGX 298, WA8GMT 268, K8BYR 252, N8BOK 238, WA8HGH 202, ABBP 190, W8PMJ 176,

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Better still, we think that just to show you the picture and give you the specifications and then slyly suggest you ask any KDK owner about the radio, will convince you. If that won't convince you, well, you just can't be convinced of anything!

• KDK continues the tradition of being the ultimate in VHF FM mobile operations. We make maximum use of multiple function, multiple shaft controls and only three sets of knobs are located on the front panel. Still many new features have been added, such as digital RIT, reverse button, memory channel readout number and more!

- •The new KDK 4 bit microprocessor chip has in-house developed software which makes all these new features possible.
- Modern styled front panel with dials intelligently arranged so you can best utilize the multi-function, easy to handle controls. We gave it a very heavy textured paint finish that is highly resistant to scratching!
- Frequency coverage 143.005 148.995 mhz. S/N better than 35 db at 1 uv input. Better than .2 uv at 12 db SINAD. Squelch sensitivity better than .15 uv. Bandwidth at -6db: ±6khz, at -60db: ±16khz. Image ratio better than 70db, Double superhetrodyne, Transmitter uses variable reactance frequency modulation with maximum deviation set at ±5khz.
- •RF power is a good, clean no spurious signal of 25 watts on high and 5 watts (adjustable) on low.
- Good audio with the famous KDK audio output capability of 1.5 watts . . . you can't blow out our audio IC!
- Nicads for memory retention built in, nothing extra to buy. Disconnect the FM2030 from the power source and the memories remain!
- · Easy to use mobile mount with instant disconnect knobs for fast. simple removal, DC Cable and mounting hardware, spare fuse, external speaker plug and complete simplified instruction book includes circuit diagrams and even complete alignment instructions! No extras to purchase!

INTRODUCTORY PRICE! Includes Tone Pad Microphone and all accessories. Shipping: \$5.00 eastern U.S.A, \$7.50 western U.S.A

- 10 memories in 2 memory banks of 5 each (A&B), Any memory can be changed instantly.
- Control functions: Select memories, show memory channel number. or select memories and show frequency of channel, or dial frequencies with two speed selectable control. Instant choice of either 5 or 100 khz tuning steps. Programmable band scan limits and memory scan.
- Frequency shown in 5 bright LED digits. LED indicator shows when signal is received (unsquelched), LED indicator shows transmit. Modern LED bar meter shows signal strength of received signal and on transmit shows relative output power.
- ·Microphone includes tone pad, and up and down buttons to change dial frequency or memory channels.
- · A standard microphone with up-down buttons only is available separately.
- The FM 2030 is basically as easy to use as a crystal receiver with rotary switch frequency selection for full "eyes-on-the-road" mobile operation.
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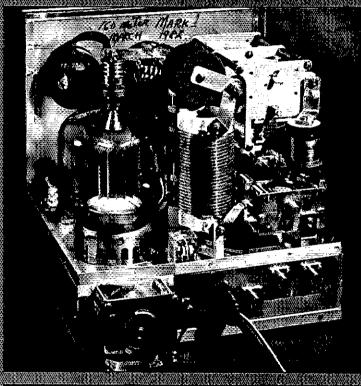
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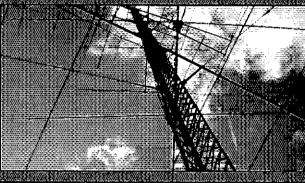
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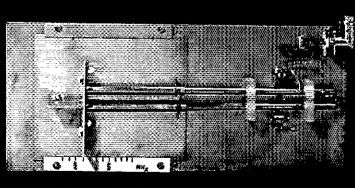
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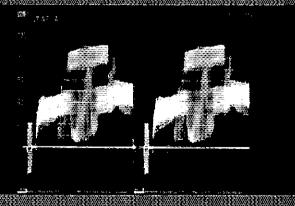
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Automatic Contest Serial Number	Yes	=N/A	Yes
Selectable Dot and Dash Memory	Yes	Yeş	Yes ≡
Independent Dot & Dash (Full) Weighting	Yes	=Yes	Yes 🚆
Calibrated Speed, 1 WPM Resolution	Yes	≟.Yes	Yes ≡
Calibrated Beacon Mode	Yes	±6'N/A	No
Repeat Message Mode	Yes	₩/A	Yes 🗐
Front Panel Variable Monitor Frequency	Yes	_Yes	Yes
Message Resume After Paddle Interrupt	Yes	= N/A	Yes =
Semi-Automatic (Bug) Mode	Yes	=Yes	Yes
Real-Time Memory Loading Mode	Yes	= N/A	Yes =
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EASTERN NEW YORK: SCM, Paul S. Vydereny, WB2'
— SEC: KB2KW. STM: WA2SPL. News from clubs:
Van Winkle ARS had a nice meeting and picnic on a second second

CITY - LONG IBLAND: SCM, John H.

to new ORS KVZC NLIPN welcomes \$2200 kt a welcomes back WBZTQC and K2S. W2TZO just months with NLIPN, but already both an NCS and 2 rep. As of 1 Aug., BAYTN cut back to Mon. 147.915315 and Thut, on 146.0767 because of lack activity and NCSs. Please help BAYTN with checkly and traffic. Under "My, how time files" bept., rememi WBZOYV back in the early 70s? He went away to clage, became N1EE. Well, now it's Dr. Lieberman and has started his 4-yr residency at Nassau Hosp. Minsola. His thing is radiology. Now if anyone has daughter that would like to meet a nice young doctor WBZVSY ungraded to Advanced, NZOOF upgraded General, Metroplex had a GE Terminet 300 termin printer donasted to them by CPFI Associates. Receiver nice letter from WZLWB, new NM for NLI CW. He reit to it as "Nut Manager." Maybe he's got somethit here? Grumman, Licco and Sperry ARCs had a joint price at Eisenhower Park. W2DQ, the club call for Suffo Co. ARC, has received quite a workout this year, lirst the NCS for the March of Dimes and then as NCS for the March of Dimes and then as NCS for 1 N2AKZ 66, WAZARC 58, W2TZO 43, WAZPMW WZDBQ 37, WZXS 36, KAZNMA 44, KZGCE 31, WZLW 30, KRZB 26, KZIZ 22, KSZG 20, NZBOD 14, KVZO KAZOK 2. (June) NZBOD 3 (May) NZBOD 14, NORTHERN NEW JERSEY; SCM, Curils R. Williar WSDTRIZ — SEC: WBZVUF, STM: WZDD, NMs; W2A AGZR NZBNB NZBOP KAZSKS KAZHMO, WEZ! WZPSU.



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one externally accessible up/down channel retain frequency and standard offset.

relative signal strength or receive, relative power on transmit. Also shows

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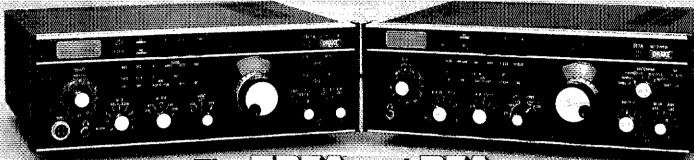
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The Utimate team...the new Drake Twins



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TR7A Transceiver

- CONTINUOUS FREQUENCY COVERAGE 1.5 to 30 MHz full receive coverage. The optional AUX7 provides 0 to 1.5 MHz receive plus transmit coverage of 1.8 to 30 MHz, for future Amateur bands, MARS, Embassy, Government or Commercial frequencies (proper authorization required).
- Full Passband Tuning (PBT) enhances use of high rejection 8-pole crystal filters.

New! Both 2.3 kHz ssb and 500 Hz cw crystal filters, and 9 kHz a-m selectivity are standard, plus provisions for two additional filters. These 8-pole crystal filters in conjunction with careful mechanical/electrical design result in realizable ultimate rejection in excess of 100 dB.

New! The very effective NB7 Noise Blanker is now standard. New! Built in lightning protection avoids damage to solid-state components from lightning induced transients.

New! Mic audio available on rear panel to facilitate phone patch connection.

• State-of-the-art design combining solid-state PA, up-conversion, high-level double balanced 1st mixer and frequency synthesis provided a no tune-up, broadband, high dynamic range transceiver.

R7A Receiver

- \bullet CONTINUOUS NO COMPROMISE 0 to 30 MHz frequency coverage.
- Full passband tuning (PBT).

New! NB7A Noise Blanker supplied as standard.

• State-of-the-Art features of the TR7A, plus added flexibility with a low noise 10 dB rf amplifier.

New! Standard ultimate selectivity choices include the supplied 2.3 kHz ssb and 500 Hz cw crystal filters, and 9 kHz a-m selectivity. Capability for three accessory crystal filters plus the two supplied, including 300 Hz, 1.8 kHz, 4 kHz, and 6 kHz. The 4 kHz filter, when used with the R7A's Synchro-Phase a-m detector, provides a-m reception with greater frequency response within a narrower bandwidth than conventional a-m detection, and sideband selection to minimize interference potential.

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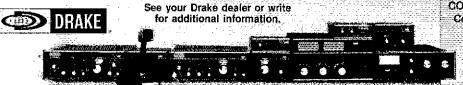
The "Twins" System

• FREQUENCY FLEXIBILITY. The TR7A/B7A combination offers the operator, particularly the DX'er or Contester, frequency control agility not available in any other system. The "Twins" offer the only system capable of no-compromise DSR (Dual Simultaneous Receive). Most transceivers allow some external receiver control, but the "Twins" provide instant transfer of transmit frequency control to the R7A VFO. The operator can listen to either or both receiver's audio, and instantly determine his transmitting frequency by

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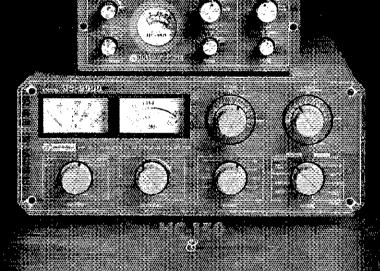
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AMS-147 146-148 MHz Mobile Magnet Mount . 26.95 ATS-147 146-148 MHz Mobile Trunk Mount . 26.95	757B SSB/CW Filter
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The notch filter has both variable frequency and selectivity controls, and is very effective in removing haterodynes and SSB splatter. Notch depth is 80 dB. For peaking, there is a variable bandpass filter with both frequency and selectivity controls. Highly useful on CW, the controls can be adjusted to emphasize voice on SSB signals. This filter can be switched in or out, independently of the other filters. By the way, there is also a fixed 6 pole hi-pass filter with 300 Hz cutoff. All three tuneable filters cover 300 Hz to 3kHz.

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members provided support for the Lebanon 4th of July Parade and the USET horse trials. Middlesex Co. ARES and RACES operators set up a station at the Middlesex Co. Fair and demonstrated Amateur Radio to the public. PSHR: KB2HM WSDTR W2XD AG2R N2XJ K2VX A2XHM N2BOP KA5DLV KA2GSX WA7DPK N2BN WB2ANK N2DPV. Traffic: KB2HM 335, AG2R 223, N2XJ 183, W2XD 153, W2RO 132, K2VX 132, KA2JMH 151, N2BOP 63, N2BNB 58, KA2GSX 36, WA7DPK 28, WB2ANK 24, WA2YHZ 24, N2DPY 22, W2CC 18, W2UH 18, KA5DLV 16, N2SU 16, W5DTR 15, WB2KLF 14, W2ZEP 9, N2BC 7, W2IU 7, W2GD 1.

MIDWEST DIVISION

MIDWEST DIVISION

IOWA: SCM, Bob McCaffrey, K¢CY — SEC: W¢RPK. ASTM: K¢GP, NMs: Wa¢AUX W¢AVX Wp6AVX Wp6HND

WýYLS. Congrats to Ka¢X W¢SS and WýYLS for receiving A1 Operator Award. This recognition is well deserved. K¢GP will be acting as STM while KA¢X is on sabbatical. Hats off to the CVARC for a tine convention. During the convention week the CVARC also aided the All-lows Tennis Tournay and provided needed back-up for the NRG at the Palo Nuclear Plant exercise, well planned use of manpower and comms. I am including ARES net reports, so ECs please jet me know your totals each month. A great deal of traffic was generated this month by the RAGBRAI exercise. My thanks to all. Over 100 messages were originated and over 60 people were involved throughout the state. That's involvement, Over 100 messages and multiple demos originated from National Balloon Races in Indianoia. Storm watches continue, as well as special events such as in the Great Lakes Area Marathon. Welcome to Wbg.JFF K46LUZ N¢CWQ as liaisons to DTRN.

Net Fred, Dy UTC QNI QTC Sess.

TICN 3560 Dy 0030+0400 370 227 62

TICN 3560 Dy 0030+0400 370 27 62

TICN 3713 TThs 0100 39 33 12

Traffic: Wa¢AUX 440, W¢SS 234, AE¢RIKA¢X 153, W¢YLS 141, K¢CY 130 k¢gP 1254, AE¢RIKA¢X 154, W¢YLS 141, K¢CY 130 k¢gP 1254, AE¢RIKA¢X 154, W¢YLS 141, K¢CY 130 k¢gP 1254, AE¢RIKA¢X 154, X¢YLS 141, K¢CY 150 k¢gP 1254, AE¢RIKA¢X 154, X¢YLS 141, X¢YLS

KAΦJQG 88, KAΦILUZ 81, WDØHND 60, KBΦOZ 44, W4JL

4. WØBW 25, WBØAVW 24, KØEVC 24, KAGGBG 20, KAΦADF 16, KØZQ 6.

KANSAS: SCM, Robert M. Summers, KØBXF — Even though I do not receive a report from each ARRL member and/or Amateur Radio op each month, it was nice hearing from the few of you who were wondering what happened to the May column, Hopefully, the mail will not be delayed again. Enjoyed a rear ince national convention in lowa, Had an opportunity to talk with a number of the SCMs from close by states who attended. Many subjects were discussed. It is amazing how many of the same type problems exist in each. Net reports (ONIIOTC): KSBN 1017/148; KPN 308/28; KWN 736/490; CSTN 1442/83; GKS 277/83; GKS-SS 29/1. At the ARRL Board Mtg in Cedar Rapids, it was decided to delete the Offical VHF Station appointment while continuing the League's commitment to promoting VHF/IJHF activity. All clubs appear to have held successful FD operations this year and are already making the plans for a bigger one next year. The Johnson Co. ARC recently elected KAØCXJ, pres.; KMØB, v.p.; WØOYH, secy.; WBØTIN, treas. Editor of their monthly bulletin FEEDBACK is KA§GAG. Another fine Issue of KANSAS AMATEUR RADIO just recently received. That to KCØGL, Traffic: WØFFIC 273 WBØZETN 170. WØHI 152, WØOYH 142, KAØCUF 91, WØKI 12, WØOMT 22, NØBDG 21, KAØE 15, WØPB 12, WAØWH 2, WØKL 1.

MISSOURIS: SCM, L. G. Wilson, KØRWL — ASCM: WØOTF, SEC: NØAJI. STM: KMØL. Congrats to new RUBG. Extra. WØGCL now has his Swan going again. The Hannibal ARC has as its new president, KKØP, WBSHOZ as its new v.p. The Kansas City DX Club recently held its second annual golf tournament, followed by a picnic at the home of KBØX and NØCEV. A good time was had by all. KCØCL is still in the hospital, but is recevered. The SOM NAS AMATEUR ADIO in the home of KBØX and NØCEV. A good time was had by all. KCØCL is still in the hospital, but is recevered. The

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let ~	QNI	QTO
IBN	304	14
CE	45	1
ION	142	97
ION2	107	34
MEN	102	0
MEOW	357	56
LEMOE	122	93
MOSSB	543	93

MEÓW 357 55
NEMOE 122 4
MOSSB 543 93
Wishes for a speedy recovery to WA\$BZT, who recently suffered a heart attack, Deepest sympathy to the family and triends of WB\$OOM, who has joined the ranks of Silent Keys. Traffic: KC\$A\$6.88, K\$SI.171, K\$PCK 89, W\$OTF 88, W\$BMA 88, WB\$VHN 62, W\$OUD 40, K\$\$BZ, W\$OUD 40, K\$BZ, W\$OU

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WCN	78/18	2030		39	316	W1DP	
HTN	13/73	2100		56	272	.WB1E	
Upgrad	les: Tec	:h/KA1GP (1WGO n	ID, Nov	ice/KA1	IJDF.	Appoint	ment
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Other features include a built-in sidetone oscillator and speaker with volume/tone controls, phone jack and earphone, message editing, entry error alarm, self-diagnostics, battery back-up and a unique auto-shutoff should you forget. Complete details on the revolutionary μ Matic Memory Keyer are in the new Heathkit Catalog and at your nearby Heathkit Electronic Center.*

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This amplifier is designed for use with hand-held transceivers in either would or fixed station configurations.

Because of its light weight and compact size, the LA-2035 can be manual under the dash, under the sout, or in any other convenient location. The LA 2035 is equipped with KF activated stand by circuitry.

Lasy operation, Simply connect your antenna and your hand-held to the 2435. Connect the LA-2035 to a suitable power supply and go.

Specifications Band 144-148 MHz Mode:FM/CW/SSB Input power: 5-3 watts

Maximum output power: 30 watts plus. Power consumption: 13.8VDC at 5A. Max. Dimensions: 100W × 35H × 125Dm/m Weight: 500 grams

Coaxial input cable supplied with a BNC connector Output connector: S0239



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Front panel switching allows independent MODE and optional crystal filter selection.

A passive double balanced mixer is employed in the receiver front end. This stage is preceeded by a low noise high dynamic range bipolar rf amplifier to provide good, strong signal performance and weak signal sensitivity.

Accurate digital readout of operating carrier frequency is displayed to 100 Hz.

A rugged, solid-state PA provides continuous duty in SSB and CW modes. A cooling fan (FA7) is available for more demanding duty cycles, such as SSTV or RTTY. The PA also features very low harmonic and spurious output.

VOX GAIN, VOX DELAY, VOX disable, QSK, selectable AGC time constants, RIT and noise blanker selection are front panel controlled for ease of operation.

The TR5 is designed with modular construction techniques for easy accessibility and service.

GENERAL

Frequency Coverage: 1.8-2.0*, 3.5-4.0, 7.0-7.5, 10.0-10.5, 14.0-14.5, 18.0-18.5*, 21.0-21.5, 24.5-25.0*, 28.0-28.5*, 28.5-29.0, 29.0-29.7* MHz. (*With accessory range crystal).

Modes of Operation: Usb, Lsb, Cw.

Frequency Stability: Less than 1 kHz drift first hour. Less than 150 Hz per hour drift after first hour. Less than 100 Hz change for a \pm 10% line voltage change.

Readout Accuracy: ± 10 ppm ± 100 Hz.

Power Requirements: 13.6 V-dc regulated, 2 A. 12 to 16 V-dc unregulated, 0.8 V rms maximum ripple, 15 A.

Dimensions:

Depth: 12.5 in (31.75 cm), excluding knobs and connectors.

Width: 13.6 in. (34.6 cm). Height: 4.6 in. (11.7 cm) excluding feet.

Weight: 14 lb. (6.35 kg)

TRANSMITTER

Power input (Nominal): 150 Watts, PEP or Cw. Load Impedance: 50 ohms.

Spurious and Harmonic Output: Greater than 40 dB down.

Intermodulation Distortion: Greater than 30 dB below PEP

Carrier Suppression: Greater than 50 dB. Undesired Sideband Suppression: Greater than 60 dB at 1 kHz.

Duty Cycle:

Ssb, Cw: 100%. Lock Key (w/o FA7 Fan): 30%, 5 minutes max-

imum transmit. Lock Key (w/FA7 Fan): 100%

Microphone Input: High Impedance.

Cw Keying: Instantaneous full break-in, adjustable delay.

RECEIVER

Sensitivity: Less than 0.5 uV for 10 dB S+N/N except less than 1.0 uV, 1.8-2.0 MHz.

Selectivity: 2.3 kHz minimum at -6 dB. 4.1 kHz maximum at ~60 dB (1.8:1 shape factor).

Ultimate Selectivity: Greater than - 95 dB.

Agc: Less than 5 dB output variation for 100 dB input signal change, referenced to ago threshold.

intermodulation: (20 kHz or greater spacing) Intercept Point: Greater than 0 dBm. Two-Tone Dynamic Range: Greater than 85 dB.

1-f Frequency: 5.645 MHz.

I-f Rejection: 50 dB, minimum.

Image Rejection: 60 dB, minimum below 14 MHz. 50 dB, minimum above 14 MHz.

Audio Output: 2 watts, minimum @ less than 10% THD (4 ohm load).

Spurious Response: Greater than 60 dB down.

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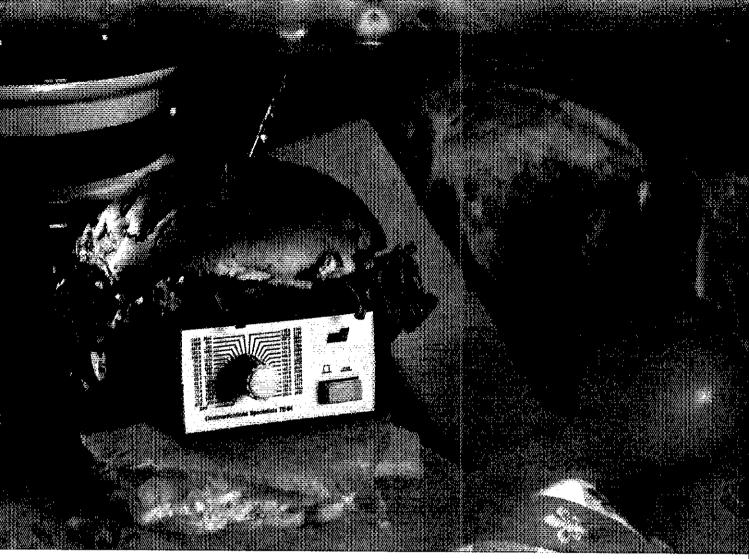
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- · All tones in Group A and Group B are included.
- Output level flat to within 1.5db over entire range selected.
- Separate level adjust pots and output connections for each tone Group.
- · Immune to RF
- Powered by 6-30vdc, unregulated at 8 ma.
- Low impedance, low distortion, adjustable sinewave output, 5v peak-to-peak
- Instant start-up.
- Off position for no tone output.
- · Reverse polarity protection built-in.

Group A

67,0 XZ	91.5 ZZ	118.8 2B	156.7 5A
71.9 XA	94.8 ZA	123.0 3Z	162.2 5B
74.4 WA	97.4 ZB	127.3 3A	167.9 62
77.0 XB	100.0 12	131.8 3B	173.8 6A
79.7 SP	103.5 IA	136.5 42	179.9 6B
82.5 YZ	107.2 1B	141.3 4A	186.2 7Z
85.4 YA	110.9 2Z	146.2 4B	192.8 7A
88.5 YB	114.8 2A	151.4 5Z	203.5 M1

- Frequency accuracy, ± .1 Hz maximum 40°C to + 85°C
- · Frequencies to 250 Hz available on special order
- · Continuous tone

Group B

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

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537, KC1G 60, WIYNE 43, WA1CSO 20, KA1FPF KA1EHR 15, KA1SO 14, N1BEE 7, KA1DRI 4, AEIS 2

537. KC1G 60, WiYNE 43, WAICSO 20, KA1FPP 19, KA1EHR 15, KA1SO 14, N1BEE 7, KA1DRI 4, AEIS 2. VERMONT: SCM, Bob Scott, W1RNA — SEC: WB1ABO. STM: N1ARI. Information for this pt seems to still be on its way!! GMWS special event stn Calvin Coolidge State Park at Plymouth rptr over 700 contacts. FM fitnet on W1K00 rptr has been doing FB nitely 2100 hours. If not tic, net closes within ten minutes, it also serves for a known time & place for those wishing to have contacts. VSB 31/504/116. VFM 30/283/109. Carrier 27/543/42. VTN 23/80/35. GMN 27/364/35. FD 4/57/17. VPN 4/67/4. Several stns handle tto but do not report. We would appreciate those stns reporting, even if only 1, that is unless, of course, the stn does not wish to be known in this category. Traffic: KA1GID 172, W1RNA 154, K18CB 131, AE1T 90, N1ARI 52, WB1ABO 39, W1KRV 33.

WESTERN MASSACHUSETTS: SCM, WIIIIam J. Hall, W1JP — STM: W1UD. SEC: WB1HIH. ACC: W1Y1. Congrets to members of the Western Mass (cw) Net. WMN celebrates its 50th year of continuous service, interrupted only during WWII. The net runs daily, having conducted 16,800 sessions since it started. A survey of all known NTS nets also reveals that WMN is the oldest net in the U.S.! The coveted BPL certificate was once more awarded to W1UD in July. W1ZPB using vacation time for much needed entenna work. Also he met a lot of tolks at the Dalton flea market whom he had OSOed for years and never eyeballed. WB1ABF and W1JP pald visit for K1JV and K11JU, sailing from RI to Chatham in sloop: "Determined". Boat carries hi gear and 2M FM to maintain contact with folks at home, mostly via W1UKR. OVS K1SF reports working St. Paul Is, on 30 MHz and MN & WI on 144 MHz on 11 July. OES/EC K1JHC reports has participation in hospital emergency drill in Worcester area. Keep those reports coming in folks. I can always use interesting material about you in the column. PSHR: WB1HIH W1UD KA1T. Traffic: KA1T 197, WB1HIH 154, WA1OPN 18, KB1W 17, K1PUG 15, W1ZPB 14, W1JP 13, WBVR 5.

NORTHWESTERN DIVISION

NORTHWESTERN DIVISION

MONTANA: SCM, Les Belyea, N7AIK — Upgrades reported: Extra — WATGJO, now K57S, N7AIU, now K07S; Advanced — KC7NY, N7ARA KC7NX, Yellowstone ARC club president WBT/WG along with KABIBE were on the TV show "Today in Montana" and gave the general public a five minute talk on Amateur Radio. Also the Billings gaing held their annual picnic in Laurel with a good turn out. A 220 remote station at Greeno is in full operation as a 220 remote station at Greeno is in full operation as a 220 rptr as well as an aglie remote on 2 meters. Most of the time they monitor 146.46 simplex. Call is KBYKB. N7AT has been getting tan mail from the FCC in Washington DC regarding an article he wrote for a local newsletter a while back (newsletters are read by people far off). W7GHT puts out an excellent newsletter for the Idaho-Montana Net with loits of good information. Was nice to have our division director W7GCP and vice director K7AOZ with us for the WiMU hamfest. Also, eight SCMs were in attendance at the same time. Watch for more on this in QS7.

Net Sess ONI GTC NM
MTN 22 602 77 K7TQM
MTN 22 177 97 K7TQM
MSN 3 28 7 K87SE
Treftic: WRRDDY 284 NYAIK 48 WRSAUCH

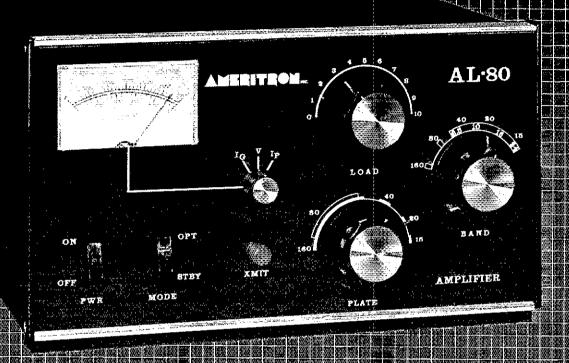
Net Sess ONI OTC NM MTN 22 602 77 K7TQM MN 22 177 97 K7VV MSN 3 28 KB7SE Treffic: WBTDZX 284, N7AIK 48, WB7WVD 12.

OREGON: SCM, William R. Shrader, W7CMU W7VSE, SEC: K7WWG. Net Time/Day Freq. ONI OTC OSN 0230/06/02 Dy 3537 501 437

OREGON: SCM, William R. Shrader, W7CMU — STM: W7VSE. SEC: K7WWG.

Net Time/Day J587 Feq. QNI CTC NM
CSN 0230/0600Z Dy 3587 601 437 KA7ELI
BSN 0145Z DY 3908 851 37 W7FQ
PTTN 0300Z Dy 146.76 351 36 W7LRB
OARES 0115Z DY 3993.5 485 97 W7HLF
PdxARES 0330Z Dy 146.76 351 36 W7LRB
LARES 0330Z Dy 146.79 1005 16 K7ZQU
Oregon section well represented at WIMU In West
Yellowstone. UPGRADES: Gen — WB7WSB: Tech —
KA7KKZ: Adv — WA7BMR WB7SRP W7JDT W7JWG; Ext
— N7CZS KA7HJT. Hearty congrats to all! N7CZS is 15
Years old so that should encourage you "oldtimers."
AI7G hurt his leg on Mt. Rainier, Just short of the sum
mit. OTVARC now has 206 members. Hoodview ABC
helped with comms for Rose Festival activities. W7FQ
re-elected BSN manager, with N7BGW as assistant
A7MPO, 9 years old, is going for General.
N7BGYKCTWXKV7F all same person. I hope that's all.
WB7RPJ new OBS in McMinnville. K7DDI won "Potty
Chair CW" contest at K.F. picnic. You really have the
touch. Salem ARC second "coftee stop" underway and
also may be in Oregon State Fair with stattion operating.
Traffic: W7VSE 678. WA7LGN 185. K7NTS 176. KC7WX
164. KN7B 128. KA7ELI 115. W7ZB 113. WB7OEX 39.
N7BGW 17, WA7IIM 15. (June) K17Y 73, WA7IIM 22.
WASHINATON: SCM. Joe Winter, WA7RWK — ASCM:
KD7G, SEC: K7SH, STM: W7GB, WA7RWK — ASCM:

164. KN7B 128. KA7ELI 115. W7ZB 113. WB7OEX 39. W7LNE 89. K17X 64. KIYY 53. WB7OZN 35. KA7AID 23. N7BGW 17. WA7IIM 15. June KIYY 73. WA7IIM 22. WASHINGTON: SCM. Joe Winter, WA7RWK — ASCM: KD7G. SEC: K7SH. STM: W7GB.
Net Freq. Time(Z) ONI OTC Seas. Mgr. WSN 3590 0145:0445 607 271 62 W7GB WARTS 3970 0100 2492 258 31 W7SFT NWSSB 3945 0130 801 40 31 W7JHR NTN 3970 1830 928 58 31 W7JHR NTN 3970 1830 928 58 31 W7JHR NTN 3970 1830 73 57 46 WA7CBN PSTS 145.93 0030/0530 142 94 62 W7IEU SCARES 147.18 0230 W 20 3 4 KA7ML WARTS net had successful picnic and meeting at Lake Kachess, and reelected the present officers for 1982/83 year: W2SFT mgr.: KA7CRN, asst. mgr.: W7BUN, secvitreas: WB7TOF, dir.NNE: W7DI, dir.YSE: WA7RCR, dir.SW: K7JAJ, dir.NW: W87WOW, at large. The Columbia Basin Net picnic was vary well attended, with lots of the good work the hams do for them. W6VRM heard mayday call on Clallam Co. ARC rptr from NSCGX, who saw overturned sallboat on Sequim Bay. W6VRM notified Coast Guard and sheriff. N7DCY was sent to seene, K7OEZ directed emerg, vehicles to the location. An emerg, vessel rescued elderly man. Congrats to all W7PM K7VSZ and WB7WV W7AVM W7DVM W7DJG W7LLB (W7FM GYNSZ LANG WB7WV W7AVM W7DVM W7DVM W7LLB (LOW W7LLB LANG W7FW W7LLB (LOW D10 LOW D10 LO



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3 (b) the cases sun spot activity now more than ever, win signal will need a smot of whenevine from the -80-**1.086** Schally make legal limit exching!

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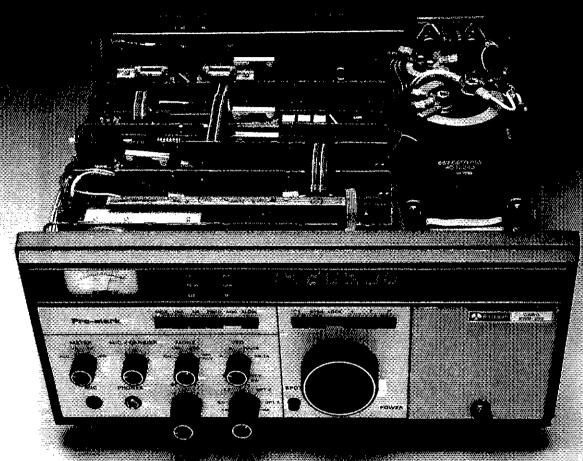
Power equatements: 2(1) vidus 50/30 Flortz, 31 simperes, or 120 volts 50/60 Flortz, 20 amperes.

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unaffected by temperature and humidity which cause intermittents in the more commonly used phenolic boards.

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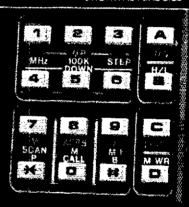
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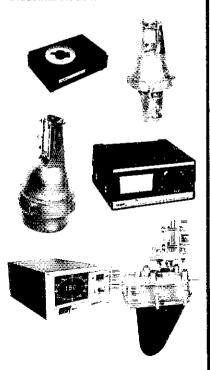
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CD45 II	8,5 sq. ft. (.79 sq. m)	5.0 sq. ft. (4.6 sq. m)
HAM IV	15.0 sq. tt. (1.4 sq. ml	N/A
12X	20,0 sq. ft. (1.9 sq. m)	N/A
HDR300	25.0 sq. ft. (2.3 sq. m)	N/A

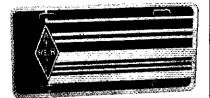
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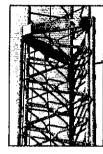
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ARRL 225 MAIN ST. NEWINGTON, CT. 06111 U.S.A. Thirteen Clark Co. ARC mbrs, headed by W7DYX, handled comms for July 3rd Spirit Run. A large group of CCARC mbrs and others overwhelmed Multinomah Co. commissioners at if radiation hearing for towers. Amateurs were excluded for now, KB7WC thanks all who attended. KM7U WB7TGF and WB7GA participated in emerg, exercise "Night Mail" for the Nat'l Comm's, System. Please tell me of any Silent Keys asap or my Q57 report. Thanks to all who send me reports and club bulletins. Keep up the good work and help me make this column interesting. Traffic: WB7WOW 580, W7DZX 555, WB7TGF 529, K7GXZ 189, N7ANE 128, W7GIP 106, W7HNA 103, N7DNG 94, W7LG 88, K7CTP 85, W7GB 75, W7EU 75, K871 60, WARDD 55, W7EUN 38, K7WW 36, N7DDP 35, K7EL 24, WA7RCR 23, KRTF 19, W7APS 9, KD7G 8, K7OXL 7, K7RBT 5, W7ERH 2, WA7GUI 1.

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ā	HG-5288	3	52 ft. 15.8 m	21 ft. 6.4 m	16 44 in. 417.6 mm	9.5 sq. ft50 mph .88 sq. m-80 km/h	455 lbs. 206 kg
F. RTING	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
SEL	HG-54HD	3	54 ft. 16.5 m	21.5 ft 66 m	19.53 in. 496.1 mm	16 sq. ft60 mph 1 5 sq. m-96 km/h	575 lbs. 261 kg
SU	HG-70HD	4	70 ft. 21.3 m	21.5 ft. 6.6 m	22 63 tn 574 7 mm	16 sq. ft60 mph 1.5 sq. m-96 km/h	1100 lbs. 499 kg
TED	HG-33MT2	4	33 ft. 10.1 m	11.5 ft. 3.5 m	13.75 in. 349.3 mm	8.5 sq. ft -50 mph .79 sq. m-80 km/h	210 lbs 95 kg
SIDE-	HG-50MT2	3	50 ft. 15.2 m	21 ft. 6.4 m	115 m. 292 1 mm	6 0 sq. ft -50 mph -56 sq. m-80 km/h	290 lbs 132 kg
SISUPP	HG-35MT2	2	35 ft. 10.7 m	20.5 ft. 6 2 m	9.25 in. 235 mm	9 5 sq. ft50 mph .88 sq m-80 km/h	187 lbs 85 kg

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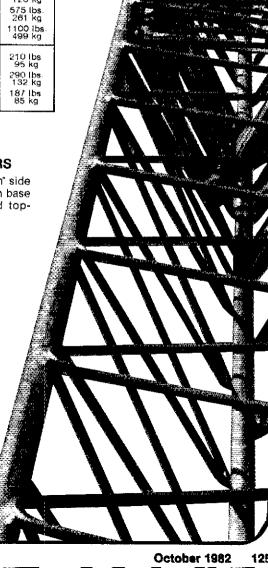
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keyboard selectable - and uses either the panel meter or scope outputs for easy tuning. Copy the weak ones. Copy the noisy ones. Copy the fading ones,

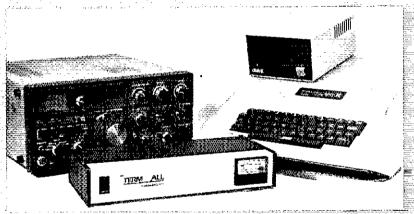
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TRS-80 NORMAL DISPLAY

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MFJ-900

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Matches coax, random wires 1.8-30 MHz.

Handles up to 200 watts output; efficient airwound inductor gives more watts out. 5x2x6".

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MFJ-984 VERSA TUNER IV



MFJ-984

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Up to 3 KW PEP and it matches any feedline, 1.8-30 MHz, coax, balanced or random.

10 amp RF ammeter assures max, power at min. SWR. SWR/Wattmeter, for/ref., 2000/200W.

18 position dual inductor, ceramic switch.

7 pos. ant. switch. 250 pt 6KV cap. 5x14x14".
300 watt dummy load. 4:1 ferrite balun.
3 MORE 3 KW MODELS: MFJ-981, \$239.95
+\$10), like 984 less ant. switch, ammeter.

(+\$10), like 984 less ant. switch, ammeter. MFJ-982, \$239.95 (+\$10), like 984 less ammeter, SWR/Wattmeter. MFJ-980, \$209.95 (+\$10), like 982 less ant. switch.

MFJ-949B VERSA TUNER II

MFJ-949B



\$139⁹⁵

MFJ's best 300 watt Versa Tuner II.

Matches everything from 1.8-30 MHz, coax, randoms, balanced lines, up to 300W output, solid-state or tubes.

Tunes out SWR on dipoles, vees, long wires, verticals, whips, beams, quads.

Built-in 4:1 balun. 300W, 50 ohm dummy load. SWR meter and 2-range wattmeter (300W & 30W).

6 position antenna switch on front panel, 12 position air-wound inductor, coax connectors, binding posts, black and beige case 10x3x7":

MFJ-989 VERSA TUNER V



MFJ-989

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3 KW PEP. 250 pf-6KV caps. Matches coax, balanced lines, random wires 1.8-30 MHz.

Roller inductor, 3-digit turns counter plus spinner knob for precise inductance control to get that SWR down.

Built-in 300 watt, 50 ohm dummy load.

Built-in 4:1 ferrite balun.

Built-in lighted 2% meter reads SWR plus forward/reflected power. 2 ranges (200 & 2000W). 6 position ant. switch. Al. cabinet. Filt bail.

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Run up to 1.5 KW PEP, match any feed line from 1.8-30 MHz.

Built-in SWR/Wattmeter has 2000 and 200 watt ranges, forward and reflected.

6 position antenna switch handles 2 coax lines (direct or through tuner), wire and balanced lines.
4:1 balun. 250 pf 6KV cap. 12 pos. inductor.

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has returned the survey I mailed. We now have a list of all club nets within the section. Send an s.a.s.e. to SCM for your copy. To keep your appointment current, all appointees should file regular activity reports with SCM. KASIA is running for state assembly from Monterey. Congrats to recent upgrades: KASIJES WASWAT KE6ZA. OBS broadcasts now on NGN on 3830 at 8 P.M. Wednesday and SPECS at 8 P.M. Monday on 145.27. The SCV will convert over to the new section structure. Contact SCM for details. If your club needs suggestions for PR, contact San Mateo RC which has been doing a fine job. Code practice is on W80IE on 3590, every night except Monday, starting at 8 P.M. To contact SCM, my address is on page 8 of every CST. Reports are due by the first of each month. WB6GFJ had a visit from FO8BM. Be sure to read the minutes of the recent Board of Directors meeting and let the SCM and director know your opinions. Traffic: WBKZJ 150, W8RFF 38, W80II 36, KE6ZA 30, WASASH 4.

ROANOKE DIVISION

VIRGINIA: SCM, Paul Sager, WE4FDT — ASCM: K3RZR. STM: KY4K. Chief OD: W4HU. Chief OBS: K3RZR. SEC: W84UHC.

Net Freq. Time NM
VNTN 7260 Noon WD4FTK
VSBN 3947 6:00 P.M. W4NWM
VSN 3705 6:30 P.M. K4VWK
VN 3947 10:15 P.M. WD4ALY
VNN 3987 10:15 P.M. WD4ALY
VNN 3987 10:15 P.M. WD4ALY
VNN 3947 10:15 P.M. WD4ALY
VNN 3937 10:15 P.M. WD4ALY
VNN 3680 7:30 P.M. TTH KA4ERP
Former SCM WA4STO Is now a radiotelegraph operator at WCC in Cape Cod. WA4STO also served as Virginia's first section traffic manager and was very active in note K&H and WA4STO have RTTY articles in the september Issue of 73. The new Virginia Radioteletype Net (VRN) will start up on September 2 on 3630 kHz at 17:30 P.M. on Tues. and Thurs. evenings. The VRN will use 60 wpm Baudot at 170 Hz shift. KA4ERP is the new NM. The Shenandoah Vailey Emergency Net (SVEN) meets at 8 P.M. on the 22/82 Winchester rptr. This month SVEN reported 31 sess., 51 OTC and 529 QNI. STARES net in Tidewater reported 32 sess., 30 QTC and 537 QNI. NSBDN now active in the VA nets from 1537 QNI. NSBDN now active in the VA nets from Clarksvills. W84WPF is the new EC of Norfolk. At last count, there were over 25 2-meter traffic or ARES nets around the state. STM KY4K has moved to Manassas. W4KX traveling around the 50 states and Canada. W4KX was first licensed as 3KU in the 1920s and served as VA SCM from 1954-1960. ARRL pres W4KFC traveling also. Traffic: W84PNY 432. WA4CCK 407, W3ATO 384, WD4ALY 198, WD4FTK 178, KY4K 135, K4JST 129, W3BBN 126, WA4LI 118, K4WM 116, WB2RD 109, WANDE A101, NNAI 98, WD4FTK 178, KY4K 135, K4JST 129, W3BBN 126, WA4LI 118, K84WT 116, WB2RD 109, WANDE A101, NNAI 98, WB4FLT 88, K4WW 75, K3RZR 69, KA3DTE 63, W3BBD 55, AAAAT 63, WANDW 61, WB4FDT 54, K14W 14, WALXB 10, WB4DOZ 9, WADM 8, W84ODZ 8, K84OG 8, N48JX 5, WB2OMZ 5, WATMS 6, WA4LX 12, K4W 14, WALXB 10, WB4DOZ 9, WADM 8, W84ODZ 8, K84OG 8, N48JX 5, WB2OMZ 5, WATMS 6, WA4KF 6, K64ER 10, WB4DOZ 9, WADM 8, W84ODZ 8, K84OG W, SWAKH 173, WATMS 6, SWAFW 18, WADW 6, WEST VIRGINIA 18, WADW 6.

(June) KZ4K 18, N4DW 6.

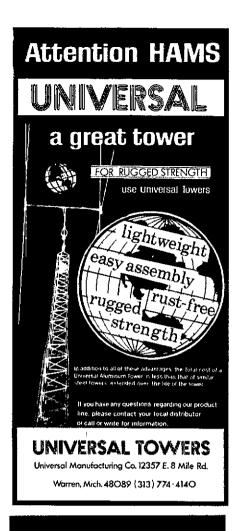
WEST VIRGINIA: SCM, Karl S. Thompson, K8KT — SEC:

K8CEW. STM: KD8G. Rotr Coord: WD4KHL. Chas area
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Chas. Twenty-flve hams participated, using WB8GDV/R

Activity was coordinated by K88ZM

WD8AEW WA8LFZ N8AJC and K8NYG. WB\$ISH is new



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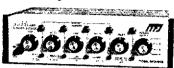
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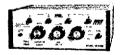
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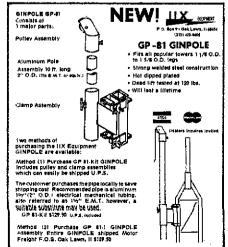
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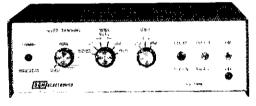
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Telephone: (414) 241-8144 Corporation Post Office Box 513Q, Thiensville, Wisconsin 53092 administrator for Welch Emerg, Hosp. New DECs are WB8WEZ WD8LKT and WD8SEN. First Wheeling Hamfest was big success. Watch for next year to be even bigger and better. Nice time was had by all at Jackson Co. Hamfest in spite of a few rain showers. Interested in 220 MHz from Lick Knob? Contact WA8CML. New rptrs on 145.17 (Bolt Mt.) and 145.23 (Blair Mt.) are working very well. Check in and give them a report. Traffic: K8QEW 67, KC8CR 68, K8KT 62, K98G 43, KA8GHF 42, W8HZA 34, N8DLK 6, WD8DHC 6, W8CAL 4, WB8UDY 4.

ROCKY MOUNTAIN DIVISION

working very weil. Check in and give them a report. Traific: K80EW 67, K53CR 86, K8KT 62, K586 43, KA8GHF 42, W8HZA 34, N8DLK 6, WD8DHC 6, W8CAL 4, WB8UDY 4.

ROCKY MOUNTAIN DIVISION

COLORADO: SCM, Lawrence E. Steimel, W\$ACD — SEC: K3PUR. STM: WD9AIT. NMs: WD9AIT W9HXB WMLAE W46PXL. ON 24 July, the Colorado Council of Amateur Radio Clubs held their quarterly meeting in Glenwood Springs, with Ski Country ARC as hosts. The CCARC voted to change the meeting schedule to the last Saturday of November, March and July. Reports from various clubs indicate increased interest in traific handling and emergency comms. The amateurs from western CO especially are aware of the need for a good smergency comms system, as their area of repossibility is large for the number of amateurs. The Ski Country ARC, Durango ARC, Magnetic Mountain Rptr. Group and Grand Mesa Rptr. Group, along with other groups and individuals under supervision of the ECs are striving to meet their communication needs. Recently the Northern Colorado Radio Amateurs provided the much needed by the breaking of a dam above the city. Thanks once again to not only the amateurs that took part in the emergency comms but also to the many that stood by so the emergency traitic could be moved. Neis: CWN seas 30, GNI 214, GTC 257, GNF 808. HNN seas 31, GNI 3364, GTC 114, ini 153, GNF 1330. Traffic: N@BQP 2189, W8AHJZ 1701, W8ACH 828, W\$ACD 895, N&CXI 221, K9DJ 198, KB\$Z 180, WD8AT1 189, W\$LAE 118, W\$EDJ 59, W8NFW 39, KB\$Z 180, WD8AT1 189, W\$LAE 118, W\$EDJ 59, W8NFW 39, KB\$Z 187.

NEW MEXICO: SCM, Joe T, Knight, W5PDY ... SEC: W5ALR, STM: KY5U. MMS: WASDINO KB5LI WSYFQ. Southwest Net (SWN) meets daily on 3939 kHz at 0100 Zulu and handled 76 msgs with 855 checkins. New MSXI ON W5FI 189, W\$LAE 118, W\$EDJ 59, W\$NFW 39, KB\$Z 187.

New MEXICO: SCM, Joe T, Knight, W5PDY W7A KRY 199, WASDINO KB5LI WSYFQ. W5NFW 39, W5NF

SOUTHEASTERN DIVISION

vyo, Jackalope net field 22 9898, 287 QNI & OTC. Traffic: W@OGH 175, WBTNHR 73, K7SLM 22.

SOUTHEASTERN DIVISION

ALABAMA: SCM, Hubert H, Wheeler, W418U — STM: WA4PIZ, SEC: NADMA. ASCMS: KA4WVU N4DRV, The AENM and amateurs everywhere were dismayed to learn of the tragic circumstances and the death of N4BIT, AENM net manager. He will also be missed on the Country Cousins Net, where he was NCS. The ARRI, Info Nethas moved to a new night. It will now meet on Tuesday evenings following the "M" net. All amateurs are invited to participate, Frequency is 3,955 MHz, and time is abt? P.M. CST. On August 3, KA4IJT was elected Net Manager of the "M" net. The Mobile rptr on 2282 will be up at 650° courtesy station WKRG-TV. The move will more than quadruple it's coverage. Read "Moved and Seconded" in Sept. QST. The Board has voted to adopt rules to supersede the Rules and Regs of the Comm. Debt. The new Rules and Regs of the Field Organization will become effective as the SCM becomes 6M. The Bankhead ARC is organized in Moulton but more into is needed. K4HJX was appointed as Official Observer. Other station applis are available. Alabama represented 100% on CAND by WACKS, also represented 100% on CAND by WACKS, will be NWAX KEWF WA4RAJ WB4ISP W4WJF KC4GS & W4VOM. Traffic: WA4JDH 910, W4CKS 165, WA4LXP 78, KAACZ 44, NW4X 33, W4IBU 32, N4HIR 18, K4HJX 17, WA4JPK 17, WB4TV7 12, K4GXS 7, W4GDH 4.

GEORGIA: SCM. Eddy Kosobucki, K4JNL — SEC: WB4HXE. ASEC: K5WJJ. STM: W4WXA. Chief OBS: W4BIA. Remember the Savannah Hamiest on Oct. 23rd 24th. It's getting bigger & better each year. Congrats to the Glynn Radio Assn of Brunswick for ARRL affillation. Columbus ARC mew officers are: NAGO, press; WABIA. Remember the Savannah Hamiest on Oct. 23rd 24th. It's getting bigger & better each year. Congrats to the Glynn Radio Assn of Brunswick for ARRL affillation. Columbus ARC mew officers are: NAGO, press; WAAMM, v.p.; KA4WM, v.p.; KA4WW, secv.; KD4NZ, treas, KA4MUV, act. mgr. The Chattahoochee Valley HTTY Group invites and phanes of the sectio

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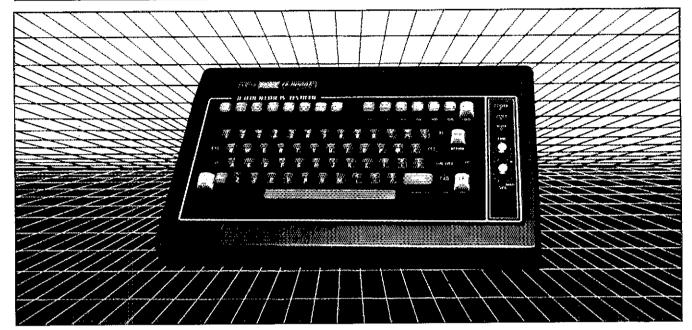
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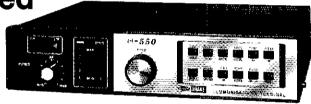
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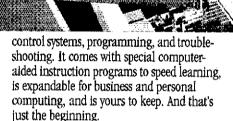
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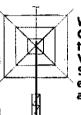
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hope that the forthcoming winter will not be like the one we had last year. Traffic: W4WXA 132, WB4NTW 92 K4NM 38, W4HON 31, W4FIZ 3D, KA4ATM 29, K4JNL 21 N4UZ 12, W4BIA 11, AKAT 10, K4BAI 2, AA4EI 2, W4IZI 2 (June) W4WXA 94, N4UZ 8.

idune) WAWAS 94, NAUZ 8.

NORTHERN FLORIDA: SCM. Billy Williams, NAUF — SEC: WAUEA, ASEC: KEBO, STM: WDAHIF. Big opposition indicated to code-free license proposal in Jax, NOFARS membership voted against any type of code-free licket at meeting, Other groups indicate similar opposition. Seems like most don't consider the code that lig a hurdle. TARS replenishing ARRL publications in Tallahassee library. WAGAA has strange new antenna. Planning underway for 1983. Orlando Hamcatjon. WB4HAK is chairman again, A new chapter of OARC is the OTS (Orlando Technical Soc.), which is composed of club members especially interested in the technical aspects of Amateur Radio. New Jax RANGE Technomy. The Comm. Chmn is WB2CP. Who succeeds WDABIW after SIZ years. See Section of Comm. Chmn is WB2CP. Who succeeds WDABIW after SIZ years. New Orange Co. Eci is WAAOPA. New DEC for west central FL is NO4P. NAIB and WAAJX multi-op entries finished high in ARRL. 10-Meter Contest. GARS net meets Sun. at 2030 on 2282 fptr. New upgrades are KAAJMT KE4UO & KCHZ (EKTA). KAYERX & KAAZUK (Fech). New Calls Include WA4L (ex. KC4BG); WA4T (ex.NG4CB). New VK 3rd party agreement popular in Fla. W4MG0 reports one-day delivery through NTS on messaga July 9th. IAN has liaison with EAN for taking VK and other legal DX tr. W4PPC of Mami is NM and reports a very busy summer season. Halliax Chap. OCWA chose WAAMYG, chairman and WZEDP secvitress. as 1983 of florers. GCAPRIA pas rets on noton of Friday on WAAMGO, chairman and WZEDP secvitress. as 1983 of florers. GCAPRIA pas rets on noton of Friday on WAAMGO, chairman and WZEDP secvitress. as 1983 of florers. GCAPRIA pas rets on noton of Friday on WAAMGO, chairman and WZEDP secvitress. as 1983 of florers. GCAPRIA pas rets on noton of Friday on WAAMGO, chairman and WZEDP secvitress. As 1983 of florers. GCAPRIA pas rets on noton of Friday on WAAMGO, chairman and WZEDP secvitress. As 1983 of florers. GCAPRIA pas pass of the St. WAAMGO of NAMGO of WAAMGO of WAAMGO of WAAMGO of WAAMGO of WAAMGO of WAAMGO of WAAMGO

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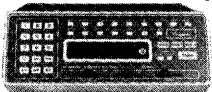
SOUTHWESTERN DIVISION

ARIZONA: SCM, Erich J. Holzer, N7EH — STM: W7EP.
NMs: WA7FDN WA7KOE, July has ended on a fine note, with the Ft. Tuthill Hamfest. Many thanks to ARCA for sponsoring the event and to W7YS and the CCARC for organizing the League booth. We appreciate the fact that vice birector WBSUIA was able to attend. His recap of the ARIBL Board meeting was interesting, I enjoyed meeting many of the section's members. I would also like to congratulate K7ESA on being awarded the Arizona Ham of the Year Award. The AZ Weather Net meets at 0630 MST on the Wildflower (144,75/145.35) rptr. KC7IG reports the ORP-ARCI sanctioned net has changed its name to the Cactus Country Nst. It meets at 0200Z Thursdays (Wed. local) on 7.040 MHz. KO7Y reports that WB7CON has upgraded to Advanced. New appointments: KB7XN, DEC Coconino Co.; N6BVS, DEC Apache Co. N7CVT has started up the Jonito Emergency Comm. Net, which meets on 146,0 MHz. at 2000 MST on Mon., Wed., and Fri. It is with great sachess that I report the following Silent Keys: WA6LBO N7BC WB7UPA. I plan to change over the section to the new Field Org. Structure on Jan. 1. I will be looking for increased member participation, PSHR: W7EP. ATEN; QNI 794, QTC 167. Cactus Net: ONI 986, QTC 117. SWN: QNI 208,

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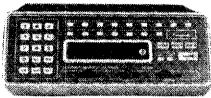
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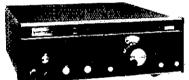
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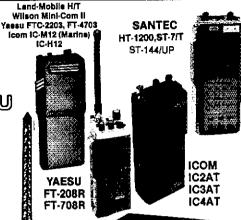
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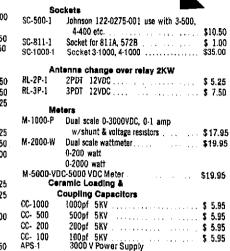
El	ectrolytic Capacitor	Co	ils
€G-125	125uf 500 voft DC \$ 3.95	TIC-1	Toroidal tun
D.	odes	_	specify freq
D-3-A		FTC-1	Final Tank
	High voltage supply diodes 1KV, 3A \$ 1.00		8877, 572
02-8.5-2	Zener 8.2 volt 50 watt ,	FTC-2	Tank Coil - :
S	vitches	VARIABLE	CAPACITO
SB-6	6 position 4 section 2KW PEP	Pla	te
00-0	ceramic switch	A-250-75	250pf 3.5
	with tuned input switching voltage	A-225-120	225pf 4.5
	use with 3-500, 4-400, 5728	A-232-45	250pf 2.2
SB-5	5 position 1 section use with		,
30-0			iding
BD-6	811's or sweep tubes \$ 9.50	A-1100-53	1100pf 3 se
DU-0	Planetary Ball Drive for variable caps	A-1000-32	1000pf 2.5
	6:1 ratio ¼ shaft	A-800-32	800pf 2.5
Tu	ned input	Die	te Chokes
ATI-6	Complete PC board tuned input board with	PC-811-1A	
	6 toroidal coils, 12 trimmer capacitors	PC-500-2A	
	6-DPDT relays and coax, fully assembled		Use with 3-
	tuneable 1.8 - 30 mhz matches any	F0-1000-2M	8777 etc.
	amplifier 6¼ " x 3¼ ", 12 VDC \$79.50		0111 file.
		Fili	ment Choke
	bes	FC-30-A	30 amp chol
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811A	\$14,50	Plat	te Caps
5728		PC-500-1	Aluminum F
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8877 EIMAI	C	PC-811-1	Use with 81:
813		PC-8877-1	Aluminum H
	All parts brand new		For 8874, 8
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C	oils	
TIC-1	Toroidal tuned input coils	
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Lo	Loading						
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KYNMQ 8, WAYYUL 8, K7POF 4, WAYNXL 3, KGYY 3, NTCVT 2.

LOS ANGELES: SCM, Stan Brokl, N2YQ — SEC: NBUK. STM: K5DY. Congrats to KA6LCY for being named employee of the month at the UCLA hospital and clinics. WB5BYC has bought an IBM personal computer and is busy writing programs for it. If you are thinking of buying a PC, contact him before you give the salesman all your money. He may be able to prevent you from making a mistake. Congrats to NF6C and KE6IU who were picked Hams of the Month, "Mother and Son" by the Western Amateur RA in Cerritos, Ca. KE6IU is ARES EC in LAX Southern District, Sub-area 4. I'm leaving for Minesota tomorrow for one week of fishing and swimming on the family take in the northern part of the state. The League net, on Thursdays 8:00 PM. on K8QQN/R, will resume the third week of September. See you then, Traftick K6IVK 193, WASOCM 157, K76D 66, WBINH 50 WASUVO 28, WD6CZW 14, WSNKE 6, K6CL 4, (June) WA6UVO 1.

Itic: K6ITYK 193, WA6OCM 157, KT6D 66, WBINH 50, WA8I VO 26, WD6CZW 14, W6NKE 6, K6CL 4. (June) WA8I VO 11.

ORANGE: SCM, Fried Heyn, WA6WZO — ASCM: WA6WZN, STM: KN6C, SEC: W6UBQ, Simulated simergency test (SET) will be held Oct. 16th. Get involved on contacting your EC listed below for info: Involved to contacting your EC listed below for info: Involved to contacting your EC listed below for info: Involved W6UBQ). W6EVEN: W6E

Dullietins, Irafflic; KS91 528, WSN1N Z29, WSSCB2 29; WASRW20 204, WASROCA 159, NSGIW 13, WSCFB 112; KSZCE 29, WG1, Y 26, KASDZU 22, WSRE 20, WSPNS 12, KSGSS 10, WSBFRS 8, WSTKV 6, WASRWN 4, KSKI 2. SAN DIEGO: SCM, Arthur R, Smith, WSINI — STM: NSGW, SEC: WSINI. ECs by district: WASRWN 4, KSKI 2. SAN DIEGO: SCM, Arthur R, Smith, WSINI — STM: NSGW, SEC: WSINI. ECs by district: WASRYN 4, KSKI 2. SAN DIEGO: SCM, Arthur R, Smith, WSINI — STM: WASRWAIL MORTH CO. Tro Net held 30 sess., handled 17D mags. WASZKC has retired as NM. Many thanks for a lob well done. Palomar ARC members NSENI WD6FWE and WBSIGS, assisted by NE6T and WSINI of the 220 club, landscaped the Palomariz20 club rpit site to meet the specs of the park ranger. For six and one half years, WASPJJ has managed the ARES 145.2 net without missing a session. He has found it necessary to retire. His exemplary performance is greatly appreciated. Our heartfelt thanks. The new NM Is KMSS, Welcome aboard. Do you know that only one out of ten illcensed Amateur Radio Operators in San Diego Co. are registered in ARES? Do you know that only one out of ten illcensed Amateur Radio Operators in San Diego Co. are registered in ARES? Do you know that only one out of thirty are the hard-core responding to emergencies, drills, and public service events? We otta do better than that! The newly-formed Coronado ARES unit provided comms for the 4th of July parade. Tratflic: KT6A 511, KJED 320, KM6I 249, WSHUJ 163, KeHAP 131, N6AT 28, N6GW 17. (June) KSHAP 125, K6AE 9.

SANTA BARBARA: SCM, Robert N, Dyruff, WSPOU — So. Cal. gov't heads briefed on test program, linking OES offices via Z-80 compatible CP/M micros via hamadio, System programmers sought for people sheltering/relocating, damage assessment, message handling. Contact WSPOU, SILENT KEY. Vent. Co. Jost WASTIMO. Elmer to many hams, Poinsettia ARC. Publ Svc: Over 850 ham-hours tailied over 6/21 SBAP Co. quake drill; guick response from WPSS ops via WD6BNH, with easist from Normar tailed over 6/21 SBAP Co. polst WASTIMO. SI

WEST GULF DIVISION

WEST GULF DIVISION
NORTHERN TEXAS: SCM, Phil Clements, K5PC —
ASCM: WASOFD. STM: W5VMP. SEC: W5GPO. NMs:
K05FX K45MAY AA5J WD5JYI AE5I. Yours truly and
W5GPO have had the pleasure of attending some great
hamiests this summer: the Oklahoma State ARRL Convention, the NW Texas Emergency Net 17th annual
reunion and swapfest, at Levelland, Hamcom '82 at
Dallas, the Midland Swapfest, and the Golden Spread
Amateur Padio Convention at Canyon, near Amarillo.
We thoroughly enjoyed renewing old acquaintances and
meeting new ones. There have been lots of ARES
planning and logistical sessions, and many new
operators signed up as operators and Emergency Coordinators. Many counties still are without an active ARES

group and a disaster plan. Please contact your SEC, Charles Byars, W5GPO, In Wichita Falls for details in getting started in your area. Don't forget the Toxoma Hamarama on October 22. 23 and 24th at Lake Texoma Lodge. There will be a major joint Toxas-Oklahoma ARES forum on Saturday, as usual. All N. Texas ECs are urged to attend, or at least send an asst. to get filled in on all the new happenings. Lots of Interest has been shown in formulating an RTTY net to handle health and welfare the during times of disaster. We need a volunteer NM to make this fille project a reality. The summer doldrums are about over, and the higher traffic and PSHR scores, along with better propagation, should be forthcoming soon. New officers for the ARC of Carrollton. K05LU, pres; K63E, v.p.; N5EW, secv.; K65A, treas.; KC5OA, dir. of engr. The club reports a very successful FD with the added bonus of a satellite str. this year. The club also operates rptrs on both 2 meters and 450 MHz. The Key City ARC out Abiline way rpts 60 in attendance at FD with 140 contacts. OVS KE5C rpts some meteor and aurora scatter contacts during July, with W4DFK (VA), and WB7QBC (WY) and K2IBP (on EME). The Richardson Wireless Klub, K5RWR had another good year at FD with 1152 cw and 1823 phone QSOs, operating 24. The Klub is having its annual "Antenna Match" antenna gain contest in October. PSHR: KA5AZK WDASHH KC5NN: K5B W5VMP. Traffic: K5ASAZK WDASHH KC5NN: K5B W5VMP. Traffic: K5ASAZK WDASH



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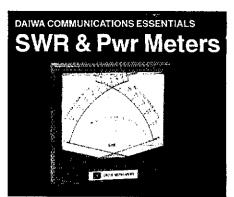
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Model CN-720B (New 2 Kw Scale)

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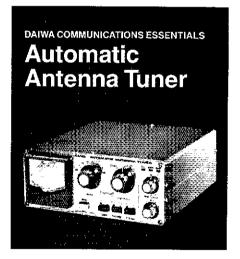
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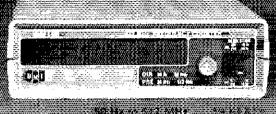
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	(2612	\$259.95	50 Hz-1.2 GHz	0.1 PPM 20"-40"C PROPORTIONAL		15 to 50 MV.	#5 to 50 MV to 450 MHz	110 VAC 8-15 VDC
1	D1200	\$299.95	10 Hz-1.2 GHz	10 MHz OVEN	. 9	15 to 50 MV	20 to 100 MV to 1 GHz	

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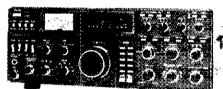
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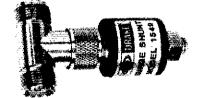
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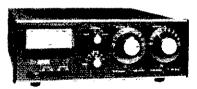
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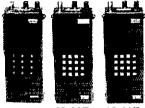
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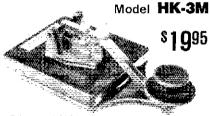
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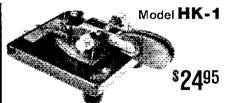
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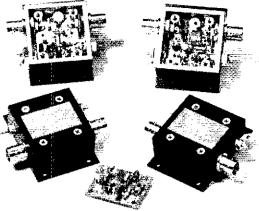
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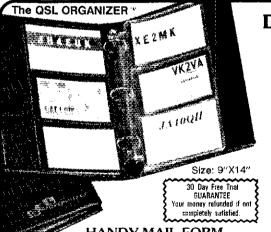
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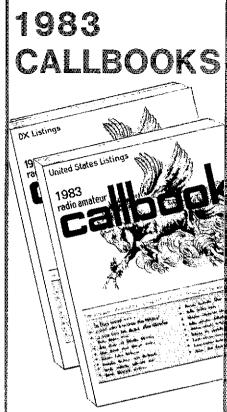
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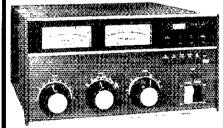


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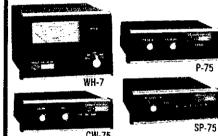
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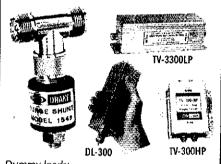
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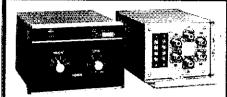
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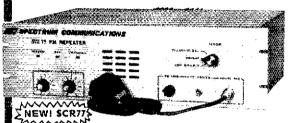
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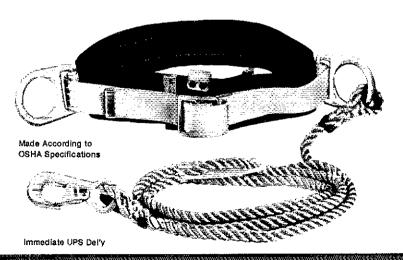
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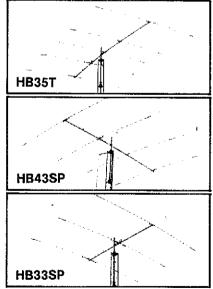
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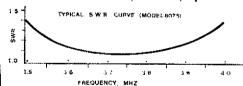
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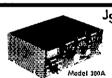
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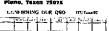
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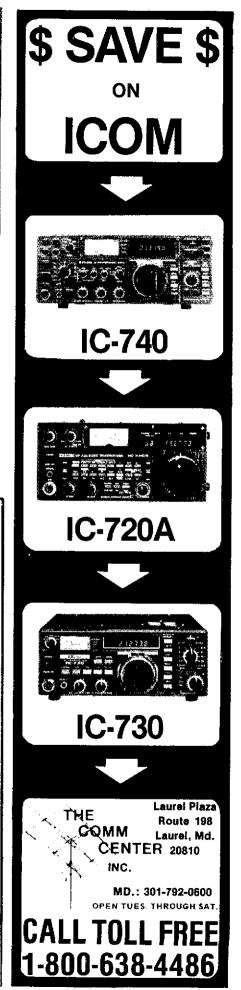
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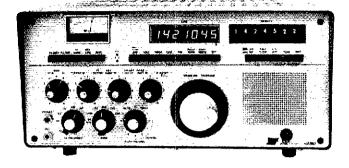
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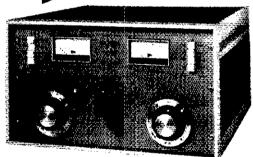


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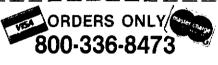
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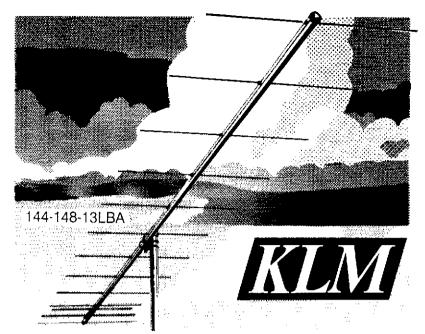
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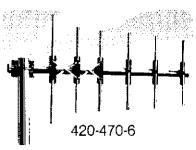
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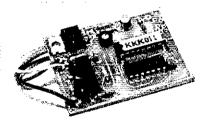
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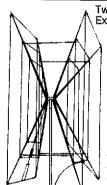


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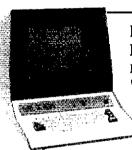
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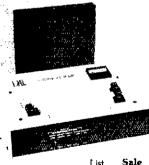
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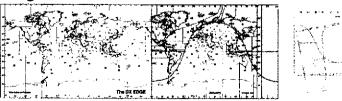
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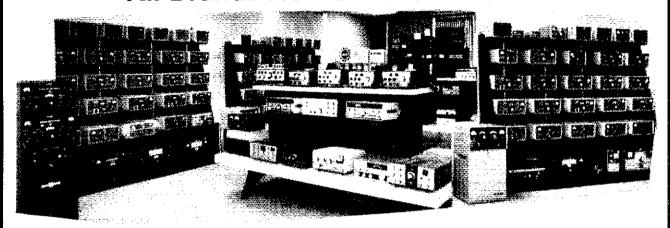
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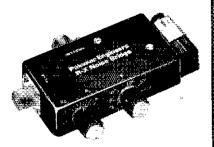
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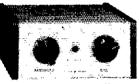
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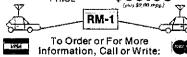
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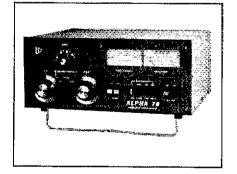
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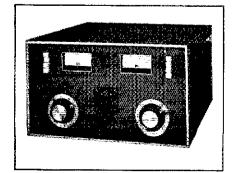
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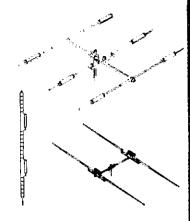
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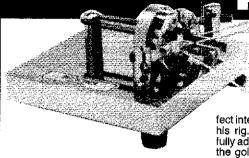


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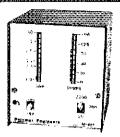
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AEA: Advanced Electronic Application: 108, 133, 149, 176

A-5 Amateur Television Magazine: 166

AGL Electronics: 97, 156 A to Z Crystal Co.: 141

Advanced Computer Controls: 164

Advanced Receiver Research: 147 Alpha Delta Communications: 145 Amateur Electronic Supply: 151

Amateur Radio Supply Co.: 176 Amateur Radio Supply of Nashville:

A.R.S.O.N.: 165

Amateur Wholesale Electronics: 109, 123 American Radio Relay League: 102, 106, 107,

124, 170, 177

Ameritron Inc.: 121 AMP-LETTER Co: 164

Amp Supply Co.: 139 Antenna Bank, The: 160

Antenna Specialists Co.: 158

Appliance & Equipment Co. Inc.: 112

Associated Radio: 172 Autek Research: 160

Autocode: 164

Barker & Williamson: 129

Barry Electronics: 138

Bencher: 120, 174, 177 Ben Franklin Electronics: 140

Birch Hill Sales: 161

Blacksburg Group, The: 157

Britt's 2-Way Radio: 139

Buckmaster Publishing: 146 Butternut Electronics: 104

CComm: 152, 153

Caywood Electronics, Inc.: 136 Colorado Silver Co.: 173

Command Productions: 172

Comm Center, The: 157

Communications Center: 137, 142 Communications Design, Inc.: 139

Communications Specialists: 119

Courage Handi Hams System: 161

Crown MicroProducts: 140

Cubex Co.: 162

Curtis Electro Devices: 146

Cushcraft: 5, 101, 128

DGM Electronics: 132

DX Print: 156

Daytapro Electronics: 173

Delaware Amateur Supply: 174 DigiMax Instruments Corp.: 142

Drake Co., R.L.: 110, 117, 134

EGE, Inc.: 168 ECS Inc.: 148

ETCO Electronics: 173

E-TEK: 174

Ehrhorn Technological Operations: 175

Electronic Equipment Bank: 128, 144

Fair Radio Sales: 170

Fox-Tango Corp.: 129, 172

GLB Electronics: 166

Gem Quad Products Ltd.: 165

G.I.S.M.O.: 132

Gotham Antennas: 131

HAL Communications: 1,

Ham Key Co.: 144

Hamlen, Harry A, K2OFL: 165

Ham Radio Center: 103, 141

Ham Radio Outlet: 94, 95 Ham Shack, The: 133

Harrison: 143

Harvey Sound, Inc.: 120

Heath Co.: 115 Henry Radio Stores: Cover II

Herrman, Ted AE8G: 156

ICOM America, Inc.: 2, 113, 144

IIX Equipment Ltd.; 131 Inline Instruments: 168

JSR Engineering: 156 Janel Laboratories: 168

Johnston, Bill: Computerized Great Circle

Maps: 172

Jun's Electronics: 155

KDK Distributing Co. Inc.: 105

KLM: 162

Kantronies: 100, 130, 142, 164

Kengore Corp.: 176

LaCue Communications & Electronics: 157

Larsen Electronics: 118

LaRue Electronics: 140

Lattin Radio Labs: 147

MCM Communications: 116

MFJ Enterprises: 127, 129, 131, 133

M&M Electronics: 112

Macrotronics: 126 Madison Electronics: 111

MarKit: 173

Miami Radio Center Corp.: 136 Microcraft: 132, 170, 172

Microlog: 114

Mid Com Electronics: 148

Mil Industries: 147

Miller Division, J.W./Bill Industries: 141

Mmi-Products: 169

Mirage Communications Equipment, Inc.: 171

Missouri Radio Center: 146, 164

Mosley Electronics, Inc.: 176

Murch Electropics: 169 N&G Distributors: 98, 99

N.P.S. Inc.; 174

National Radio Institute: 135

National Tower Co.: 102

Nemal Electronics: 173 Nye Co., William: 150

P.C. Electronics: 139

Palomar Engineers: 174, 178

Payne Radio: 159 Power Communications: 161

Printed Products Co.: 142

RCA Service Co.: 131 Radio Amateur Callbook: 149

Radiomasters: 150

Radios Unlimited: 128 Radio Warehouse: 144

Radio Wholesale: 129

Radio World: 145, 174

Robot Research: 180 Rockwell International/Collins Telecommunications:

Ross Distributing Co.: 156

Rusprint: 104

Santec: 4

Sartori Associates: 170

Sherwood Engineering: 140, 170

Skylane Products: 176

Space Electronics: 171

Spectronics, Inc.: 116

Spectrum Communications: 154

TET Antenna Systems: 155

Telex Communications, inc.: 124, 125

Telrex Labs: 96 Ten-Tec: 163

Texas Towers: 166, 167, 179

Tokyo High Power Labs: 111 TOWTEC Corp.: 136

Trio-Kenwood Communications: 6, 7, Cover IV

Tristao Tower Co.: 162

Tufts Electronics: 170 UPI Communications Systems, Inc.: 154

Universal Electronics: 141

Universal Mfg. Co.: 129

Universal Radio: 171 Van Gorden Engineering: 165

Vanguard Labs: 161

Vibroplex Co.: 173

VoCom Products Corp.: 171 W2KK Computerized Propagation Forecasts: 177

W91NN "Folded Uniroid" Antenna: 164

Wacom Products: 160

Western Electronics: 168

West Jersey Communication Products: 156 Wrightapes: 166

Xantek, Inc.: 169 X1TEK: 148

Yaesu Electronics Corp.: Cover III

Zephyr Services: 168

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Outstanding features providing maximum ease of operation include a large, easy to-read (direct sunlight or dark) LCD display, 21 multi-function memories, automatic offset, programmable priority channel, memory and band scans, built-in lithium battery memory back-up, built-in 16-key autopatch, and a choice of a hefty 45 watts output (TR-7950), or 25 watts output [TR-7930].

TR-7950 FEATURES:

 NEW, large, easy-to-read LCD digital display

Easy to read in direct sunlight or dark (back-lighted). Displays transmil/receive frequencies, memory channel, repeater offset, (+,S,-), sub-tone number (F-0, 1, 2, 3), tone, scan, and memory scan lock-out. Includes LED S/RF bar meter, and LED indicators for REVERSE, CENTER TUNING, PRIORITY, and ON AIR.

- 21 NEW, multi-function memory channels Stores frequency, repeater offset, and optional sub-tone channels. Memories 1 through 15 for simplex or \pm 600 kHz offset. Memory pairs 16/17, and 18/19 are paired for non-standard repeater offset. Memortes "A" and "B" set upper and lower scan limits, or for simplex or ± 600 kHz offset. In MEMORY mode, a circle of light appears around the memory selector knob. When the memory selector knob is rotated in either direction to channel 1, an audible "beep" will sound.
- Choice of 45 or 25 watts output The TR-7950 provides a hefty 45 watts output, while the TR-7930 features a more modest 25 watts. A HI/LOW power switch allows power reduction to approx. 5 watts.

Built-in lithium battery has an estimated 5 year life.

Automatic offset

The microprocessor is pre-programmed for simplex or ± 600 kHz offset, in accordance with the 2 meter band plan. "OS" key allows manual change in offset.

Programmable priority alert The PRIORITY channel may be programmed in any of the 21 memories. With ALERT switch "ON," a dual "beep" sounds when a signal is present on the PRIORITY channel. Än OPER switch allows an easy move to the PRIORITY channel.

- Programmable memory scan lock-out key for programming scan to skip selected memory channels, without erasing the memory
- Programmable band-scan width The lower limit may be programmed into memory "A," and the upper limit into inemory "B"
- Center stop during band-scan, with indicator

Stops in center of channel during bandscan, with center tuning indicator.

- · Scan resume selectable Sean stops on busy channel. Selectable automatic time resume scan (approx. 5 sec., adjustable), or carrier operated resume-scan. A scan delay of approx. L5 seconds built-in.
- Scan control using up/down microphone Momentarily pressing UP or DOWN button on microphone tunes one step in the selected direction, on memory or on 5-kHz step tuning. Holding the button for about 2 seconds starts UP or DOWN automatic scan action. Scan start also possible using "SC" key on keyboard. Scan may be cancelled by momentarily pressing the PTT switch, or by pressing both UP/DOWN buttons simultaneously.

- Long-life lithium battery memory back-up
 Programmable sub-tone channels Optional TU-79 3 frequency sub-tone un provides keyboard selectable sub-tone channels, which may be stored in memory.
 - Built-in 16-key autopatch, with monito The keyboard functions as a 16 key autopatch during transmit, DTMF fones appear in the speaker output when a key is pressed during transmit.
 - Front panel keyboard control Used for selecting frequency, offset, programming memories, controlling scan. and autopatch encode. Keyboard lighting is providèd.
 - Extended frequency coverage Covers 142.000-148.995 MHz, in 5-kHz steps.
 - · Repeater reverse switch Locking-type switch, with indicator.
 - "Beeper" amplified through speaker
 - Compact, lightweight design
 - Easy-to-install adjustable-angle mobile mounting bracket

Optional accessories:

- TU-79 3 frequency tone unit.
- KPS-12 fixed-station power supply tor TR-7950.
- KPS-7 fixed-statton power supply. for TR-7930.
- SP-40 compact mobile speaker.

More information on the TR-7950 and TR-7930 is available from all authorized dealers of Trio-Kenwood Communications IIII West Walnut Street, Compton. California 90220.

