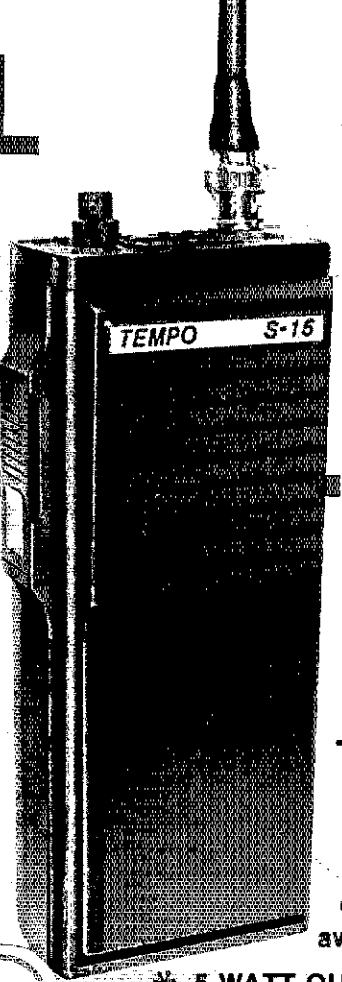

QST
March 1982 $2.50
devoted entirely to Amateur Radio
Amateur Radio links wilderness family to "lower 49"
Page 54
ARRL

the ALL NEW tempo S-15...



...more radio ...less money

TEMPO'S ALL NEW S-15 SYNTHESIZED HAND HELD OFFERS IMPORTANT FEATURES AT A PRICE THAT DEFIES COMPARISON.

Compare these features with any other hand held available... the S-15 is the obvious choice

- 5 WATT OUTPUT (1 watt low power switchable)
- "EASY REMOVE" BATTERY PACK
- 1 HOUR QUICK CHARGE BATTERY SUPPLIED (450 ma/HR)
- BNC ANTENNA CONNECTOR & FLEX ANTENNA
- EXTREMELY EASY TO OPERATE
- PLUG FOR DIRECT 13.8 VOLT OPERATION
- 3 CHANNEL MEMORY. (1 channel permits non-standard repeater offsets. 200 micro amp memory maintenance (standby)).
- VERY SMALL AND LIGHT WEIGHT (only 17 ounces)
- 10 MHz FREQUENCY COVERAGE: 140-150 MHz (150-160 for export customers)
- AMPLE SPACE FOR PROGRAMMABLE ENCODER
- SPEAKER/MICROPHONE CONNECTOR
- ELECTRICALLY TUNED STAGES (receiving sensitivity and output power are constant over entire operating range)
- LOW PRICE...$289

S-15 with touch tone pad...$319

SUPPLIED ACCESSORIES:
Rubber antenna • Standard charger • Ear phone • Instruction manual • 450 ma/HR battery (quick charge type)

OPTIONAL ACCESSORIES:
1 hour quick charger (ACH 15) • 16 button touch tone pad (S15T) • DC cord • Solid state power amplifiers (S-30 & S-80) • Holster (CC15) • Speaker/mike (HM 15)

Tempo S-2
Enables you to use 220 MHz repeaters throughout the U.S.. The S-2 is thoroughly field tested and offers a long life of dependable service. A good way to get into 220 MHz operation if you're not on yet and with the addition of a Tempo power amplifier you can build a small base station or a powerful mobile rig. $289 S-2T...$319

NEW REDUCED PRICES!

Tempo S-4
The first 440 MHz hand held and still a winner...offers the perfect way to get into an uncrowded band. Check one out at your local Tempo dealer or write Henry Radio. $289 S-4T...$319

Boost the power of your hand held or mobile unit with a Tempo solid state power amplifier. A broad range of power outputs available at very affordable prices. Please write for literature.

Tempo M1
Tempo does it again! This time with the world's first and only ALL CHANNEL synthesized hand held marine transceiver. The Tempo M1 operates on all marine channels...both U.S. and international, plus four weather channels. This is a real working tool and a hobby rig with hundreds of uses. It is skillfully engineered and built to provide endless hours of hard use. 1 watt low power—2½ watts high power positions. And the price...LESS THAN $500.

Available from Tempo dealers and **Henry Radio**

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1-100 WPM Morse
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2 Page
Display

72 or 36
Character
Lines

Status
Indicator
on Screen

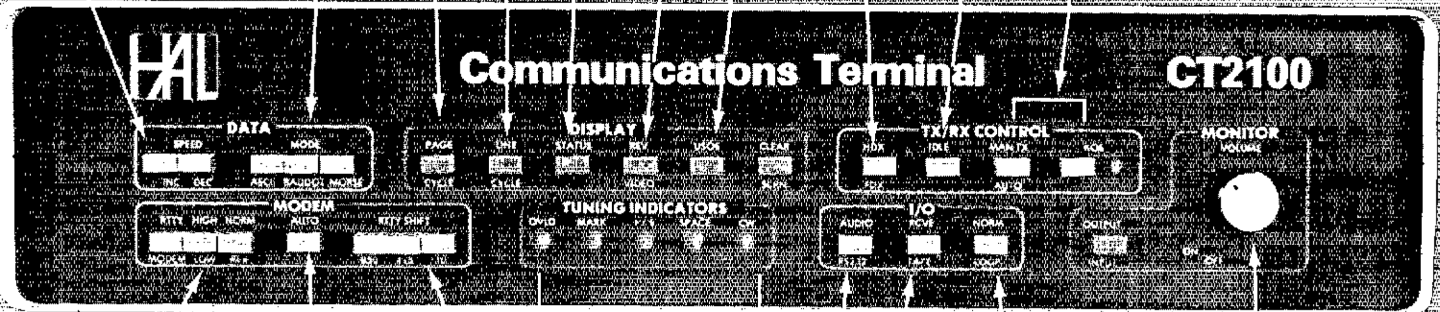
Black
or
White
Characters

Unshift
on
Space
(For Baudot)

Half
or
Full
Duplex

Synchronous
Idle
("Diddle")

Auto
TX/RX
Control



Four Internal
RTTY Demodulators
• High Tones (U.S. Standard)
• Low Tones (IARU Standard)
• 103 Modem (1070/1270 HZ)
• 202 Modem (1200/2200 HZ)

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All 3 RTTY
Shifts
(High or Low Tones)

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

Audio or
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Data

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and Receive
With RTTY Loop Devices

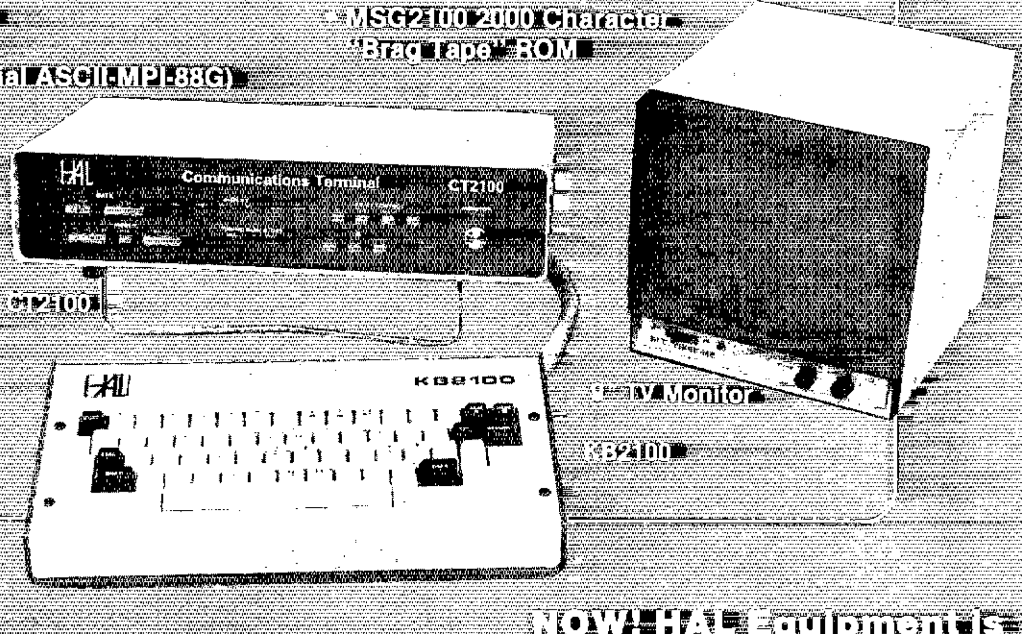
Input Audio
From
Receiver or Tape

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

CT2100 System:

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

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



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NOW! HAL Equipment is in stock at leading Amateur Dealers. See page 146 for the location of your nearest dealer.

ICOM IC-290

The Latest State of the Art in 2 Meter Mobile

5 Memories/Priority/Scan/Squelch on SSB.

FM Base.
- Five memories [illegible] your favorite [illegible]
- [illegible] your most important [illegible]
- [illegible]
- [illegible]

SSB/CW [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]
- CW [illegible]
- AGC [illegible]
- NB [illegible] SSB/CW.

[illegible]ability
- [illegible] between [illegible] memories [illegible]
- [illegible] resume [illegible] carrier drop [illegible]
- Adjustable [illegible]
- 15 KHz or 5 KHz FM [illegible]
- Stop on busy or empty [illegible]

ICOM Performance
- 143.8 to 148.[illegible]
- [illegible]
- Digital frequency display [illegible] significant digits [illegible]
- [illegible] power switch
- LED indicators: RECV/SEND/PRIO/DUP
- [illegible]
- [illegible]
- [illegible]
- [illegible]

ICOM

[illegible] Avenue N.E., Bellevue, WA [illegible]
[illegible] Dallas, TX [illegible]

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March 1982 *Volume LXVI Number 3*

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THE COVER

With no neighbors, no regular mail service and no electricity, the Mueller family was cut off from civilization — except for Ann's hastily developed operating prowess, and Dwight's ingenuity. See page 54.
(Photo by Dwight Mueller)

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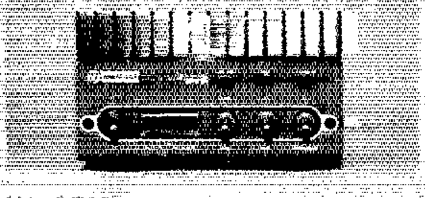
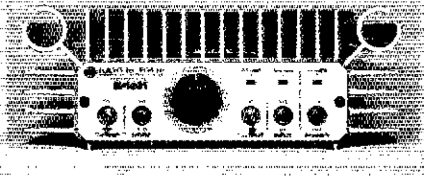
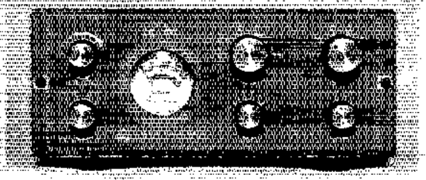


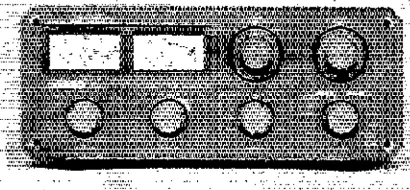
HL-82V — 10W to 80W 2 mtr power amp with 12db gain MOS-FET Rx preamp. Selectable output power levels and a precision output power meter. SSB or FM/CW operation. $159.95 Suggested Retail.



HL-160V — 3W input to 12W input produces 160W of output with 12db MOS-FET preamp. SSB, CW, FM, AM modes. Coaxial relay on output side. If you want to "hawg" the frequency, this is it... the "Boss Hawg" amp. $349.95 Suggested Retail.



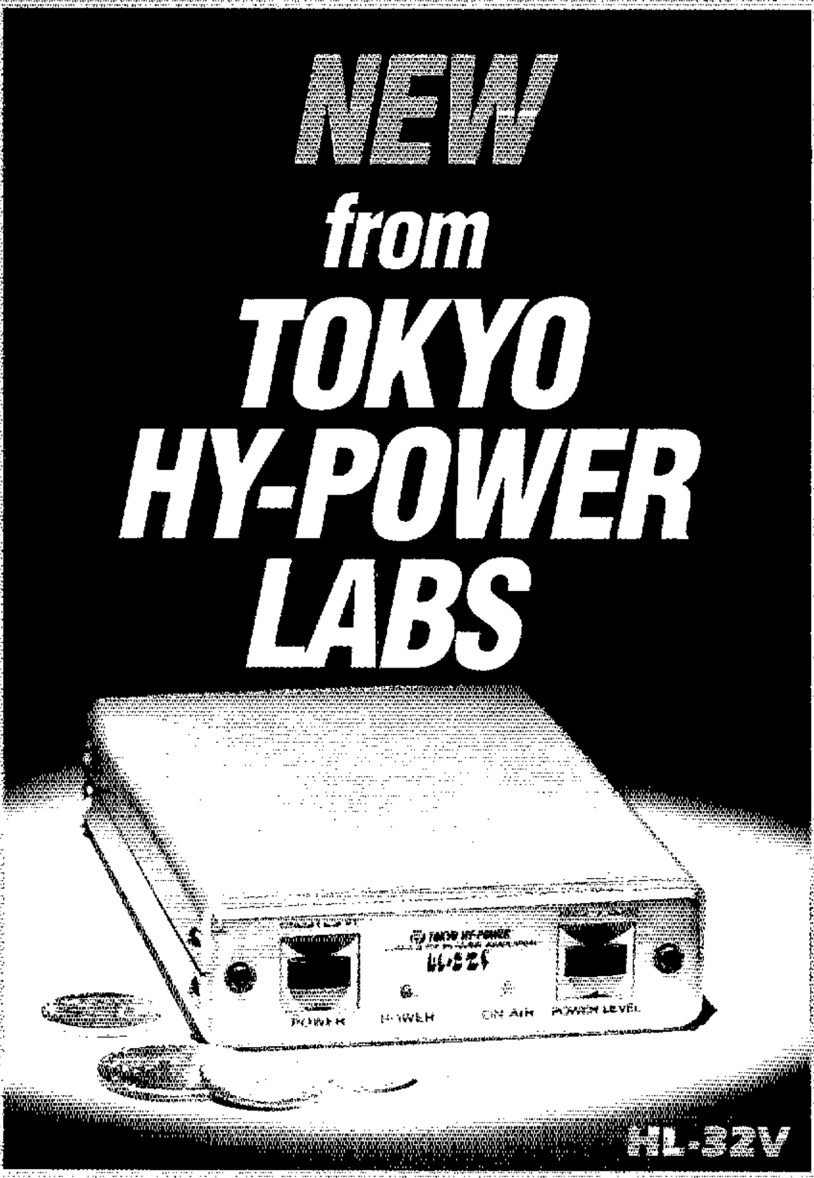
HC-150 — Our most popular antenna coupler. Handles 150W output transceivers from 3.5 to 30 MHz WARC bands, 10 ohms, to 250 ohms & accurate SWR & power meter (± 10%). Coupler or direct function. Ceramic coils. Quality throughout. $99.95 Suggested Retail.



HC-2000 — The ultimate in quality transmatch design and construction. Takes a full 2 kW output at peak on most bands. Accurate VSWR and separate FWD metering. 3 coax & 2 wire antennas and dummy port, plus bypass. One box, coax switch, power meter, antenna tuner: what could be more convenient! $349.95 Suggested Retail.

TOKYO HY-POWER LABS., INC.

Long the quality leader among fine Japanese communications equipment manufacturers, TOKYO HY-POWER LABS now makes these outstanding units available to you through American dealers. Now you can get our advanced features and quality at your kind of prices.



This is it! The compact HL-32V VHF handy-amplifier from THL. This low profile unit produces 10W to 30W of output with drive from your 0.5W to 3W handheld.

Turn it on with the convenient front panel controls including PWR LED and TX LED or slip the package under the seat out of sight and out of mind. Low insertion loss on receive and selectable power level design provides low VSWR to the transceiver. Use with any talkie from 0.5W to 3W for 10W to 30W output. Linear mode for SSB or FM (switch selected). And the best news of all: the price is only $89.95! Suggested Retail. At your favorite dealer now!

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SAITAMA, JAPAN

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Watt's new...on 2 meters?

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

TR-9130

The TR-9130 is a powerful, yet compact, 25 watt FM/USB/LSB/CW transceiver providing increased versatility of operation on the two meter band. It features six memories, memory scan, memory back-up capability, automatic band scan, all-mode squelch, CW semi break-in, and incorporates microprocessor technology. It is available with a 16-key autopatch UP/DOWN microphone (MC-46), or a basic UP/DOWN microphone.

TR-9130 FEATURES:

- **25 Watts RF output**
  All modes, (FM/SSB/CW), utilize a new high power linear module, for more reliable FM operation and increased DX on SSB or CW.
- **FM/USB/LSB/CW all mode operation**
  For added convenience in all modes of operation, the mode switch, in combination with the digital step (DS) switch, determines the size (100 Hz, 1 kHz, 5 kHz, 10 kHz) of the tuning step, and the number of digits displayed.
- **Six memories**
  On FM, memories 1 through 5 for simplex or ±600 kHz offset, with the OFFSET switch. Memory 6 for non-standard offset. All six memories may be operated simplex, any mode.
- **Memory scan**
  Scans memories in which data is stored. Stops on busy channels.
- **Internal battery memory back-up**
  With 9 volt Ni-Cd battery installed, (not KENWOOD supplied), memories will be retained approximately 24 hours, adequate for the typical move from base to mobile. A terminal is provided on the rear panel for connecting an external back-up supply.
- **Automatic band scan**
  Scans within whole 1 MHz segments (ie., 144.0-144.999 MHz), for improved scanning efficiency.
- **Dual digital VFO's**
  Incorporates two built-in digital VFO's, selected through use of the A/B switch, and individually tuned.
- **Transmit frequency tuning for OSCAR operations**
  On SSB or CW, the tuning knob or UP/DOWN buttons on the microphone may be used to adjust the transmit frequency during transmission.
- **16-key autopatch UP/DOWN microphone version**
  The TR-9130 is available with the MC-46 16-key autopatch UP/DOWN microphone, or with the basic UP/DOWN microphone. Manual UP/DOWN scan of entire band possible using either microphone.
- **Squelch circuit on all modes (FM/SSB/CW)**
  The squelch circuit is effective on SSB, CW, and FM.
- **Repeater reverse switch**
  For checking signals on the repeater input, on FM.
- **Tone switch**
  For activating a tone device, (not KENWOOD supplied).
- **CW semi break-in circuit with sidetone**
  Built-in, for convenience in CW operations.
- **Digital display with green LED's**
- **High performance receive-transmit design**
  The use of a low-noise dual-gate MOSFET plus two monolithic crystal filters in the receiver front-end results in excellent two signal characteristics. Care in transmitter design assures clean signals in all modes.
- **Compact size and light weight**
  170 (6-11/16) W x 68 (2-11/16) H x 241 (9-1/2) D mm (inch), 2.4 kg (5.3 lbs.) weight.
- **Extended frequency range**
  Covers 143.9 to 148.9999 MHz, which includes certain MARS and CAP frequencies.
- **Transmit offset switch**
- **High performance noise blanker**
  Suppresses pulse-type noise on SSB and CW.
- **RF gain control**
  For all modes of operation.
- **RIT (Receiver Incremental Tuning) circuit**
  Useful during SSB/CW operations.
- **Amplified AGC**
  Enhances SSB and CW operation. The AGC time constant is automatically optimized for each mode of operation.
- **HI/LOW power switch**
  Selects 25 or 5 watts RF output on FM or CW.
- **Accessory terminal**
  A four pin accessory terminal is provided for use with a linear amplifier or other accessory.
- **Quick release mounting bracket** (Supplied)

More information on the TR-9130 is available from all authorized dealers of Trio-Kenwood Communications 1111 West Walnut Street, Compton, California 90220.

KENWOOD
...pacesetter in amateur radio

Accessories:

- KPS-7 Fixed station power supply.
- TK-1 AC adapter for memory back-up.

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

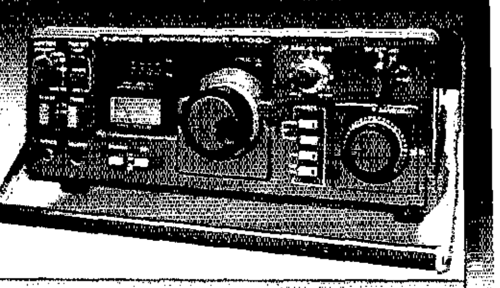
R-600

"Now hear this"...digital display, easy tuning

The R-600 is an affordably priced, high performance general coverage communications receiver covering 150 kHz to 30 MHz in 30 bands. Use of PLL synthesized circuitry provides maximum ease of operation.

R-600 FEATURES:
- 150 kHz to 30 MHz continuous coverage, AM, SSB, or CW.
- 30 bands, each 1 MHz wide, for easier tuning.
- Five digit frequency display, with 1 kHz resolution.
- 6 kHz IF filter for AM (wide), and 2.7 kHz filter for SSB, CW and AM (narrow).
- Up-conversion PLL circuit, for improved sensitivity, selectivity, and stability.
- Communications type noise blanker eliminates "pulse-type" noise.
- RF Attenuator allows 20 dB attenuation of strong signals.
- Tone control. • Front mounted speaker.
- "S" meter, with 1 to 5 SINPO "S" scale, plus standard scale.
- Coaxial and wire antenna terminals.
- 100, 120, 220, and 240 VAC, 50/60 Hz. Selector switch on rear panel.
- Optional 13.8 VDC operation, using DCK-1 cable kit.
- Other features include carrying handle, headphone jack, and record jack.

Optional accessories for R-600 and R-1000:
- DCK-1 DC Cable kit. • SP-100 External Speaker.
- HS-6, HS-5, HS-4 Headphones.
- HC-10 Digital World Clock.

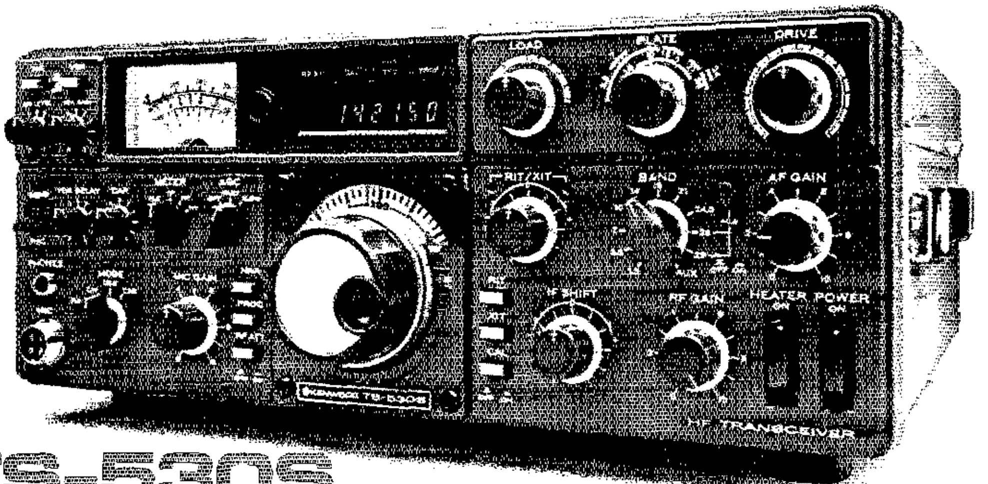


R-1000

High performance, easy tuning, digital display

The R-1000 high performance communications receiver covers 200 kHz to 30 MHz in 30 bands. An up-conversion PLL synthesized circuit provides improved sensitivity, selectivity, and stability.

R-1000 FEATURES:
- Covers 200 kHz to 30 MHz.
- 30 bands, each 1 MHz wide.
- Five-digit frequency display with 1-kHz resolution and analog dial with precise gear dial mechanism.
- Built-in 12-hour quartz digital clock/timer.
- RF step attenuator.
- Three IF filters for optimum AM, SSB, CW.
- Effective noise blanker. • Tone control.
- Built-in 4-inch speaker. • Dimmer switch.
- Wire and coax antenna terminals.
- Voltage selector for 100, 120, 220, and 240 VAC. Operates on 13.8 VDC with optional DCK-1 kit.



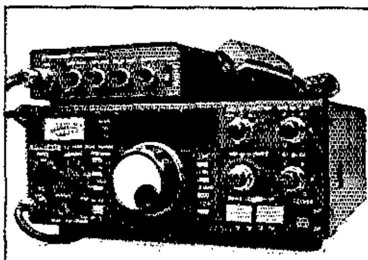
TS-530S

"Cents-ational"...IF shift, digital display, narrow-wide filter switch

The TS-530S SSB/CW transceiver covers 160-10 meters using the latest, most advanced circuit technology, yet at an affordable price.

TS-530S FEATURES:
- 160-10 meters, LSB, USB, CW, all amateur frequencies, including new 10, 18, and 24 MHz bands. Receives WWV on 10 MHz.
- Built-in digital display (six digits, fluorescent tubes), with analog dial.
- IF shift tunes out interfering signals.
- Narrow/wide filter selector switch for CW and/or SSB.
- Built-in speech processor, for increased talk power.
- Wide receiver dynamic range, with greater immunity to overload.
- Two 6146B's in final, allows 220W PEP/180 W DC input on all bands.
- Advanced single-conversion PLL, for better stability, improved spurious characteristics.
- Adjustable noise-blanker, with front panel threshold control.
- RIT/XIT front panel control allows independent fine-tuning of receive or transmit frequencies.

Optional accessories:
- SP-230 external speaker with selectable audio filters.
- VFO-240 remote analog VFO.
- VFO-230 remote digital VFO.
- AT-230 antenna tuner/SWR/power meter.
- MC-50 desk microphone
- KB-1 deluxe VFO knob.
- YK-88C (500 Hz) or YK-88CN (270 Hz) CW filter.
- YK-88SN (1.8 kHz) narrow SSB filter.



TS-660

The TS-660 "QUAD BANDER" covers 6, 10, 12, 15 meters.
- FM, SSB (USB), CW, and AM
- Dual digital VFO's
- Digital display
- IF shift built-in
- 5 memories with memory scan
- UP/DOWN microphone
- All-mode squelch
- Noise blanker
- CW semi break-in/sidetone
- 10 W on SSB, CW, FM; 4 W on AM.

Optional accessories:
- PS-20 power supply
- VOX-4 speech processor/VOX
- SP-120 External speaker
- MB-100 Mobile mount
- YK-88C, YK-88CN CW filters
- YK-88A AM filter.

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*Executive Committee Member

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Illinois	Larry M. Keeran, K9ORP, 706 East Fremont, Bloomington 61701 (309-829-7389)
Indiana	Bruce Woodward, W9UMH, 6208 Bramshaw Rd., Indianapolis 46220 (317-251-5606)
Wisconsin	Roy Pedersen, K9FHI, 510 Park St., Juneau 53039
Dakota Division	
Minnesota	Helen Haynes, WBØHOX, 3101 N.W. 18th Ave., Rochester 55901 (507-288-2437)
North Dakota	Lois A. Jorgensen, WAØRWM, Box 55, Abercrombie 58001 (701-553-8724)
South Dakota	Erwin C. Helmbuck, Jr., KØOTZ, 3312 Parkview, Rapid City 57701 (605-348-5433)
Delta Division	
Arkansas	Dale E. Temple, W5RXU, 1620 Tarrytown Rd., Little Rock 72207
Louisiana	John J. Meyer, N5JM, 112 Sherwood Forest, New Orleans 70119
Mississippi	Paul C. Kemp, WB5SNB, 3581 Beaumont Dr., Pearl 39208 (601-939-7612)
Tennessee	John C. Brown, NO4Q, P. O. Box 37, Eva 38333 (901-584-7531)
Great Lakes Division	
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Michigan	James R. Seeley, WB8MTD, 14630 Clinton Rd., Springport 49284 (517-569-2411)
Ohio	Allan L. Severson, AB8P, 1275 Ethel Ave., Lakewood 44107 (216-521-1565)
Hudson Division	
Eastern New York	Paul S. Vydareny, WB2VUK, 259 N. Washington, North Tarrytown 10591 (914-631-7424)
N.Y.C. & Long Island	John H. Smale, K2IZ, 315 Kensington Ct., Copiague 11726 (516-226-4835)
Northern New Jersey	Robert E. Neukomm, KB2WI, 404 O'Brien Ct., Wyckoff 07481 (201-891-3064)
Midwest Division	
Iowa	Bob McCaffrey, KØCY, 3913-29th St., Des Moines 50310 (515-279-9848)
Kansas	Robert M. Summers, KØBXF, 3045 North 72nd, Kansas City 66109 (913-299-1128)
Missouri	Larry G. Wilson, KØRWL, 5415 E. 97th St., Kansas City 64137 (816-966-8953)
Nebraska	Shirley M. Rice, KAØBCB, 510 East 16th St., Scottsbluff 69361 (308-632-4337)
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Eastern Massachusetts	Richard P. Beebe, K1PAD, 6 Tracy Cir., Billerica 01821 (617-667-5609)
Maine	Clevis O. Laverty, W1RWG, 17 Fair St., Norway 04268 (207-743-2353)
New Hampshire	Robert Mitchell, W1NH, Box 137-A, Chester 03036 (603-895-3456)
Rhode Island	Gordon F. Fox, W1YNE, 13 York Dr., Coventry 02816 (401-828-6045)
Vermont	Robert L. Scott, W1RNA, 9 Laroe St., Swanton 05488 (802-868-4944)
Western Massachusetts	William Hall, W1JP, Prospect Hill Rd., Brimfield 01010 (413-245-7140)
Northwestern Division	
Alaska	Richard Henry, AL7O, P.O. Box 451, Tok 99780 (907-883-5507)
Idaho	Lemuel H. Allen, Jr., W7JMH, 1800 S. Atlantic St., Boise 83705 (208-343-9153)
Montana	L. C. "Les" Belyea, N7AIK, P. O. Box 327, Belgrade 59714 (406-388-4253)
Oregon	William R. Shrader, W7QMU, 2042 Jasmine Ave., Medford, 97501 (503-773-8624)
Washington	Joseph N. Winter, WA7RWK, 819 N. Mullen St., Tacoma 98406 (206-759-9857)
Pacific Division	
East Bay	Bob Vallio, W6RGG, 18655 Sheffield Rd., Castro Valley, CA 94546 (415-537-6704)
Nevada	Ralph E. Covington, Sr., W7SK, P. O. Box 7750, Reno 89510 (702-322-7988)
Pacific	J. P. Corrigan, KH6DD, Box 698, Kaneohe, HI 96744
Sacramento Valley	Norman A. Wilson, N6JV, Rte. 1, Box 730, Woodland, CA 95695 (916-666-1465)
San Francisco	Robert Odell Smith, NA6T, 320 Park St-P.O. Box 1425, Fort Bragg, CA 95437 (707-964-4931)
San Joaquin Valley	Charles P. McConnell, W6DPD, 1658 W. Mesa Ave., Fresno, CA 93711 (209-431-2038)
Santa Clara Valley	Jettie B. Hill, W6RFF, 22410 Janice Ave., Cupertino, CA 95014 (408-255-6714)
Roanoke Division	
North Carolina	Ian C. Black, WD4CNR, Rte. 5, Box 79, Murphy, 28906 (704-837-5684)
South Carolina	Richard McAbee, W4MTK, 205 Jewel St. N.W., New Ellenton 29809 (803-652-2596)
Virginia	Byron C. "Luck" Hurder, WA4STO, Box 167, Seven Fountains 22653
West Virginia	Karl S. Thompson, K8KT, 5303 Pioneer Dr., Charleston 25312 (304-776-4352)
Rocky Mountain Division	
Colorado	Lawrence E. Steimel, WØACD, 1750 Roslyn St., Denver 80220
New Mexico	Joe Knight, W5PDY, 10408 Snow Heights Blvd., N.E., Albuquerque 87112
Utah	Leonard M. Norman, W7PBV, 933 South Cedar Knolls, Cedar City 84720 (801-586-9859)
Wyoming	Richard G. Wunder, WA7WFC, Box 2807, Cheyenne 82001 (307-634-7385)
Southeastern Division	
Alabama	Hubert H. Wheeler, W4IBU, 2100 Buckingham, Huntsville 35803 (205-881-9168)
Georgia	Edmund J. Kosobucki, K4JNL, 5525 Perry Ave., Columbus 31904 (404-322-2856)
Northern Florida	Billy F. Williams, Jr., N4UF, 911 Rio St. Johns Dr., Jacksonville 32211 (904-744-9501)
Southern Florida	Woodrow Huddleston, K4SCL, 219 Driftwood Ln., Largo 33540 (813-584-0984)
West Indies	Julio Negroni, KP4CV, Georgetown, No. 269, Rio Piedras, PR 00927 (809-764-8099)
Southwestern Division	
Arizona	Erich Holzer, N7EH, 3526 E. March Pl., Tucson 85713 (602-326-8976)
Los Angeles	Stanley S. Brokl, N2YQ, 2645 North Marengo Ave., Altadena, CA 91001 (213-798-8827)
Orange	Fried Heyn, WA6WZO, 962 Cheyenne, Costa Mesa, CA 92626 (714-549-8516)
San Diego	Arthur R. Smith, W6INI, 4515 Melisa Way, San Diego, CA 92117 (714-273-1120)
Santa Barbara	Robert N. Dyruff, W6POU, 1188 Summit Rd., Santa Barbara, CA 93108 (805-969-3073)
West Gulf Division	
Northern Texas	Phil Clements, K5PC, 1313 Applegate Ln., Lewisville 75067 (214-221-2222)
Oklahoma	Leonard R. Hollar, WA5FSN, RFD 1, 710 South Tenth St., Kingfisher 73750 (405-375-4411)
Southern Texas	Arthur R. Ross, W5KR, 132 Sally Ln., Brownsville 78521 (512-831-4458)

THE AMERICAN RADIO RELAY LEAGUE, INC.

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

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

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

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

All general correspondence should be addressed to the administrative headquarters at Newington, Connecticut 06111.

A Message From the President: "Thanks, Everyone!"

In January 1972, the League's Board of Directors elected me the seventh president of the ARRL. In March of this year, the League's Board will elect the eighth president in the history of our fine organization . . . W2TUK/W2HD already noting the fact that 10 years is long enough today for anyone to hold an office as demanding and responsible as the ARRL presidency.

Personally speaking, the last 10 years have rocketed by, equaling the speed of our space-age technology. Reflecting upon these 10 years brings many thoughts of happiness to me. So many of your faces are before me with your hearty welcomes and expressions of appreciation . . . these times will long linger in my memory. Flying more than a half million miles, and fulfilling a promise to bring the League to its members, visits were completed to all 50 states, Canada, the Canal Zone and Puerto Rico. In many cases these visits were a first for a League president. Additional visits were made as an official League representative to the Bahamas, Bermuda, Chile, Great Britain, Panama and Peru. Once again, the hospitality and friendship experienced on these visits were outstanding and so typical of Amateur Radio when hands are extended in international friendship.

When the Board elected me president in 1972, that office also carried with it the responsibilities of the presidency of the International Amateur Radio Union (IARU), a job of momentous responsibility and awesome travel requirements. It seemed that the best approach was to separate the two offices and, fortunately, the Articles of the IARU provided for such an eventuality. The Board recommended Bob Denniston, WØDX, as IARU president and Bob was elected by the IARU member societies and was subsequently followed by Noel Eaton, VE3CJ, who has carried the IARU flag in recent years which included the most significant event of those years, the World Administrative Radio Conference (WARC) of 1979. Few events in Amateur Radio have been so important, and it has been a very satisfying personal feeling to have been present during the planning and then applauding the superb execution of that planning at Geneva. It was a demonstration of teamwork at its very best and *QST* has covered the story very well in its reports. Thanks to those who labored so long and successfully for all of us.

Another planning project has recently been reported upon in the pages of *QST* and that is the work of the Long Range Planning Committee (LRPC). This committee, comprised of members of the Board, League members from outside the Board and Headquarters staff personnel, has taken a very deep look within the structure of the ARRL to determine how best it might serve Amateur Radio in the decades ahead. The work of the LRPC provides constructive ideas for the Board of Directors to consider for years to come. Thanks to the LRPC for its dedication and valuable contributions.

Often during my visits to clubs, hamfests and conventions, many of you have heard me state that the strength of our League rests heavily on the shoulders of our volunteers. Even if we could afford a Headquarters staff many times larger than we presently have, it would still be unable to perform the myriad of tasks accomplished by our dedicated and very professional volunteers in the field. From club members and officers and their local activities and moving up through the organizational structure of Section Communications Managers and section volunteers all the way to the League's Board, we find outstanding efforts put forth by members who voluntarily labor for the enjoyment of accomplishment and service. My personal thanks are extended to each and every one of you who has devoted your time so that Amateur Radio may exist for others.

There are other points which should be emphasized for further field activity. A prime example of one is our publicity program. It has been helped along immensely by many individuals and to some extent by the formation of the Public Relations Advisory Committee. Nonetheless, it still appears to me that we "don't blow our own horns long enough, loud enough or often enough!" We have a unique hobby . . . one which provides unmatched opportunities for public involvement and recognition. Let's shout about it!

With the help of our field workers, Advisory Committee members and others, let's all strive to put a little something extra back into Amateur Radio for all the enjoyment it provides. Too often, too many have drawn too much from the well without worrying about replacement. Our future is nothing without growth. Helping others to enjoy Amateur Radio is a very rewarding experience. Youth involvement can possibly result in our next generation of engineers and scientists. To those enjoying the fruits of their golden years, Amateur Radio might enhance those days. Can you help?

Oftentimes during visits in the field and in letters received, words of criticism were loudly put forth by those who stated that the League was not representing the members' interests adequately . . . that representation before the government agencies was almost nonexistent . . . that our assistance in legal problems was nothing but words with little or no action. To all those critics, let them know that their words were always heard or read, and where the criticism was found to be factual, positive responsive programs were established. Today, we find our representation in Washington meeting almost every need of Amateur Radio. League officers and staff have visited the FCC, the Departments of State and Defense and other agencies as appropriate to the needs of Amateur Radio.

No message of thanks would be complete without mention of the League's Headquarters staff and their outstanding efforts under the capable leadership of General Manager Dick Baldwin, W1RU, and his predecessor, John Huntoon, W1RW. Thanks also to the many directors, vice directors, vice presidents and others attending board meetings who have helped to steer the course of the League. Their contributions are recorded in the pages of

Amateur Radio history.

Taking a quick look into the future, my crystal ball sees greater Amateur Radio use of satellite communications as a direct result of those dedicated amateurs who have given so much to the OSCAR program. Other specialized communications techniques will be employed to speed communications and narrow bandwidths so that more stations can be accommodated. Our radio frequency spectrum is our most prized resource and should be used wisely and to its fullest extent with the proper communications taking place on the proper bands.

The future also has some clouds on the horizon. We still continue to have difficulties with RFI until the manufacturers of home-entertainment devices and other electronic aids do some protective work on their equipment. Changes in life style may continue to plague our antenna problems. Planned communities and condominium living are not conducive to sizeable antenna arrays or even the simplest of wires. Fortunately, these very difficulties may provide the technical challenge needed to bring sunshine to the scene. Remote stations with vhf, uhf or microwave links may spring forth and encourage community antenna facilities. Satellites may also provide opportunities for global communications via simple antennas and earth relay stations. There is little doubt that challenges to technology will be met with answers.

For me, 1982 marks the end of almost 30 years of elected, voluntary service to Amateur Radio. They have been rewarding years because the satisfaction of being a part of a dynamic hobby under the leadership of the ARRL is unbounded. Additionally, the knowledge of the respect with which our League is recognized outside our borders is extremely gratifying.

In closing this message to you, there is one point which must be mentioned. Surely, there have been occasions when your president failed to achieve something you desired. There have been occasions when letters went unanswered and notes were misplaced. My personal apologies are sent to each and everyone who experienced such treatment. It was never intentional and proves that no one is perfect. To those who have attacked me or the League, a very famous president once said these words: "If I were to try to read, much less answer, all the attacks made on me, this shop might as well be closed for any other business. I do the very best I know how . . . the very best I can; and I mean to keep doing so until the end. If the end brings me out all right, what is said against me won't amount to anything. If the end brings me out wrong, ten angels swearing I was right would make no difference." (Abraham Lincoln)

TNX A MEG & 73/88. BCNU on the air.
— Harry, W2TUK/W2HD

League Lines...

Special grace period for expired club and military recreation stations! If your club or military base had a station license that expired between March 11, 1977 and July 14, 1980, and it was lost because the one-year period of grace for renewal expired, the FCC will grant an application for renewal. This FCC offer is for a limited time only! The renewal application must be received by the Commission on or before June 1, 1982. The Commission established this special grace period at the request of ARRL after concluding that misunderstandings occurred during the intermediate steps in Docket 21135, taken to restructure the callsign assignment system.

Help us get on the new WARC bands! The new international frequency allocations agreed to in Geneva in 1979 must still be ratified, with the advice and consent of the U.S. Senate before U.S. amateurs can use the newly allocated frequencies. ARRL members residing in the following states may wish to write their Senators urging ratification of Senate Treaty Document 97-21, Radio Regulations and Final Protocols, Geneva, 1979: Charles Percy, R-IL, Howard H. Baker, Jr., R-TN, Jesse A. Helms, R-NC, S. I. Hayakawa, R-CA, Richard G. Luger, R-IN, Charles McC. Mathias, R-MD, Nancy L. Kassebaum, R-KS, Rudy Boschwitz, R-MN, Larry Pressler, R-SD, Claiborne Pell, D-RI, Joseph R. Biden, D-DE, John H. Glenn, D-OH, Paul S. Sarbanes, D-MD, Edward Zorinsky, D-NE, Paul E. Tsongas, D-MA, Alan Cranston, D-CA, and Christopher J. Dodd, D-CT. Address: The Honorable ________, U.S. Senate, Washington, DC 20510.

Confusion caused by the U.S. Air Force's assignment of KA1 callsigns to Marcus Island stations has been resolved. The Air Force has stopped using these call signs and will reassign KA2 call signs to its stations.

A bill to exempt ham gear from the New York state sales tax has been introduced into the state legislature. The proposal, if adopted, will amend New York Tax Law, Chapter 60, Article 28, Section 1115, so as to exempt from sales and use taxes "radio communications equipment, including but not limited to transmitters, receivers, antennas, towers and electronic peripheral equipment purchased by persons holding a valid 'Amateur Radio License' ..." The bill has come about partly in reaction to the state tax officials' disruption of the Rochester Hamfest last May when people were threatened with arrest and ordered to leave the Hamfest site for minor infractions of the NYS Sales Tax Law.

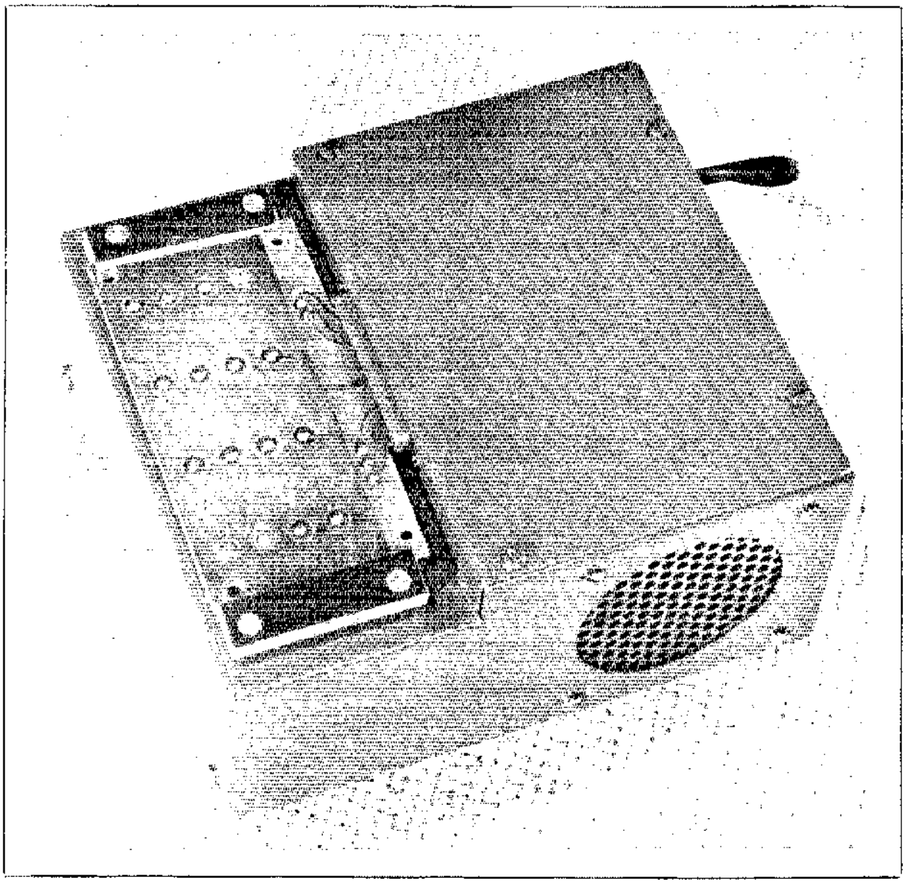
Florida radio amateurs are trying to be exempted from a bill that would outlaw "... any frequency modulation radio receiving equipment so adjusted or tuned as to receive messages or signals on frequencies assigned... to police or law enforcement officers..." More information about the bill, H.B. 129, is available from Billy F. Williams, N4UF, P.O. Box 9673, Jacksonville, FL 32208.

A Digital Readout System for the Visually Impaired Operator

Simple, easy-to-construct pad and digital techniques combine to enable the blind amateur to change operating frequency quickly and efficiently.

By J. C. Swail,* VE3FK

Most modern amateur transceivers display dial readings in digital form. It is almost essential for a blind operator to have a reliable, inexpensive and easy-to-use system that he or she can read. Several articles have described methods of presenting digitally displayed information to the visually impaired person. Some systems utilize synthetic speech output or an arbitrary audible code — usually, but not always, Morse code. I must use some such system to read the frequency of my transceiver.



Although any of the methods work well enough to indicate the frequency to which the equipment is tuned, they are cumbersome when trying to put a rig on a given frequency, such as a net or "sked" channel. The problem results because with these audio systems it is necessary to listen to the readout announcement repeatedly while making adjustments closer and closer to the desired point.

In the system I have devised, a combination of touch and sound are used to display the digits to the operator. All the dots that are required to display are permanently available; no moving parts are involved. These dots are arranged in rows of four to represent the binary-coded decimal (BCD) format. When a dot is touched, the sounding of a tone indicates the presence of the displayed digit. Thus, a desired frequency can very rapidly be dialed up by placing the fingers on the correct dots and rotating the knob to the required point.

Operation

In operation, BCD information is obtained from the appropriate point in the transceiver readout counter, i.e., at the input to the BCD-to-seven-segment LED driver. This information feeds to the touch-sensitive readout interface. The pads, which comprise the actual tactile readout, are formed as insulated islands on the circuit board, and are surrounded by bare copper. To construct the pads, drill a small hole in the center of each island, placing a very short piece of wire in the hole. Then build up the circle with

*National Research Council of Canada, Ottawa, ON K1A ØR8

solder to form a rounded dot.

The dots, arranged in columns of four, represent digits. These dots indicate, from top to bottom of a column, 1-2-4-8 (BCD). In the units built at VE3KF, the counter translates only four digits, the hundreds, tens, units and tenths of kHz. The operator should know the position of the band switch and thus the first two digits.

Touching a pad forms a high-resistance path between it and the main copper field of the board. This closes a solid-state switch. If that particular pad is involved in the representation of the digit then being displayed, a gate will be closed, initiating an audible tone. If the pad is not involved in that specific digit, the gate does not close, the tone does not sound and that pad is ignored. For instance, if the first and second dots sound, and the third and fourth are silent, then the number represented is three. On the other hand, if the first and fourth sound, while the second and third are silent, the number is a nine, and so on.

In one variation of the circuit, the BCD information is fed through a 1702 EPROM to convert it into the Braille code. Although Braille is formed from a 2 × 3 six-dot matrix, all the numbers 0 - 9 are formed from a 2 × 2 four-dot matrix. Thus, in this case, instead of printing vertical rows of four dots, they are printed in squares. However, experience with both systems has shown that most blind people adapt to the BCD representation quickly; it is certainly much simpler to design and build the circuits.

Circuit Description

Fig. 1 shows the simplest form of the system. This interface was used with a Yaesu FT-501 transceiver and YC355D frequency counter, as well as on a Heath IB-1101 counter. These units employ neon-type displays that are not multiplexed. Each digit has a separate BCD drive available. A 17-conductor ribbon cable connects the counter to the interface.

Each BCD input from the transceiver connects to the first input of a separate CMOS two-input NAND gate. The second input of each NAND gate goes to the dot corresponding to the appropriate BCD connection.

The 16-gate outputs combine in two eight-input OR gates, type 4048. These control the audio tone generator, and hence the speaker output. It is essential that the gates associated with the dots be the CMOS type; the resistance of a finger may be as high as 10 megohms — much too high for TTL circuitry.

Fig. 2 shows the circuit devised to interface with a multiplexed readout. This circuit works with my Yaesu FT-901DM. The NAND gates must be triple-input types because they must also receive information from the multiplex outputs of the

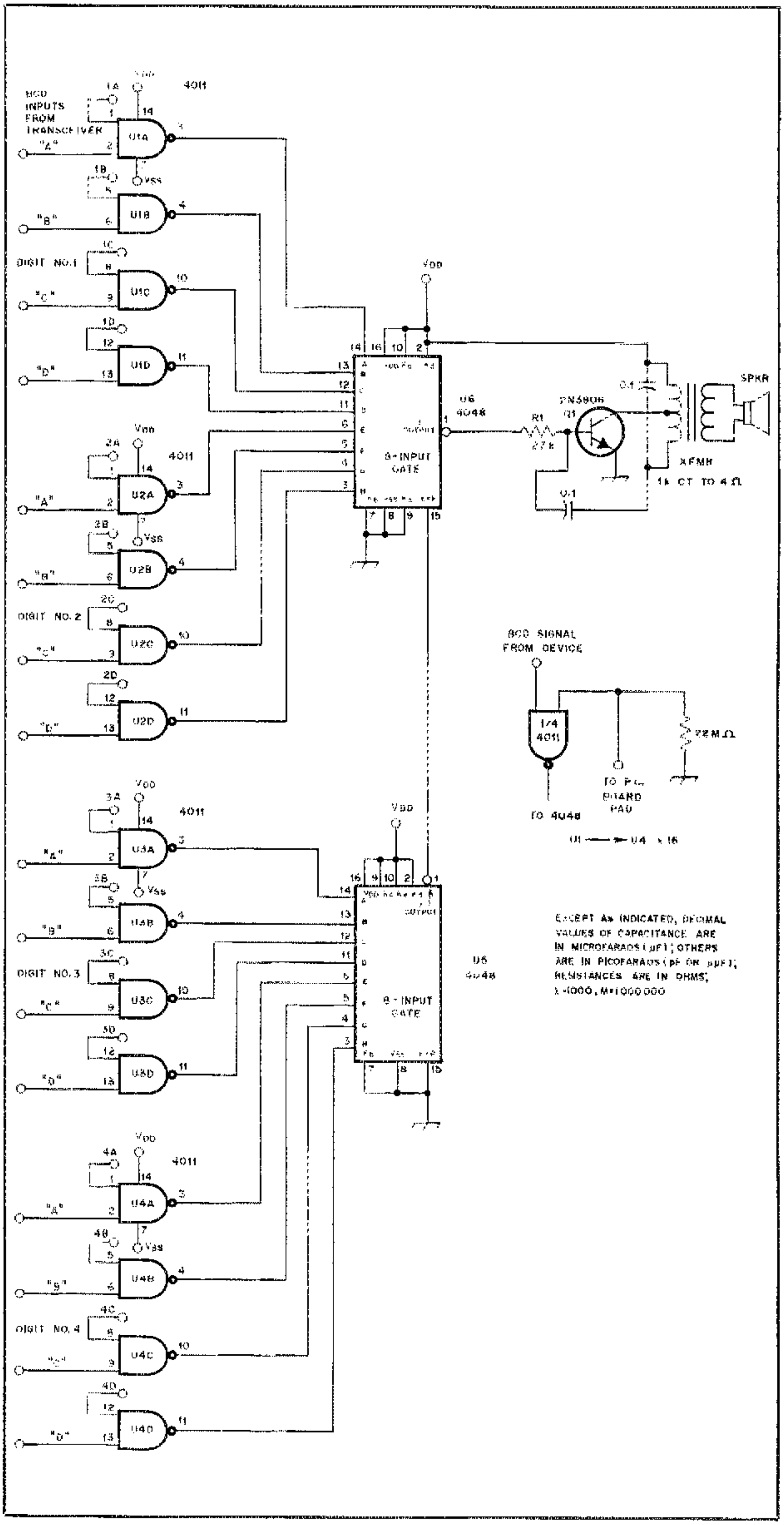


Fig. 1 — Four-digit auditory BCD readout. Capacitors are disc ceramic. Resistors are carbon-composition type, 1/4 watt.

T1 — Small audio output transformer. Primary, 1-kΩ center tapped, secondary 4 Ω. Radio Shack 273-1380 acceptable.

U1-U4, incl. — Quad two-input NAND gate CMOS IC, type 4011 or equiv.

U5, U6 — Multifunction expandable 8-input gate CMOS IC, type 4048 or equiv.

counter. When a pad is touched, the gate will not close unless both the appropriate BCD signal and the multiplex signal for that digit are simultaneously present. Again, two eight-input OR gates (4048s) combine the 16 NAND gates. It is not necessary to provide an audio generator, because the multiplexing frequency of a few hundred hertz will provide a tone; thus, the gates drive the audio amplifier directly.

In some transceivers it is difficult to get at the BCD information. The seven-segment information at the LEDs may be converted into BCD through the use of a Signetics 74C915 seven-segment-to-BCD converter. Fig. 3 shows a variation of the multiplex readout that was developed by Joe Blanchett, VE3BAD, for Bob LaRose, VE3EEK. This circuit interfaces Bob's FT-101ZD to a touch output. In this instance the multiplex pulses were too short for the reliable operation of the touch-sensitive system. Joe installed a pulse-stretching circuit. He also used the less expensive 4068 eight-input chips to combine the gates. In this case, it is necessary to use another two-input gate to combine the 4068 signals.

Interfacing the FT-707

Most of the counter functions in the FT-707 are accomplished by a single 40-pin IC. Frequencies from the VFO, carrier and mixing oscillators are combined in this chip and the output is the seven segment and multiplex signals that go directly to the LED transistor drivers. At this point several problems arise, at least as far as our interface is concerned.

First, BCD information is not available from the counter IC; second, the signals are inverted; that is zero is plus 5 volts and one is 0 volts. Last, in most LED displays, the number 7 is formed by lighting segments A, B and C; Signetics 74C915 seven-segment-to-BCD decoder chip is programmed in this way. However, Yaesu has chosen to represent 7 by adding the F segment to the A, B and C segments. The 74C915 decoder IC will not recognize it as a valid number.

Fig. 4 depicts a simple solution to this problem. The 11 signals from the counter, that is, the seven segment and four multiplex signals, pass through inverters to provide the right polarity for our purpose. The segment signals go to the decoder, with the exception of the F-segment signal. The inverted multiplex signals go to the gates, as in the other circuits.

Remember the extra F segment in number 7; we must arrange to present F to the 74C915 for the numbers 4, 5, 6, 8, 9 and 0, but not 7. Either segments D or G, or both, occur in all but 7. Thus, we apply D and G signals to the inputs of an OR gate, which will go to a 1 state if either or both of these is present. The output of this gate feeds one input of a NAND gate with

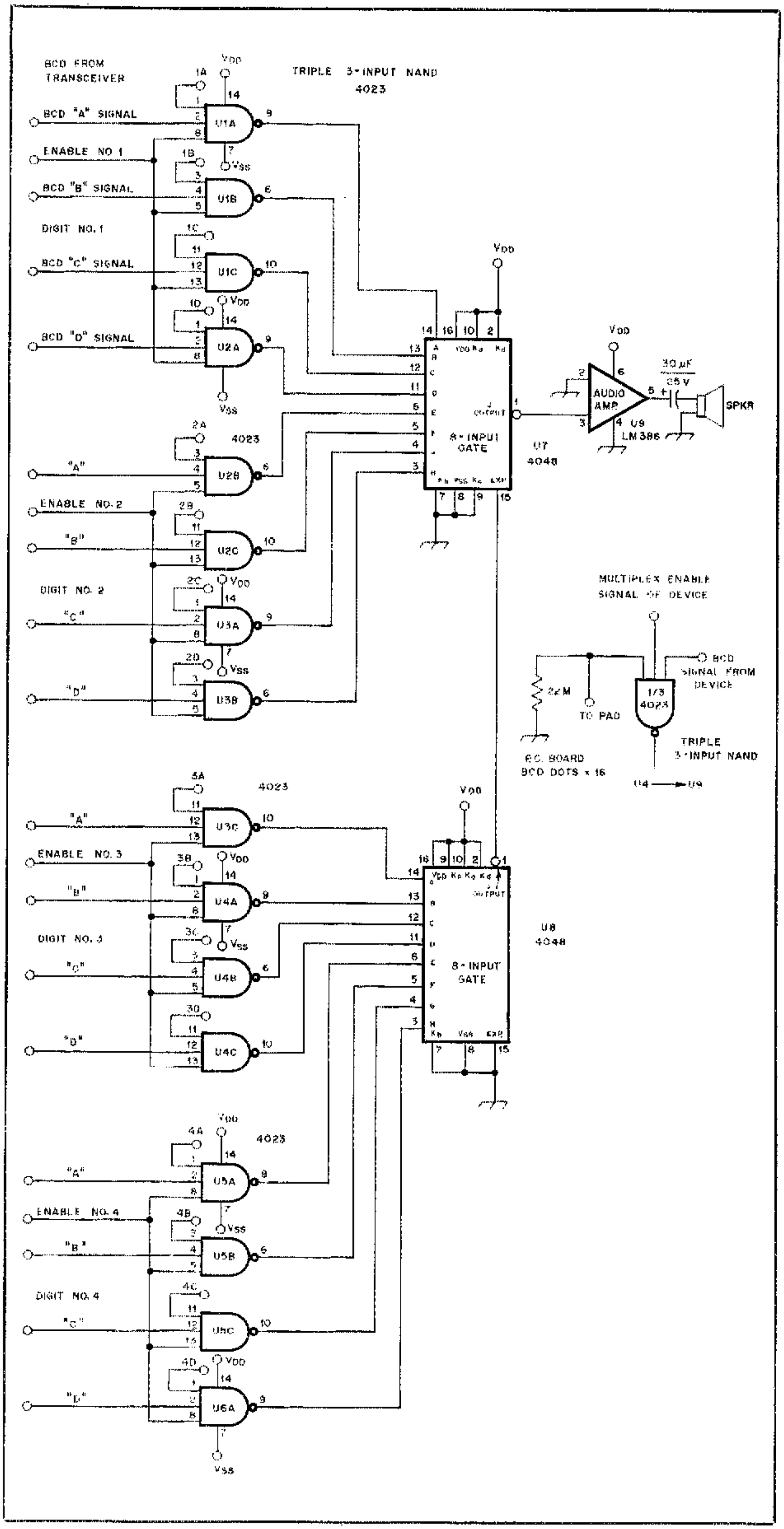


Fig. 2 — Four-digit auditory BCD readout for multiplexed signals. Capacitor is electrolytic. Resistors are carbon-composition type, 1/4 watt.

U1-U6 — Triple three-input NAND gate CMOS IC, type 4023 or equiv.
U7, U8 — Multifunction expandable 8-input gate CMOS IC, type 4048 or equiv.
U9 — Low-voltage audio power amplifier IC, type 386 or equiv.

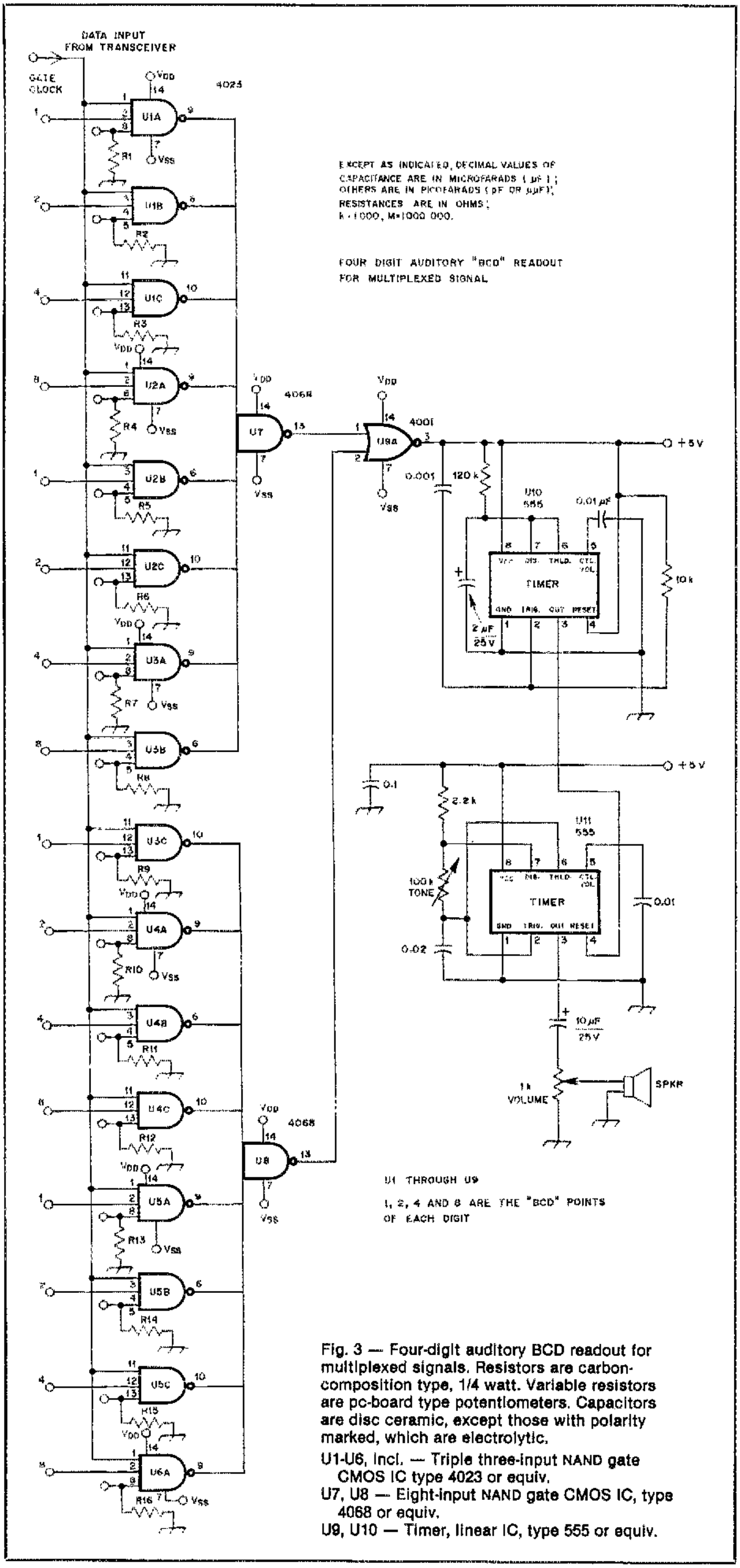


Fig. 3 — Four-digit auditory BCD readout for multiplexed signals. Resistors are carbon-composition type, 1/4 watt. Variable resistors are pc-board type potentiometers. Capacitors are disc ceramic, except those with polarity marked, which are electrolytic.

U1-U6, incl. — Triple three-input NAND gate CMOS IC type 4023 or equiv.
U7, U8 — Eight-input NAND gate CMOS IC, type 4068 or equiv.
U9, U10 — Timer, linear IC, type 555 or equiv.

Fig. 4 — BCD printed circuit board interface for Yaesu FT-707 transceiver with multiplexed signal. Capacitor is electrolytic. Resistors are carbon-composition type, 1/4 watt.

U1, U2 — Hex buffer/converter, inverting type, CMOS IC, type 4049 or equiv.
U3 — Seven-segment-to-BCD converter CMOS IC, type 74C915 or equiv.
U4-U9 — Triple three-input NAND gate CMOS IC, type 4023 or equiv.
U10, U11 — Multifunction expandable 8-input gate CMOS IC, type 4048 or equiv.
U12 — Low-voltage audio power amplifier IC, type 386 or equiv.
U13 — Triple three-input OR gate CMOS IC, type 4075 or equiv.

the other input being fed by the F signal. Thus the NAND gate will not switch if F only is present, but will switch if F is present together with either or both D and G. The output of the gate is inverted to reestablish correct polarity before going to the decoder.

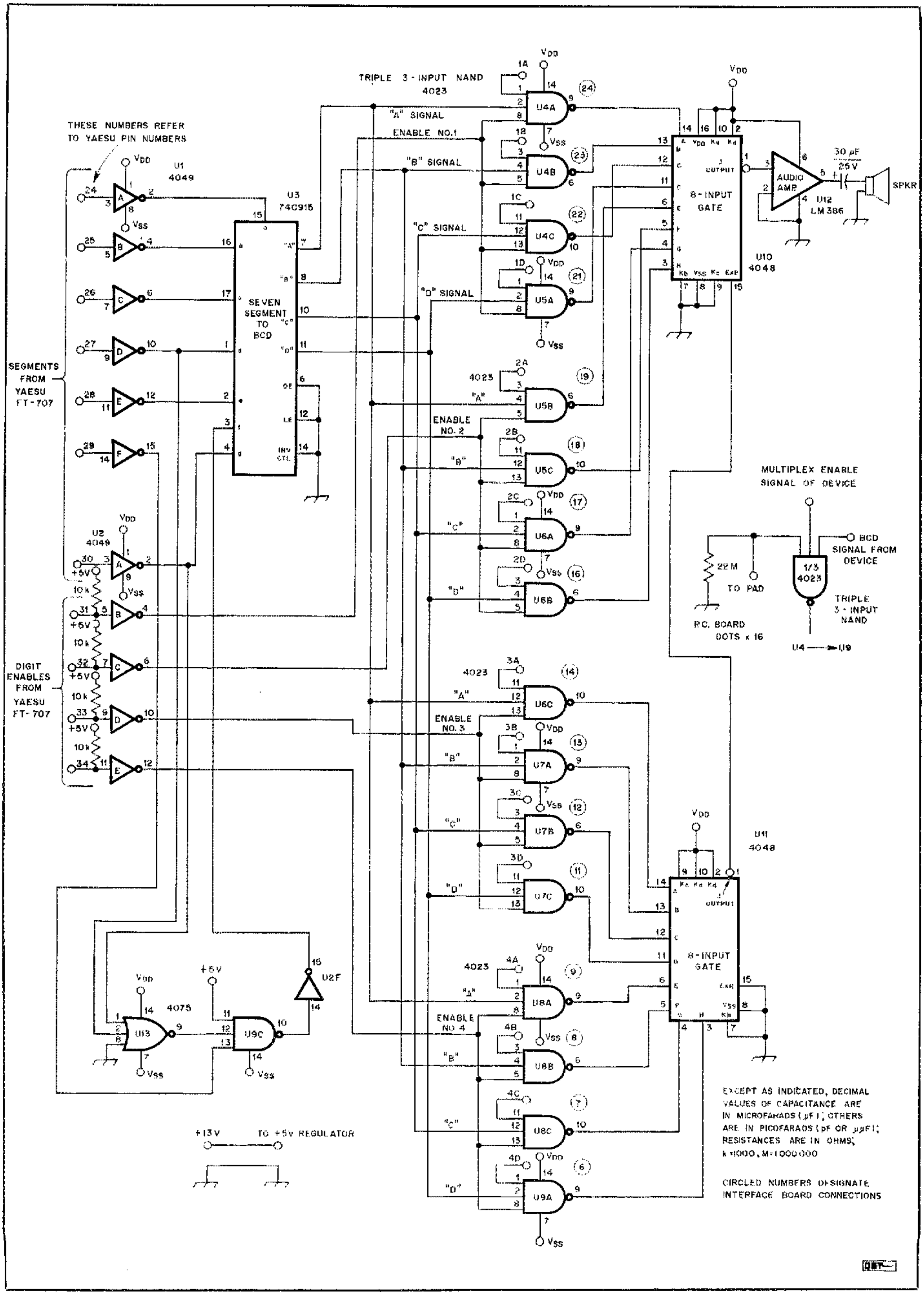
The readout connects to the transceiver by a 13-wire flat ribbon that may be passed into the unit through a small space under the top cover at the right rear. Solder it to the underside of the counter board.

Conclusion

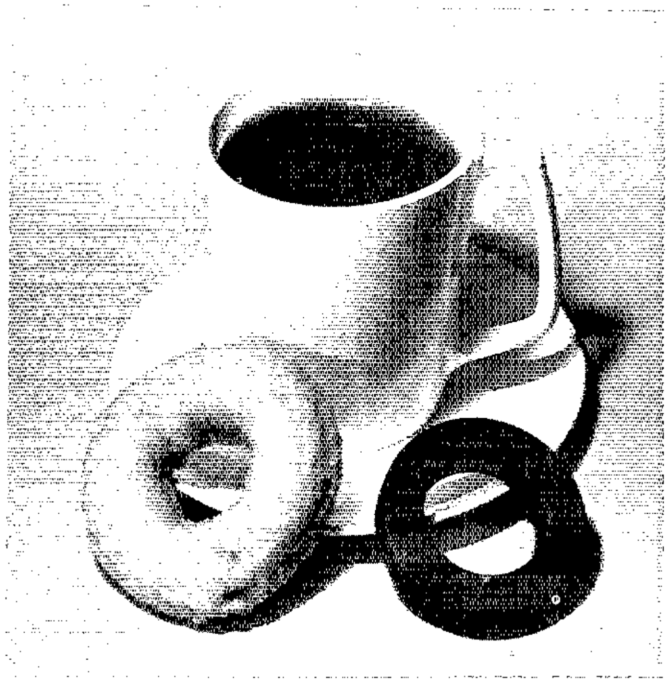
Although each model of transceiver or other digital instrument presents its own circuit problems, I believe the sample circuits shown will enable hams to work out variations to suit their requirements. Although the circuits may appear complex, all of the ICs are cheap, and the circuit arrangement is straightforward. This system is now in use by a number of Canadian amateurs, on calculators as well as on transceivers. I hope in the near future that customized counters incorporating this readout system will be available on the market.[1]

Jim Swail, born and raised in Montreal, lost his sight in an automobile accident at age four. In 1946, the same year he graduated from McGill University (BS), he was licensed as VE2TU. Shortly after graduation he began working for the National Research Council in Ottawa, where he changed his call sign to VE3KF. Jim's first project with NRC was working on time and frequency equipment. He designed the first digital control system for CHU. Since 1965 he has been fully engaged in developing vocational aids for the handicapped. He is married and has four grown children.

[1]For information, write J.C.U. Electronics, 7007 Huntridge Hill, N.E., Calgary, AB Canada.


THESE NUMBERS REFER TO YAESU PIN NUMBERS
SEGMENTS FROM YAESU FT-707
DIGIT ENABLES FROM YAESU FT-707
U1 4049
U2 4049
U3 74C915
SEVEN SEGMENT TO BCD
TRIPLE 3-INPUT NAND 4023
"A" SIGNAL
ENABLE NO.1
"B" SIGNAL
"C" SIGNAL
"D" SIGNAL
ENABLE NO. 2
ENABLE NO. 3
ENABLE NO 4
U10 4048
8-INPUT GATE
U11 4048
AUDIO AMP
U12 LM386
30 µF 25 V
SPKR
MULTIPLEX ENABLE SIGNAL OF DEVICE
BCD SIGNAL FROM DEVICE
1/3 4023
TRIPLE 3-INPUT NAND
22 M
TO PAD
P.C. BOARD DOTS x 16
U4 → U19
4075
U13
U9C
U2F
+13 V
TO +5 V REGULATOR
EXCEPT AS INDICATED, DECIMAL VALUES OF CAPACITANCE ARE IN MICROFARADS (µF); OTHERS ARE IN PICOFARADS (pF OR µµF); RESISTANCES ARE IN OHMS; k=1000, M=1000 000
CIRCLED NUMBERS DESIGNATE INTERFACE BOARD CONNECTIONS

Doughnuts for the Tennessee Valley Indians



Indians on the warpath? Try a powwow with coffee and doughnuts. (Drink the coffee, but don't eat the doughnuts.)

By John A. Wick,* W1HIR

TVI in a cable-TV area? How can my neighbor be having TVI when my own sets, fed from the same cable drop, are clean? Not only was my neighbor hearing funny sounding voices from his TV set when I was running my ssb 1-kw rig on 15 or 20 meters, but he was also hearing the other hams in the neighborhood. This made it harder to solve the problem initially because no correlation could be found between the operating habits of any one ham and the time the interference was noted. Finally, I ran a controlled test, using the telephone, with my neighbor observing his TV set while I operated the rig on 20 meters. It didn't take long to determine that my neighbor was receiving my transmissions very well! My antenna was closest to the problem set, so I decided that by eliminating the susceptibility of the TV set to my transmitter, I probably would be able to eliminate all of the strange voices he was hearing.

The problem was quite perplexing. Both houses were fed from the same cable drop and if my transmissions were getting into the CATV system, I should be able to detect spurious rf on my cable. There was nothing on the line that wasn't supposed to be there. The classic fix for TVI, the high-pass filter, would not work in this case because it had nothing to filter!

The Cause Emerges

How was the rf getting into the neighbor's TV set if I couldn't see it on the cable? After some thought and discussions with a local ham, Lloyd Ford, K1YSE, an explanation for the interference started to take shape. I was looking for the interfering signal in the wrong place! I had been looking for the signals between the center conductor and the shield of the CATV cable. Where I should have been looking was between the shield or center conductor of the cable and the power line at his TV set.

We commonly think of signals in terms of voltages existing between conductors. It is also possible for cables to act like antennas with the same voltage on both conductors. When this happens, the signal is referred to as a common-mode signal, in contrast to the signal existing between the conductors, which is referred to as the differential-mode signal.

The combination of power line and CATV cable was serving as an antenna, with the interference being a result of the common-mode antenna current flowing through the chassis of the TV set rather than differential-mode signals on the CATV cable.

Since the beginning of radio it has been known that two things are necessary to receive radio signals: an antenna and a detector. Some sort of tuner is needed only if selectivity is required. Reflection upon this brought to mind the old Marconi antenna system shown in Fig. 1. The configuration appeared a lot like the situation shown in Fig. 2. It's your choice whether the power line or the CATV cable is the antenna. With the Marconi antenna, the detector receives a signal because rf is flowing between the antenna and the counterpoise. If either is disconnected, current flowing through the inductor is greatly decreased, since only capacitance to ground remains for a current path.

Signal Detection

In the early days of radio, the detector coupled to such an antenna was some sort of nonlinear junction between two dissimilar materials, often a galena crystal and a metal "cat's whisker." In the case of a vulnerable TV set, at least one of the amplifying devices within the set has a signal region over which it is nonlinear. If strong signals are coupled to it through the wiring inside the TV set, it will demodulate the rf. With sideband, a distorted audio signal will be heard and, if the sideband signal is not too strong, interference will only be experienced on audio peaks. In such cases, no interference is noted when operating at lower power levels.

Eliminating rf rectification in a nearby TV set is probably not the most desirable way to prevent the reception of unwanted signals. Unless internal modifications are

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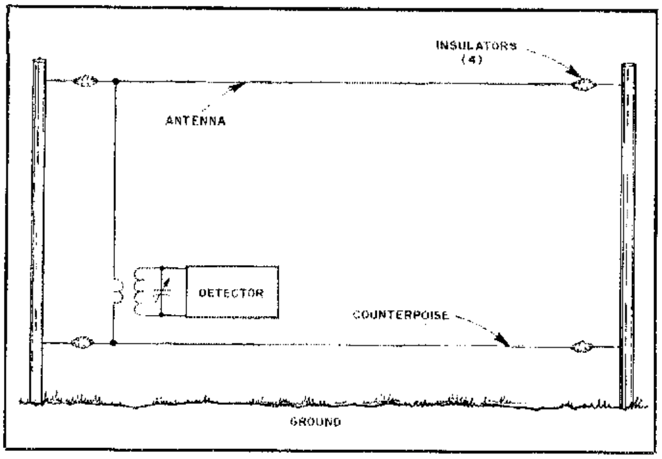

Fig. 1 — Marconi antenna with counterpoise.

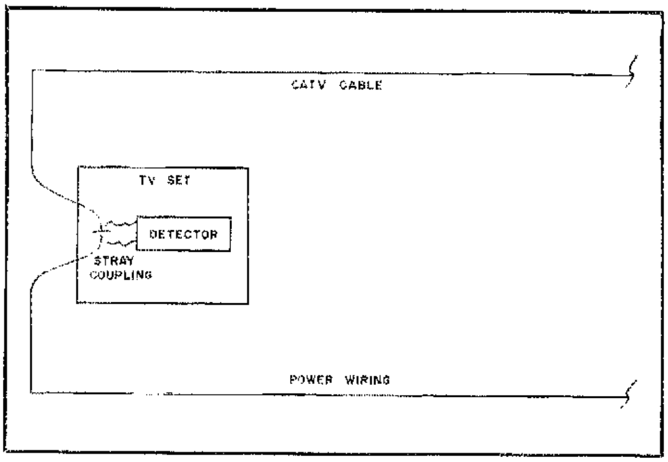

Fig. 2 — The CATV equivalent of a Marconi antenna.

made by a recognized TV service organization, the ham is immediately open to blame if anything goes wrong with the TV set. Reducing transmitter power, although effective in some cases, reduces the effectiveness of amateur communications and is undesirable. Since the presence of the signal on both the shield and center conductor of the cable is an antenna effect rather than cable leakage, installation of low-leakage coaxial cable will have no effect on the interference.

Breaking the Path

The common-mode path between the antenna cable and line cord could be broken by physically cutting either the power cord or the antenna lead of the TV set. While this would definitely eliminate the undesired reception of amateur signals, it might also make the TV owner very unhappy!

What we need is a way of breaking the antenna lead or the power-line lead for the common-mode currents without disrupting the TV signals on the CATV cable, or depriving the set of power. One way of doing this was described in a recent *QST* article.[1] A resonant trap, or breaker loop, is inductively coupled to the TV line in this approach. At the resonant frequency of the loop, a high rf impedance is coupled to the TV line so that it approximates an open circuit to the common-mode antenna currents. Since the TV cable is not cut or interrupted, the presence of the breaker loop has no effect on the normal TV signals. To protect a vulnerable TV set from multiband operation, it is necessary to install one loop for each frequency band on which TVI is a problem.

Another way to introduce such a high series impedance would be to install rf chokes in series with both the shield and center conductor of the antenna cable. While this would stop the interfering common-mode currents, it would also stop the TV signals very effectively. If rf chokes of sufficient current-carrying capacity were available, they could be installed in the line cord to disrupt the common-mode antenna currents there also.

Wouldn't it be nice if one could easily turn the antenna cable or the power cord into an effective rf choke without having to cut or modify it in any permanent way? A creative coffee break led to the inspiration that a doughnut might be able to solve the problem. No, the idea was not to use a sugar doughnut to bribe an irate TV viewer but to use a large lossy toroid and the existing TV set antenna cable or power cord to make an rf choke. A large toroid was used so that it would be possible to wind five or six turns of the line cord or antenna cable around it without having to remove and reinstall connectors. In practice, it is generally easier to wind the line cord on the core than it is to wind the toroid with the stiff coaxial antenna lead. Because the choke is being used to break a current path, it generally doesn't matter which lead it is installed in (see Fig. 3).

In particularly severe cases of interference, the effectiveness of the toroid may be quadrupled if the antenna and power leads of the set are both wound on the core. It is important that they be wound in opposite directions so that the coupling of the rf common-mode current into the toroid is maximized (see Fig. 4). If there is any doubt about which way to wind the second cable on the core, try it both ways. The difference in effectiveness will be astounding! If there are wires other than antenna and power leads connected to the set, more experimentation and possibly more than one toroid may be required. Remember that the toroids are being used to break rf-current paths and that any wire of appreciable length may function as an antenna.

Many TV sets use 300-ohm twin-lead instead of coaxial cable either to the antenna or master antenna system. Everything that has been said about the use of toroids on coaxial leads applies to their use on 300-ohm antenna leads as well. Tests indicate that the TV signals are not attenuated or affected by winding the twin-lead on a toroid in the manner described here.

In the case of my neighbor's TV set, two toroids were required. Not only was I dealing with an old TV set, but also with an add-on, remote-control unit. It seems that the remote-control tuner had been added to compensate for the demise of the tuner in the set. Watching my neighbor's face as the doughnuts were being installed on his set gave me the impression that he thought hams practiced black magic. When tests revealed that all interference had been eliminated, it was obvious that he was ready to believe in whatever witchcraft I had to offer. The public relations aspects of an interference-suppression device that can be installed simply by wrapping the line cord of the TV set around it can be quite significant. The set owner is not likely to blame you for future failure of the set or for poor reception if you never opened the back of his set or touched the antenna connections. After all, what harm could a "doughnut" on the line cord do to a set?

Buying Doughnuts

To be effective, the "doughnut" needs to be a bit fancier than the sugared kind you get at the local coffee shop. You want to create a high, lossy impedance (at hf) in series with the line cord. To do this without having to wind many turns on the toroid, you need a core with high permeability. An rf toroid of the type normally used to construct antenna baluns is not what is needed here; a high-permeability device is required. A toroid designed for use at very low frequencies is ideal for this application. For example, the toroid found in an old TV deflection yoke can be used.

A commercial toroid that I found to be very effective is a ferrite core with an outside diameter of 2.4 inches (mm = inches

[1]Notes appear on page 19.

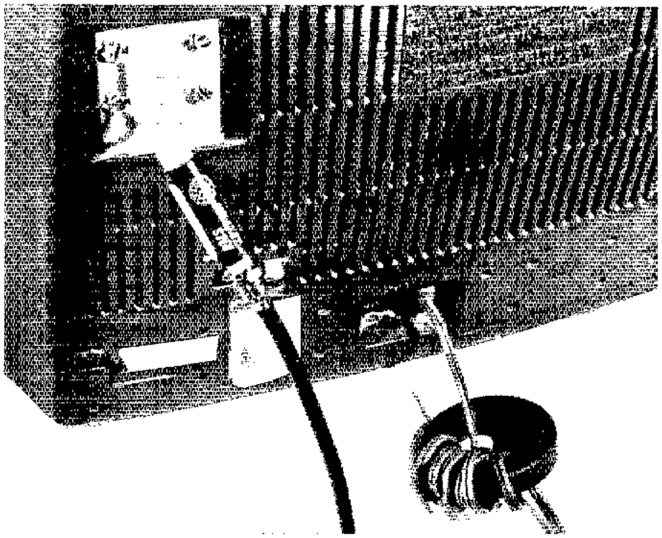

Fig. 3 — The ease of installation is shown by the toroid on the power cord of this TV.

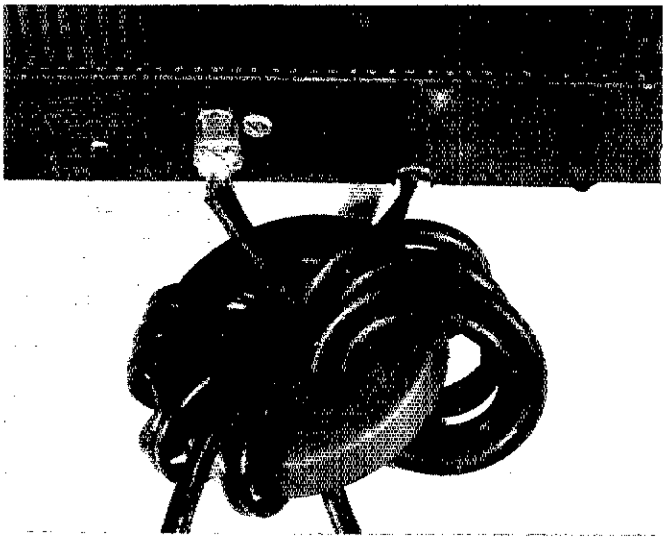

Fig. 4 — Both the antenna lead and the power cord may have to be wound on the toroid in severe cases.

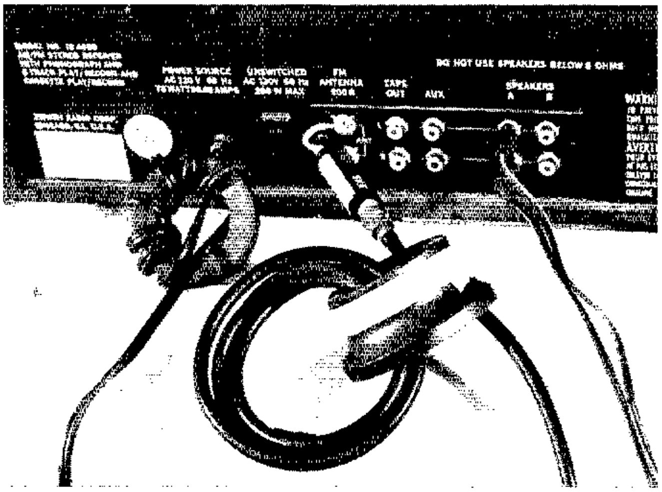

Fig. 5 — The author used the toroid from a TV deflection yoke as a core for an rf choke on the antenna lead of his stereo.

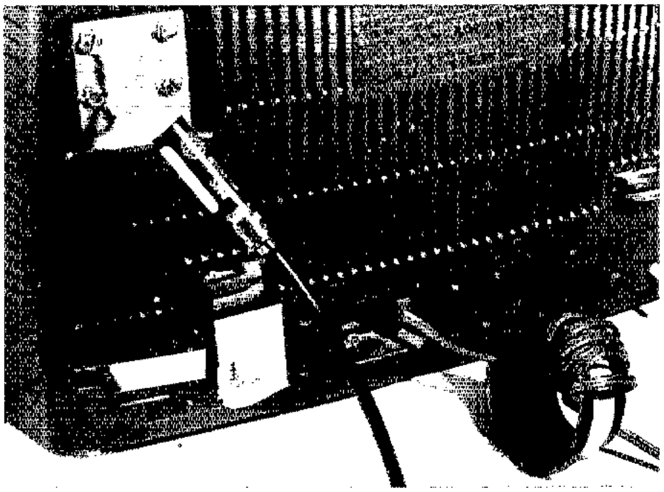

Fig. 6 — A salvaged TV deflection-yoke toroid can be used as the core of an rf choke wound in the power cord of a TV.

× 25.4). It is a low frequency toroid with a permeability of 850. The toroid was a PERMAG no. F-568-1-H. These toroids are not currently available to the amateur community on a small-lot basis, so Joe Reisert, W1JR, has agreed to serve as a distributor for them.[2]

A smaller toroid is also available that can be used when you want to install the choke inside the set. Modification of internal wiring to include a section of cable wound on the toroid is required. This smaller core has an outside diameter of 0.875 inches and a stock number of F-624-19-H. (Amidon cores FT-240-43 and FT-82-43 should be acceptable substitutes. — Ed.)

Other Uses for Doughnuts

Use of a "doughnut" is not limited to TVI problems. Home stereo equipment may also be vulnerable to interference if the speaker leads function in conjunction with the line cord to form an antenna. If this is occurring, shielding and bypassing the speaker leads will not reduce the level of interference. A "doughnut" installed on the line cord or speaker leads may be all that is necessary to clear up a frustrating interference problem.

Toroids may also find application in the ham shack when rf shows up where it isn't wanted. In some cases, winding the coaxial-cable antenna lead and the equipment power leads around toroids might break common-mode currents responsible for rf on equipment panels and instability problems. Also, the installation of a toroid on the phone line leading to a phone patch might help clear up some sticky RFI problems.

My stereo is located directly below the base of my five-band trap vertical and, as would be expected, it suffered from rf rectification. Fig. 5 shows how this problem was solved. Interestingly enough, the color-TV console that normally holds the stereo has always been completely clean, indicating that it is possible to build consumer equipment that is tolerant to rf.

Fig. 6 shows how a core from a TV deflection yoke was used to tame a problem set. The core used here was removed from a junk black-and-white TV set by cutting away the deflection-coil wire. The two ferrite segments found in the coil were taped together to make the core. TV service shops routinely discard these ferrite segments after removing the wire for scrap, so cores should be readily available from this source. Tests conducted by the author showed that the TV deflection-coil core was slightly less effective than the *commercial toroid*, and was considerably less expensive. The core from a color-TV deflection coil was also tried and found to be useful. This core is much larger than the one found in a black-and-white set and may be too large for many applications. However, it might be useful in breaking parasitic antenna currents on large-diameter coaxial lines.

Get Your Own House in Order

When dealing with interference to any consumer device the ham must first verify that the transmitter is clean and is not flat-topping or emitting parasitic signals. While the use of a spectrum analyzer provides the most convincing proof that a transmitter is clean, most amateurs are not fortunate enough to have access to one. An on-the-air examination of the transmitted signal by another local amateur should reveal any problems. If no interference is noted in any consumer electronic equipment in the ham's own home, it is reasonable to assume that the neighbor is the unfortunate owner of electronic equipment that was not designed or installed as well as it might be from an RFI standpoint.

With his own house in order, the ham must next tactfully enlist the assistance of the set owner. The first item of business should be a thorough inspection of the antenna system. If twin-lead is used, it is important that both sides of the line provide a low-resistance signal path from the antenna to the TV set balanced input. It is also important to verify that if a coaxial line is used, the line is coupled either to a cable-input jack or that a transformer is used between the coaxial cable and the balanced 300-ohm antenna terminals on the set. Any inspection of a receiving installation should result in the elimination of rusty or corroded joints between metal parts, which could serve as rectifiers.

At this point, it greatly simplifies the process if another ham can be enlisted either to operate the transmitter or to observe the interference. Hand-held vhf radios are quite useful during this process, especially as a means of verifying that the transmitter is on the air after an effective fix has been installed!

While the author has found that most TVI problems can be cured using toroids at the set, other techniques may have to be used as well. The case of the mast-mounted preamplifier is a good example. Here, it may be necessary to install filtering or a toroid at the input of the preamplifier. A toroid may also be needed at the output of the preamplifier. A change in the interference level when power is removed from the preamplifier is a good clue as to the location of this sort of problem.

Before attempting to solve any RFI problem, you should be thoroughly familiar with the section of the ARRL *Radio Amateur's Handbook* dealing with RFI, *Radio Frequency Interference* by ARRL and other similar literature. The common-mode interference discussed in this article is not the only type of TVI you might encounter. This cure applies only to those cases in which a transmitter operating considerably lower in frequency than the TV is inducing parasitic signals on the antenna feed line and the power line.

Notes

[1]C. Eichenauer, "Color TVI — A Solution," *QST*, March 1981, pp. 22-24.

[2]Joe Reisert, W1JR, will take orders for the PERMAG toroids. The large toroid, F-568-1-H, costs $11.50 plus $1.50 for postage and handling. The small toroid, F-624-19-H, costs $3.50 plus $.75 postage and handling. Address orders to: Joseph Reisert, 17 Mansfield Dr., Chelmsford, MA 01824. The ARRL and *QST* in no way warrant this offer.

New Books

☐ *The Gunnplexer Cookbook*, by Bob Richardson, W4UCH. Published by the Ham Radio Publishing Group, Greenville, NH. First edition, 1981. Softbound, 6 × 9 inches, 335 pages, $9.95.

In the author's own words, "This is a 'Cookbook' — it is neither a textbook nor a handbook. Cookbooks provide the user with 'recipes.' " Indeed that is what this book does and does quite well. Written on a level that even an inexperienced amateur constructor can follow, it requires no knowledge of microwave techniques. Circuits described generally use low-cost, easily obtained components or kits, and require basic test equipment. This approach contributes much to the practical usefulness of the book. Starting from a basic Gunnplexer, Richardson describes power supplies, modulators, techniques for power and frequency measurement, afc, i-f amplifiers, weak-signal sources, phase-locking systems and video techniques — in short, everything you need to know to get a Gunnplexer system on the air. He also describes the mechanical details of building weatherproof enclosures, parabolic dishes and mounts, and proportional temperature control ovens for Gunnplexers.

I was pleased to see an emphasis on Gunnplexer communications techniques to narrow bandwidth using both afc, which can contribute about 10 dB to the path-loss capability of a system by reducing i-f bandwidths from 200 kHz to 20 kHz, and phase locking to a crystal, which can provide about 20 dB of improvement over a wideband Gunnplexer system.

As mentioned earlier, this is a "Cookbook," without much explanation of fundamentals. In several places the author mentions the possibility of a second volume. If this comes about I would like to see perhaps a little more basic microwave information along with the "how" of Gunnplexer operation. For example, no mention is made of the fact that Gunnplexer systems are wide open on their image frequency, leading to a sensitivity loss, nor is the effect of crystal oscillator noise in phase-locked systems commented on. One other fact that might be included is that there is an international narrow-band frequency for crystal stabilized simplex operation on the 10-GHz band at 10.368 GHz. If we can all get on the same frequency, we one day may work each other!

I did notice a couple of errors while reading through the text. On page 156, the gain of a parabolic dish is said to increase or decrease by 3 dB each time its diameter is doubled or halved. This should, of course, be 6 dB (as is stated elsewhere). A less important error is on page 182 where, in a description of how to calibrate accurately azimuth bearings for a large (96-inch) parabolic dish to ±0.2°, the assumption is made that Polaris (the pole star) has an azimuth of 0°, i.e., is true north. In fact, the azimuth of Polaris depends on when and where the measurement is made, and it can vary (typically) by 1° either side of true north. The azimuth of Polaris is given in tables in the *Nautical Almanac*. For most practical purposes the error introduced by assuming Polaris to be true north would be of little consequence, but for accurate work using large dishes, readers should be aware of it.

This book would be a valuable addition to the library of anyone working, or even considering working, with Gunnplexers for audio, video or data transmission. — *Bob Atkins, KA1GT*

Refining the SB-104

Want to improve the performance of your favorite rig? Perhaps these ideas are just what you've been looking for.

By David Palmer,* W6PHF

Introduction of the Heath SB-104 hf transceiver in 1976 provided a product of solid-state engineering at a price attractive to many hams. Completely solid state (except for the digital frequency counter displays), it made efficient portable and mobile operation possible. However, after a few hours of use in the real world of weak signals and crowded bands, and the occasional "rock crushing" signal from the kilowatt down the block, a few deficiencies became apparent. Cross-modulation, intermodulation and desensing (blocking) of the receiver in the presence of strong signals are particularly annoying with the original receiver front-end board. Although the 40673 dual-gate MOSFET mixer used in the '104 is better in many respects than the vacuum tube pentagrid mixer, a major weakness exhibited is that of relatively poor dynamic range.

In 1977,[1] Heath released a series of modifications that included a new receiver front-end board, thus creating the "A" model. Discrete component doubly balanced mixers (DBMs) replaced the two 40673 mixers, and redesigned, prealigned bandpass filters for each band resulted in improved performance.

But, for those like me, whose primary interest is chasing cw DX, the new receiver front-end board was a disappointment since the noise floor had not been lowered and additional spurs were evident. Masking of weak cw signals occurred when the 400-Hz crystal filter and an active audio filter were used. An examination of the receiver suggested poor gain distribution, and modifications to several of the circuit boards ensued. What follows is a description of the steps I took in an effort to improve the performance of my SB-104. Physical placement of the required components is left to the discretion of the owner/modifier.

Receiver Front-End Board Modifications

An article by Cheadle[2] suggested that the poor balance of the discrete DBMs is the source of the intermodulation and cross-modulation problems, and part of the blocking problem. Apparently, precise DBM balance using discrete components is difficult to achieve. This results in the creation of in-band mixing products from the combined presence of strong signals and the LO emission which, in the SB-104A, exceeds 20 microvolts on 20 meters. Consequently, I installed two Mini-Circuits[3] SRA-1 DBM modules on the circuit board with suitable terminations for the ports.[4]

Refer to Fig. 1. The first mixer i-f port is terminated with a 24-MHz diplexer, and the hf injection level is increased to approximately +7 dBm by changing C441 (a 33-pF mica capacitor on board D) to a 56-pF unit.[5] Installation of another SRA-1 DBM at the second mixer requires the addition of a 10-MHz diplexer that is constructed from 5%-tolerance silver-mica capacitors and an rf choke. Somewhat improved performance can be realized by replacing the rf choke with a toroidal inductor. A VFO buffer/amplifier is built on the circuit board to increase the injection level to +10 dBm and to reduce the mixer insertion loss. An L network is used to maintain a 50-ohm impedance match with the DBM LO port.

Better receiver performance resulted from the installation of the two DBMs, but the noise floor was still too high. Increasing the i-f gain after the second mixer is accomplished by installing a CA3028A cascode amplifier mounted in an eight-pin TO-5 IC socket in the area near the 8-MHz bandpass filter. The RF GAIN control (R15A) is replaced with a dual, concentric-shaft 10-kΩ linear taper potentiometer. The front section is used to ad-

[1]Notes appear on page 26.

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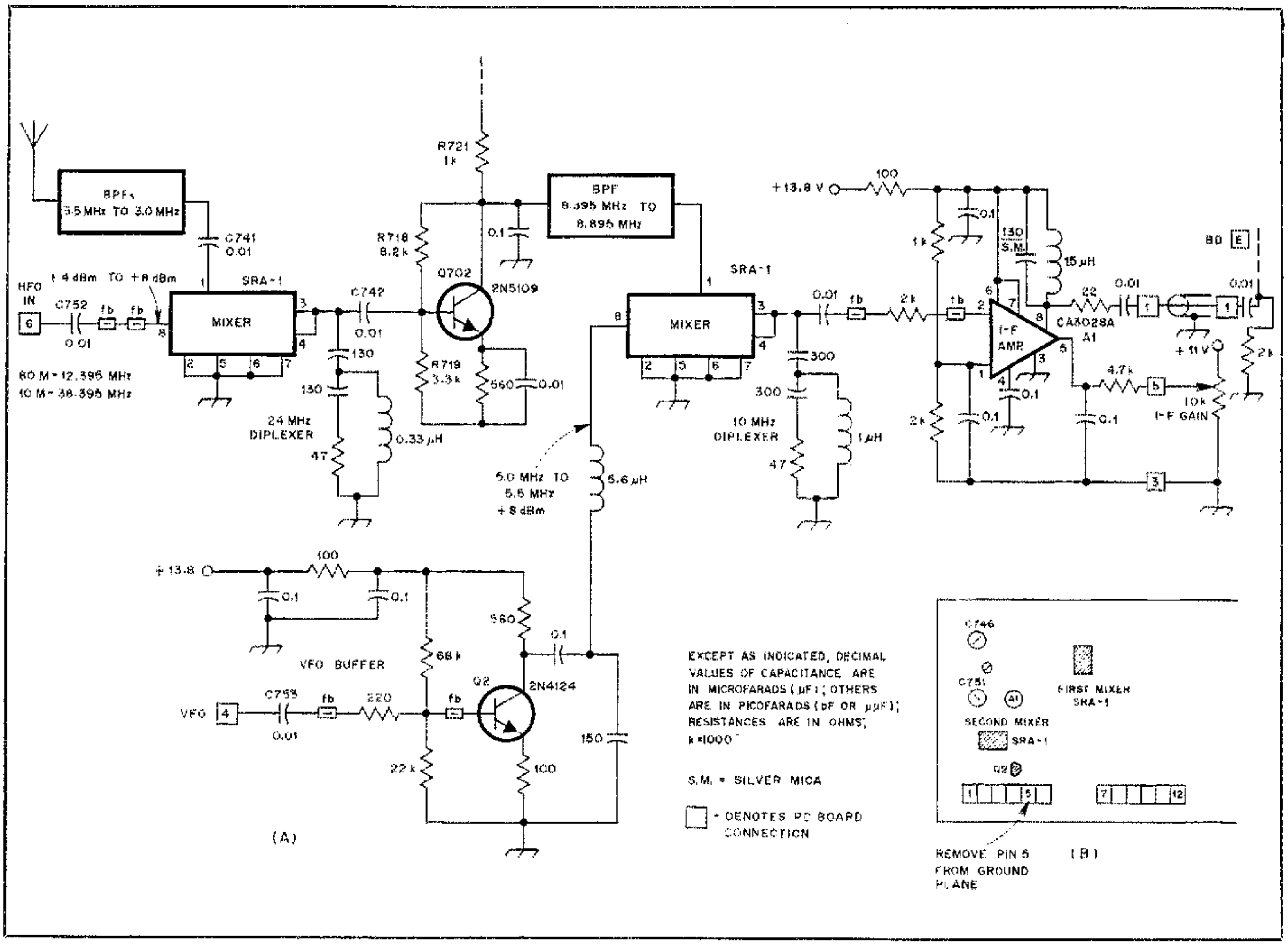

Fig. 1 — Schematic diagram of changes made to the SB-104 receiver front-end board (G). Pin 5 is removed from ground and used as a terminal for the I-F GAIN control. Heath component identification has been retained. All resistors are 1/4-watt, 5% types; capacitors are 50-V units.

just the i-f amplifier gain (board F) and the rear section is wired to board G terminal 5, which is first disconnected from the ground plane. The increased i-f gain markedly lowers the noise floor; this is particularly noticeable when using the 400-Hz cw filter.

Carrier Generator/Crystal-Filter Board Changes

The series noise blanker system used by Heath considerably degrades receiver performance. Therefore, Q601 was replaced by a 40673 MOSFET. This permits the attachment of a shunt type of noise blanker to gate 2 of the device (see Fig. 2).

In the cw mode, a "beep" was heard in the speaker during the transition from transmit to receive. This is caused by a long time constant on the V_{cc} bus of Q611, the CW GENERATOR. Changing C635 from a 22-μF capacitor to a 0.1-μF unit solves the problem by permitting the CW GENERATOR to turn off during the transmit/receive changeover interval.

Difficulty in achieving a good carrier null in the balanced modulator was caused by poor carrier-frequency bypassing at the

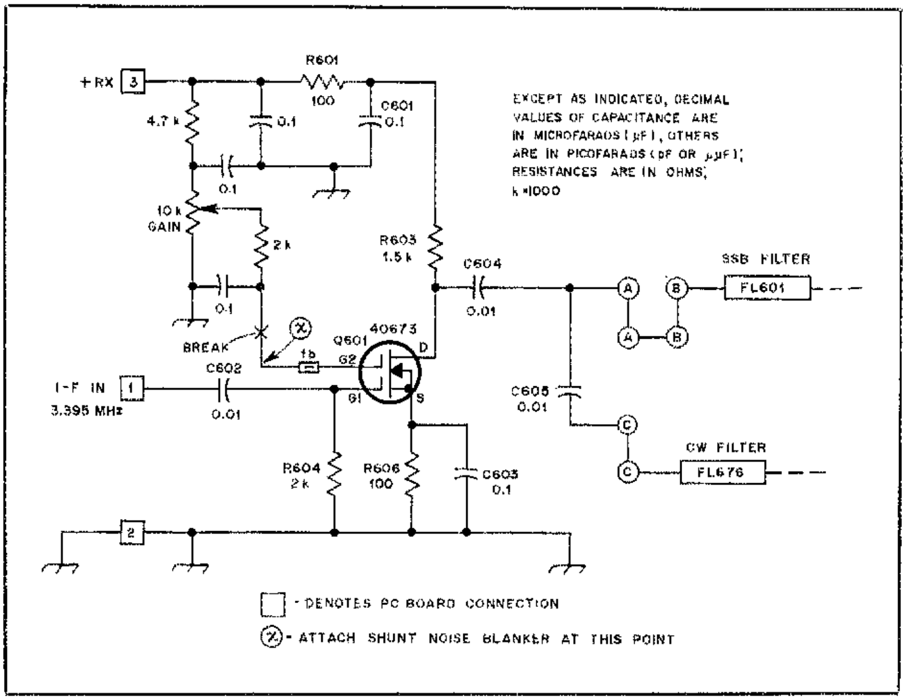

Fig. 2 — Carrier generator/crystal filter board (E) changes. A shunt type noise blanker may be attached at point X. The bipolar transistor (Q601) has been replaced by a dual-gate MOSFET.

modulation input port. Replacement of C646 (a 4.7-μF tantalum capacitor) with a 0.1-μF ceramic capacitor and series-connected 47-ohm resistor produces better suppression.

Receiver I-F/Audio Board

The first modification to be made (see Fig. 3) provides additional receiver gain by tuning L501 with a 10- to 60-pF trimmer capacitor. A gain improvement of approximately one S unit should be noted.

During cw operation an annoying wide-band audio hiss was noted in the receiver. It was discovered that the IC502 low-pass filter section turnover frequency was approximately 15 kHz rather than the 1.5 kHz it should be to match the ssb crystal-filter passband. After some discussion with Bob Warmke (W6CYX), the entire active filter was redesigned and the IC502 high-pass filter section was converted to another low-pass filter. Both filters were modified as shown in Fig. 4 to low-pass filters with 2-kHz turnover frequencies.

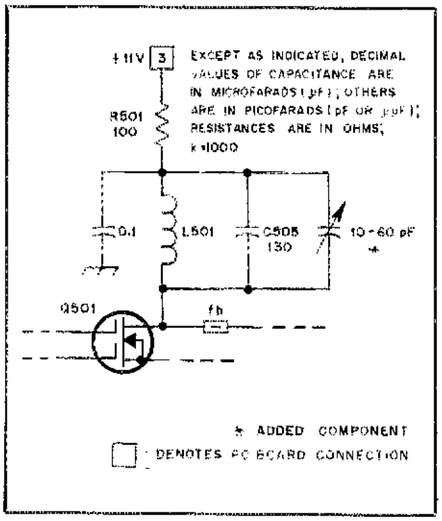

Fig. 3 — A trimmer capacitor is used to tune L501 on board F to obtain additional receiver gain.

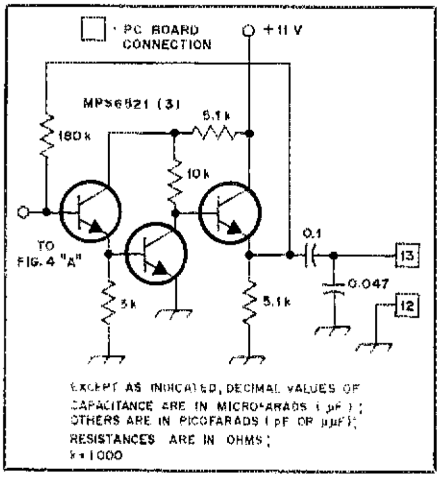

Fig. 5 — Schematic diagram of the audio preamplifier added to board F. Resistors are 1/4-watt, 5% types; capacitors are 50-V units. Pads for mounting Q1 through Q3 may be cut into the existing ground plane.

Attempts to properly decouple the AF board inputs to eliminate af feedthrough during transmit proved ineffective because of a ground loop. Therefore, a transistor switch was built between board terminals 12 and 16, with the transistor base connected through an RC filter to the +XMT bus. In the transmit mode, the base is pulled high and the transistor saturates, effectively shorting the filter output.

While using the HP-1144 power supply, an annoying 60-Hz hum was noticed. The hum pickup was traced to the two shielded wires that connect from terminals 15 and 16 on board F to the AF GAIN control. These two wires are in the same harness as the 117-V ac wiring to power switch S3F. Using a separate twisted pair of shielded wires, connected from the AF GAIN control to the appropriate terminals on board F, eliminated the hum.

A preamplifier to drive a cw active audio filter was constructed on the board

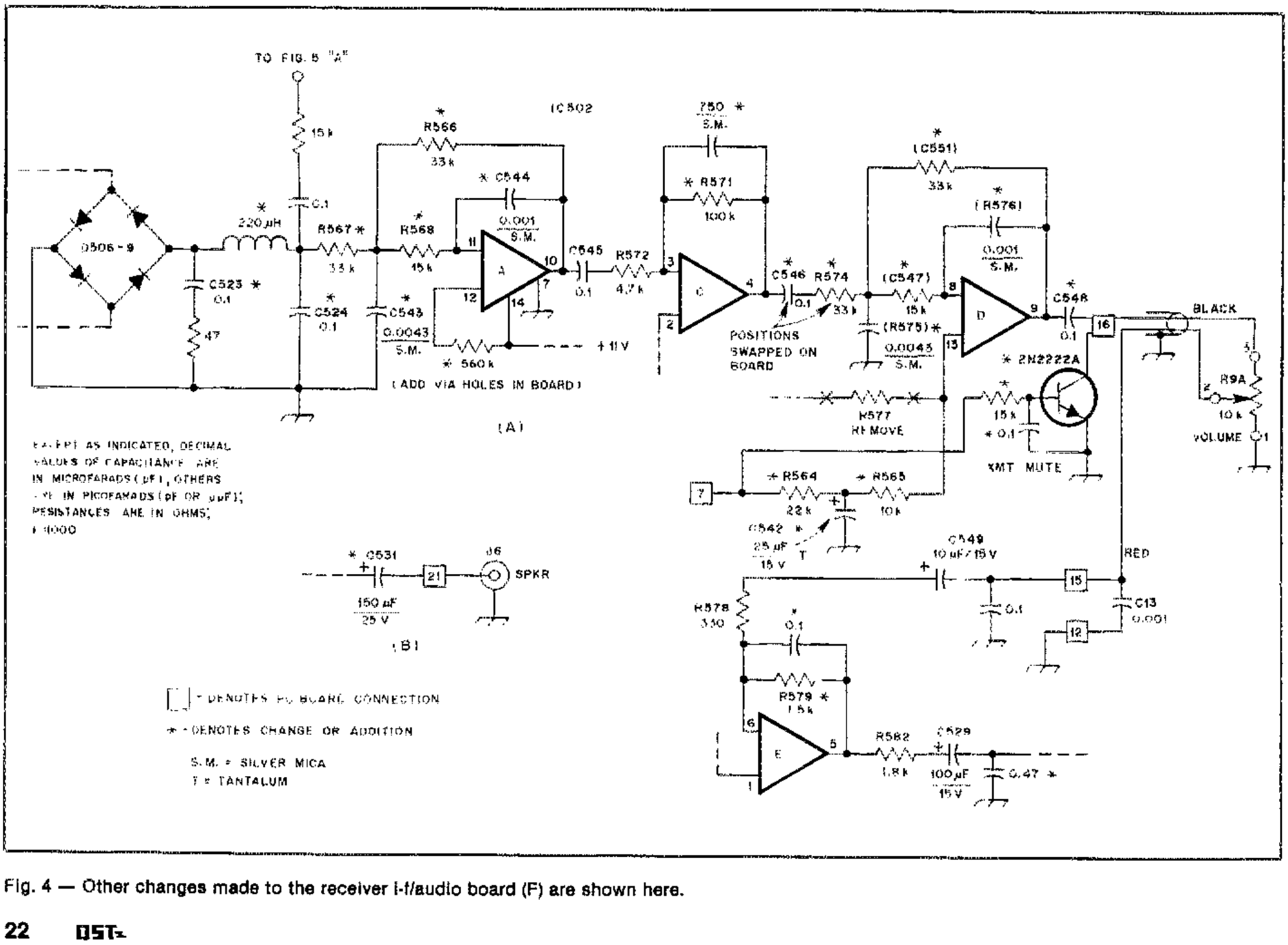

Fig. 4 — Other changes made to the receiver i-f/audio board (F) are shown here.

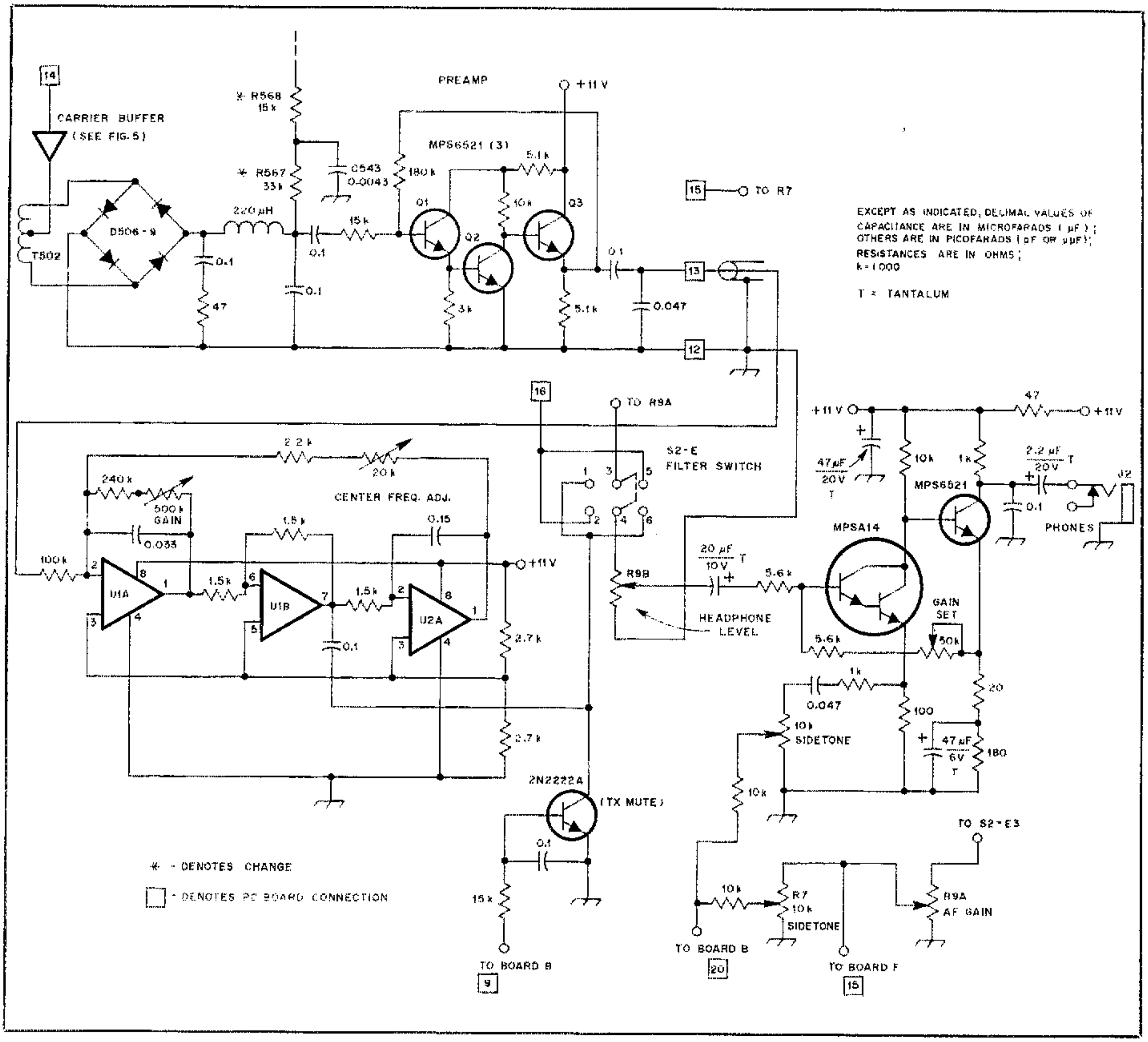

Fig. 6 — An adjustable active cw band-pass filter and headphone amplifier are assembled on a piece of perf board and interconnections made as described in the text. R9 is replaced with a dual potentiometer.

in the area between the i-f strip and the audio amplifier. Terminal 13 is removed from ground and a shielded cable is connected to the filter board. This is shown in Fig. 5.

Active CW Filter and Headphone Amplifier

Having used an HRO-60 with a sharp crystal filter, it soon became apparent that the SB-104A cw filter was not adequately separating weak cw signals from the noise. A biquad active audio filter[6] (Fig. 6) was assembled on a piece of perf board along with a low-noise, low-distortion headphone amplifier. One advantage of the filter is that both the frequency and bandwidth can be adjusted to suit the operator's preference. Wideband noise generated by the high-gain i-f amplifier is also eliminated, considerably improving the overall cw noise figure.

Because of a personal preference, the headphone amplifier was wired directly to the PHONES jack, and the af power amplifier was wired to the rear panel SPKR jack. S2E was then rewired to connect the cw or the ssb audio filter to the headphone amplifier or speaker power amplifier. The AF GAIN control (R9) was replaced with a dual, concentric-shaft 10-kΩ audio-taper potentiometer to permit independent control of the headphone and speaker audio levels.

Carrier Buffer Amplifier and Product Detector

Distorted audio, particularly noticeable on weak signals, was caused by insufficient carrier level being fed to the product detector. A scope at the LO port of T502 (see Fig. 7) revealed a 150-mV peak-to-peak sine wave indicative of inadequate drive. A buffer amplifier consisting of a transistor and an LC matching network was constructed on the circuit board using point-to-point wiring. The transistor is mounted in a 3-pin socket and the other components are wired to it. The trace from terminal 14 (CARRIER INPUT) is severed at the terminal and then connected to the board ground plane. A short length of RG-174/U is then connected to the terminal, the shields are grounded and the center conductor is soldered to the 0.01-μF ceramic capacitor in series with a 1.5-kΩ resistor at the base of the tran-

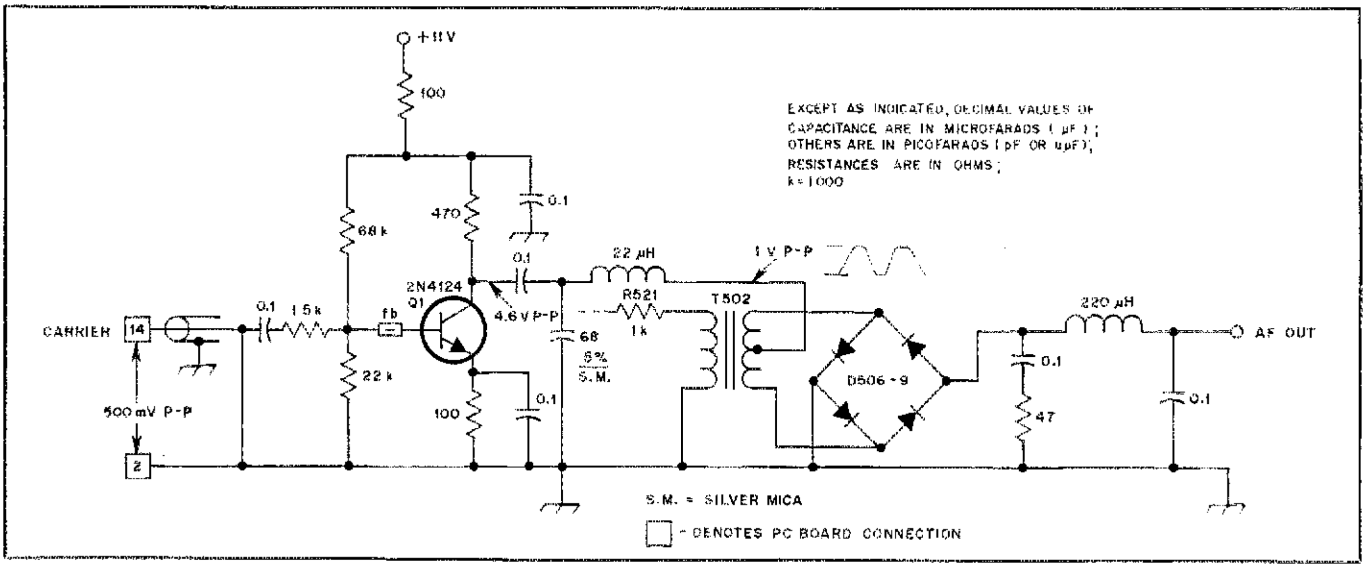

Fig. 7 — Point-to-point wiring is used to construct a buffer amplifier on board F. C522 (between T502 secondary center tap and terminal 14) must be removed.

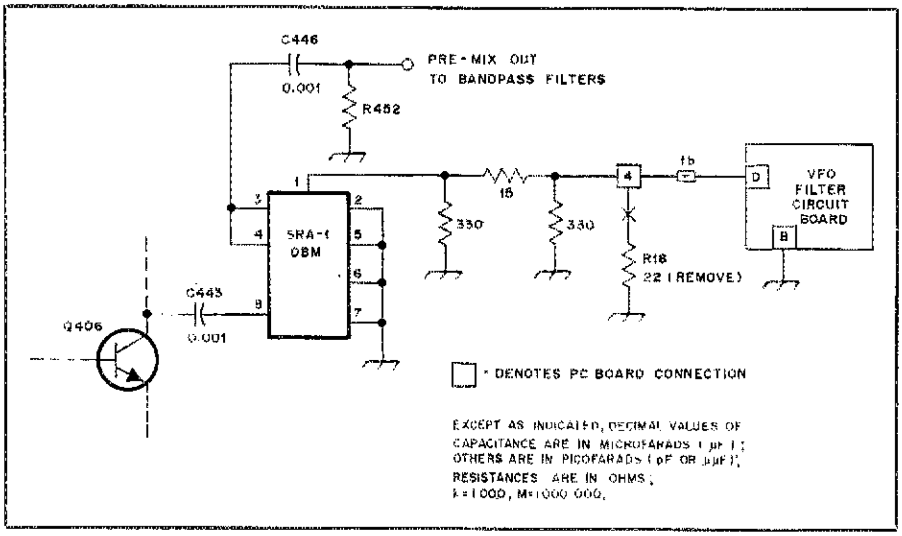

Fig. 8 — Schematic diagram of the additions and changes made to the HFO/premix board (D).

sistor. An LC impedance-matching network consisting of a 68-pF silver-mica capacitor and 22-µH rf choke couples the carrier signal to the product detector. A 900-mV pk-pk sine wave with symmetrically clipped peaks observed at the LO port indicated the correct drive level had been obtained.

Proper diode ring termination is accomplished by installing a series RC network comprised of a 0.1-µF capacitor and a 47-ohm resistor. A low-pass filter made from a 220-µH rf choke and 0.1-µF capacitor prevents the carrier signal from entering the audio circuits. The resulting recovered audio is best described as crisp and clean with negligible intermodulation distortion. As a final step, remove C519 (0.01 µF) to prevent leakage of the carrier signal to other receiver sections.

HFO/Premix Board

As in other systems that use multiple oscillators and mixers, the SB-104A has a few in-band mixing products — "birdies" — that pass through the chain and can create problems. Spurious emissions can occur in the transmitter output where band-pass filters cannot attenuate them, and receiver spurs will often interfere with the reception of a desired signal. Several spurs were traced to the pre-mixer on board D. Refer to Fig. 8. Installing a 2-dB H pad at the LO port to terminate both the DBM and the VFO filter properly did reduce the amplitude of the spurs, but did not eliminate them. The original DBM was removed and an SRA-1 DBM mounted directly on the board. If your SB-104 has been modified to the "A" version by the installation of a new VFO filter board (part no. 85-1930-1), remove the 22-Ω resistor wired between the edge connector terminal 4 and chassis ground.

Transmitter I-F Board

Transmitter output measurements revealed several in-band spurs generated by the mixer on board C. After removal of the original mixer components, an SRA-1 DBM was installed (as shown in Fig. 9) directly on the circuit board. Some modifications were made to the circuit to accommodate the new mixer. The Q301 emitter-bias network was removed from ground and wired between the emitter pad and terminal 1 of the DBM module. C314 was changed from 0.01 µF to 0.1 µF because of the low impedance of the rf port.

To terminate the LO port properly, a 2-dB H pad was constructed from R326 (changed to 430 ohms), R325 (unchanged), and another 430-ohm resistor, soldered between terminals 7 and 8 of the DBM module. An undesired low power output condition can often be solved by increasing the i-f signal level at IC301 pin 4 by reducing the resistance of R318 from 1.8 kΩ to 470 ohms.

I-F Buffer Amplifier

The omission of a wideband, low level i-f output from the SB-104A precludes the use of a Heath Scanalyzer or other i-f spectrum display. A buffer amplifier (Fig. 10) consisting of a CA3028A cascode amplifier, a toroidal transformer (T1) and a few other components was built on a piece of perf board and mounted on the underside of the chassis between circuit board sockets F and G. A 3/4 ×

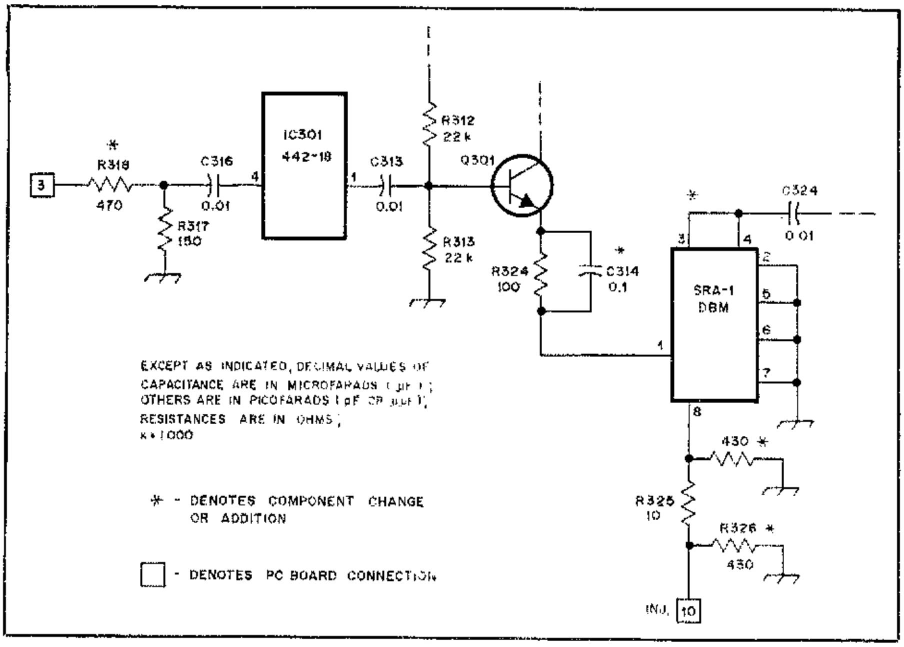

Fig. 9 — A modular DBM replaces the discrete component mixer on the transmitter i-f board (C), and some existing component values are altered.

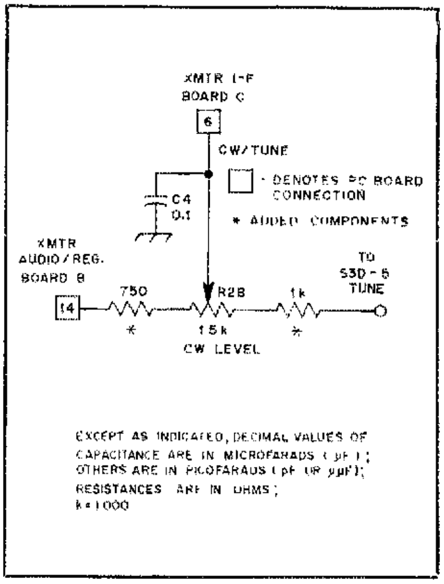

Fig. 12 — Independent adjustment of the MIC GAIN and CW LEVEL controls requires R2 be replaced by a control with concentric shafts. R2A (MIC GAIN) is not shown. Added resistors are 1/4-watt, 5% carbon types.

2-1/2-inch (mm = in. × 25.4) board will easily accommodate all components and allow space at one end of the board for the installation of a 6-32 spade lug for mounting purposes. Connect the output of the buffer amplifier to terminal 1 of board G and solder the coaxial cable removed from terminal 11 of board G to the low-impedance secondary winding of T1.

ALC Relay Switching

During operation, I noticed that a pulse was being placed on the alc bus when the transmitter was keyed. The transient was generated by the opening of the bus by the T-R relay. Moving the switching function from the relay to the unused half of the HI-LO power switch, S3E, as shown in Fig. 11, solves the problem.

Cw Level/Mic Gain

Independent control of the CW LEVEL and MIC GAIN functions was desired. So, R24A was replaced by a 100-kΩ/1-kΩ dual, concentric-shaft potentiometer. To obtain better control of the CW LEVEL, the range of the control was reduced as shown in Fig. 12.

VOX Instability

Rf feedback on the +11-V bus of circuit board B can result in the VOX circuit malfunctioning when using an amplifier.[7] A 0.1-µF ceramic capacitor connected between pins 7 and 14 of IC201 eliminates the feedback.

Another source of erratic VOX operation can be cured by substituting a

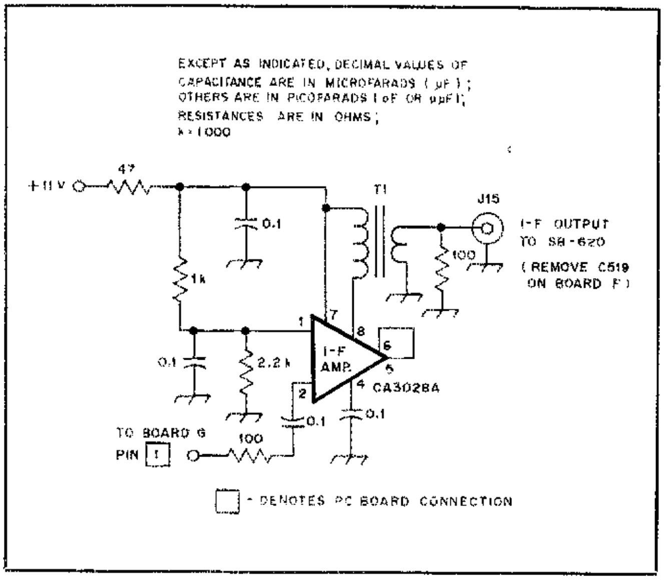

Fig. 10 — Schematic diagram of the i-f buffer amplifier added to the SB-104 to permit use of an i-f spectrum display. All resistors are 1/4-watt, 5% types; capacitors are 50-V units. T1 consists of 20 primary turns and 4 secondary turns wound on a T50-2 core.

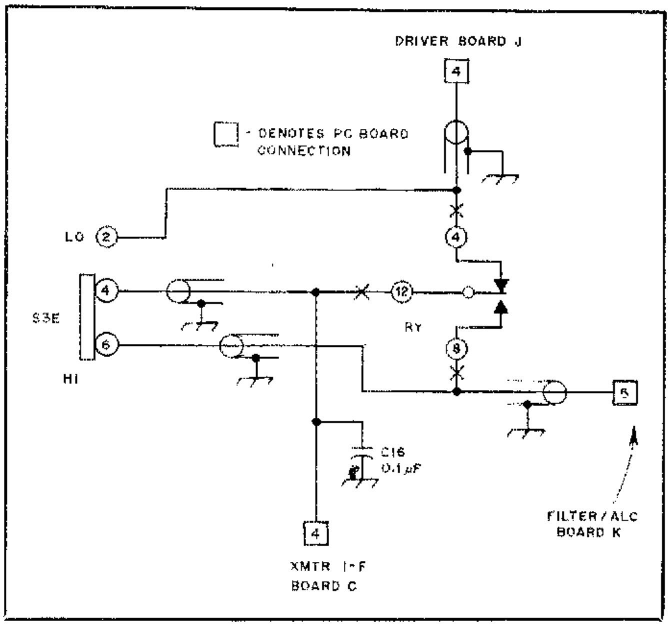

Fig. 11 — Alc/output board (K) changes. Heath component identification is used in the schematic diagram.

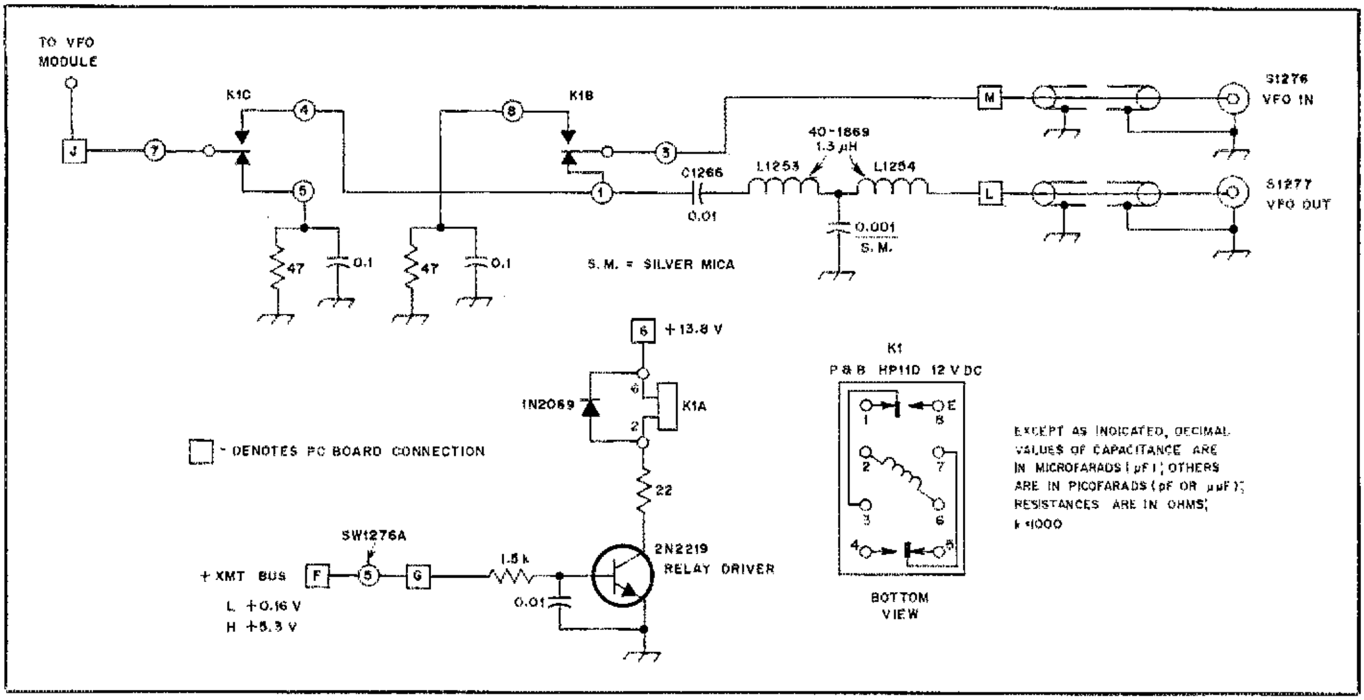

Fig. 13 — A relay replaces the transistor switches used in the SB-644 remote VFO. Resistors are 1/4-watt, 5% carbon composition types; capacitors are 50-V units.

Darlington pair for Q203 on board B. Relay driver Q207 can fail because of high voltage transients should D204 fail. A 0.1-μF capacitor between the collector of Q207 and the board ground plane will dampen any such transients.

Diode Substitution

Replacement of the four discrete DBMs will free 16 FH-1100 hot-carrier diodes (part no. 56-87). Twelve of these should be used to replace the band-pass filter switching diodes (part no. 56-24). A noticeable improvement in receiver sensitivity and noise figure will result, as the hot-carrier diode has significantly less internal capacitance and a much lower conduction voltage. After substituting the diodes, realign the receiver front-end filters using a sweep generator or a noise source.

SB-644 VFO Modifications

Conversion of the SB-104 to the "A" version creates a switching interface problem when using the SB-644 remote VFO. The SB-644/A assembly manual (part no. 595-2055-02) suggests a simple way of solving several quirks in the original unit. The necessary components to make the conversion, including a new circuit board and the toroidal inductors for the low-pass filter, were purchased from Heath and installed.

A significant reduction of VFO harmonics and a considerable improvement in VFO isolation can be achieved by replacing the transistor switches with a Potter and Brumfield HP11D dpdt 12-V dc relay. See Fig. 13. As the fixed-frequency feature of the transceiver was not used, the relay was mounted directly on the circuit board in the space intended for the crystal-oscillator circuit.

HP-1144 Overvoltage Crowbar

One unfortunate experience of a few SB-104 owners involves a collector-to-emitter short in one of the power supply series pass devices, which places approximately 22 volts on the 13.8-V bus. Component destruction is immediate and expensive, and repair is difficult.

In 1977, Heath offered a crowbar field-retrofit kit (part no. 830-33) that will protect the transceiver should an over-voltage condition occur. This modification should definitely be made, as it will eliminate a possible source of grief. If rf hash is created by the power supply, a 0.02 μF/100-V ceramic capacitor should be wired in parallel with each bridge-rectifier diode to act as a transient bypass.

Addendum

When instability is encountered in the high-gain rf and af amplifier stages used in the transceiver, it can often be traced to inadequate shielding and bypassing. Several rf and i-f circuits in the SB-104 were found to be at the threshold of oscillation during the transition from receive to transmit. Usually the problem can be solved by improving the circuit decoupling from the V_{cc} bus. A number of 0.1-μF and 0.001-μF/50-V ceramic capacitors were eventually installed in several circuits.

Every circuit board terminal with a dc function was bypassed with a 0.1-μF ceramic capacitor where it entered the board. Some of the 0.01-μF capacitors in the original circuit were replaced with 0.1-μF units. Distribution points for the +5-, 11- and 13.8-V dc sources were bypassed with a parallel capacitor combination consisting of a 15-μF/20-V tantalum and 0.1-μF and 0.001-μF ceramic units. The alc bus and all unshielded rf and af signal wires were replaced with lengths of RG-174/U coaxial cable, with the shield grounded only at one end.

I hope the preceding modifications will be of help to other SB-104 owners. The resulting improved performance should increase your operating enjoyment considerably. Please include an s.a.s.e. with any correspondence.

Notes

[1] Heath Co., SB-104A modification kit (part no. SBM-104-2).
[2] D. Cheadle, "Selecting Mixers for Best Intermod Performance," *Microwaves*, November and December 1973.
[3] Mini-Circuits, 2625 East 14th St., Brooklyn, NY 11235.
[4] W. Hayward and D. DeMaw, *Solid State Design for the Radio Amateur* (Newington: ARRL, 1977).
[5] R. Jefferis, WB6OQP; private communication.
[6] J. Rohler, "Biquad Bandpass Filter for CW Use," *Ham Radio*, June 1979, p. 70.
[7] See note 4.

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DeMaw D. and G. Collins. "Modern Receiver Mixers for High Dynamic Range." *QST*, January 1981, p. 19.
Tashner, R. "Improved Receiver Performance for the Heathkit SB-104A." *Ham Radio*, April 1981, p. 78.
Woodward, G., ed. *The Radio Amateur's Handbook*. Fifty-ninth edition. Newington: ARRL, 1982.

Dual Full-Wave Loop Antenna

By John Griggs,* W6KW

Achieving gain from an antenna at 7 and 3.5 MHz normally requires a rather large piece of real estate, a high tower or both. To obtain significantly improved performance over a dipole at these frequencies, and to do it inside an average city lot, is a goal worth pursuing! With this in mind I decided to replace my inverted-V dipoles on 7 and 3.5 MHz with a dual full-wave loop antenna, one inside the other.

I had noticed the strong signals on 7 MHz from Pat Kearins, W7UI (now a silent key), and from Carl Winter, W6OAW, on 3.9 MHz, and was interested to find that both were using full-wave loops. Both signals would pin my S-meter, and my QTH is well over 200 miles (km = miles × 1.613) from either station. The antenna at W7UI was a loop suspended by a very high supporting structure. This loop resembled a square, with one corner facing up, one facing the ground, and the other two corners pulled outward by guy wires.

My attention was attracted to a horizontal loop antenna used by another ham on 3.9 MHz that produced extremely strong signals. It was a square loop, 65 feet (meters = feet × 0.3048) on a side, with each leg parallel to the ground but only 14 feet high. Fed by a tuned line, it functioned well, but it was most effective for relatively short ranges, up to 200 miles or so.

Of more interest to me, however, was the 75-meter rectangular loop used at W6OAW. I learned that this was a dual antenna, i.e., a full-wave rectangular loop for 3.9 MHz suspended about 40 feet above ground, with another full-wave loop for 7 MHz inside the first, in the same plane. The 3.9-MHz loop is a closed circuit, whereas the 7-MHz loop is an open circuit. This permits operation on 10, 15 and 20 meters as well as 40 meters when used with open-wire feed line and a matching network. The outer loop is fed with coaxial cable.

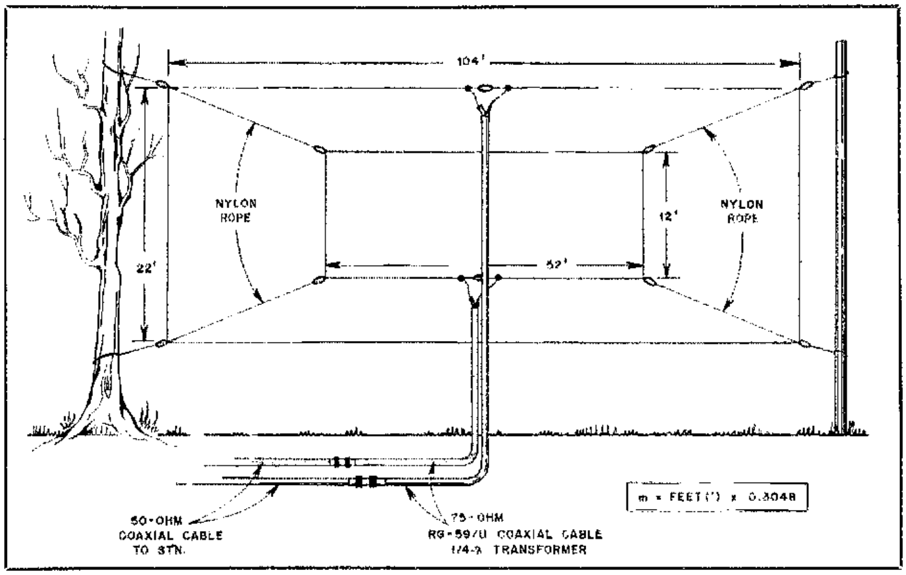

Fig. 1 — Dimensions for the dual full-wave loop antenna. Input impedance is on the order of 104 ohms. A quarter-wave matching section of RG-59/U is used to provide a match to 50 ohms.

Design Planning

In considering loop antennas for my lot, which is 75 feet wide by 125 feet deep, I found that I could use two 40-foot high pipe masts, 130 feet apart along a diagonal across my lot. I duplicated the W6OAW arrangement, except that I hung the antenna vertically and made both loops closed-circuit designs. I could use them only on the bands for which they were cut, 7.2 MHz and 3.8 MHz. Each is fed with a quarter-wave matching section of RG-59/U, which provides a 50-ohm match for the RG-8/U cables leading in to my operating position.

Construction

See Fig. 1 for construction details and dimensions. Matching the 104-ohm antenna impedance to the 50-ohm line impedance requires a quarter-wave coaxial line having a characteristic impedance of 72 ohms. The formula for a 1/4-wave section is:

$$\frac{246}{f(\text{MHz})} = \ell(\text{ft}) \qquad \text{(Eq.1)}$$

This result must be multiplied by the velocity factor of the coaxial cable, 0.66 for RG-59/U 73-ohm cable. The quarter-wave section was determined to be 42.7 feet for 3.8 MHz and 22.6 feet for 7.2 MHz. These connect to RG-8/U cables for a 50-ohm match to the transceiver.

The top section of the 3.8-MHz loop is fed at the center because of the length of the quarter-wave line, but the shorter matching section for the 7.2-MHz loop allows me to feed the bottom portion of that antenna.

The inner loop is supported from the corners of the outer loop by means of nylon rope and suitable insulators. It is best to use lightweight, high-quality insulators and wire no larger than no. 14 to reduce the weight of the array. Pulleys (and rope) will be required at the tops of the 40-foot poles and also at the 18-foot level. The fact that the bottom horizontal section of the antenna narrowly misses the top of my house roof seems to have no deleterious effect on its operation.

Measure the antenna sections carefully, and cut them to length. Pay particular attention to locate the feed point at the exact center of the horizontal wire sections. This provides horizontal polarization. Feeding the loop at the center of either vertical section will provide vertical polarization.

Tuning

If trimming is needed to resonate the antenna to your favorite operating frequency, cut or add equal length pieces at each vertical section. Do not shorten the sides to the point at which the top and bottom sections are less than 0.1 wavelength apart. Careful pruning of the horizontal sections would be required if such a problem develops.

Information given to me by those using this antenna seems to confirm my results. A typical comment is "Boy are you ever loud!" A gain of 1.8 dB over a dipole is claimed for this type of antenna. The principal difference appears to be a lower angle of radiation. While it is possible to work stations off the ends of the antenna, maximum radiation occurs broadside to the element. What I like about the antenna is the ability to hear weak stations. It is outstanding in this regard.

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Assembling Big Antennas on Fixed Towers

How do you get an ungainly mass of DX-getting aluminum to the peak of a metallic mountain? This offset boom-mounting method makes a tough job safe and simple.

By Bob White,* W1CW, Ellen White,* W1YL and Jim White,** K1ZX

An irresistible offering at the Florida Hamboree flea market led to the family acquisition of seven rugged tower sections. That purchase resulted in a fixed 70-footer[1] decorating the "back 40." Our ham-oriented family now decided to buy that long-yearned-for *big* antenna, get it up and start working DX from the reputedly fabulous south Florida latitude.

A KLM 6-element tribander was speedily acquired. Soon thereafter (with lots of anti-seize compound under our fingernails) our efforts produced an imposing structure: a really beautiful sight — six elements on a 32-foot boom — lying on the ground! Somehow this monster antenna had to be placed at the top of the 70-foot tower. Without access to cranes, "cherry pickers," hot-air balloons, helicopters (or any one of many other suggestions that wouldn't be appropriate to repeat here), what to do? Obviously, there was only one practical answer: The antenna had to go up *in pieces.* The remaining question was how to engineer the operation to make it safe and as easy as possible for those "lucky volunteers" who would be atop the tower doing the actual assembly.

The PVRC Mount

The answer was found in an adaptation of what to some is known as the "PVRC mount." Many members of the Potomac Valley Radio Club have successfully used this method, though the literature on the details of just how it's done is surprisingly sparse. Simple and ingenious, the idea involves offsetting the boom from the mast to permit the boom to tilt 360° and rotate axially 360°. This permits the entire length of the boom to be brought alongside the tower, allowing the elements to be attached one by one.

As the photos show, the mount itself consists of a short length of pipe of the same (or greater) diameter as the rotating mast, a steel plate and the hardware to hold it all together. The plate is drilled for eight U bolts: four to attach the plate to the mast, and four to attach the pipe to the antenna boom-to-mast plate. Additionally, four pinning bolts are used to ensure that the antenna ends up level and parallel to the ground. Two pinning bolts pass through the mast, two through the horizontal pipe. When the horizontal pipe pinning bolts are removed and the U bolts are loosened, the boom-to-mast plate can be tilted 360°, allowing either half of the boom to come alongside the tower.

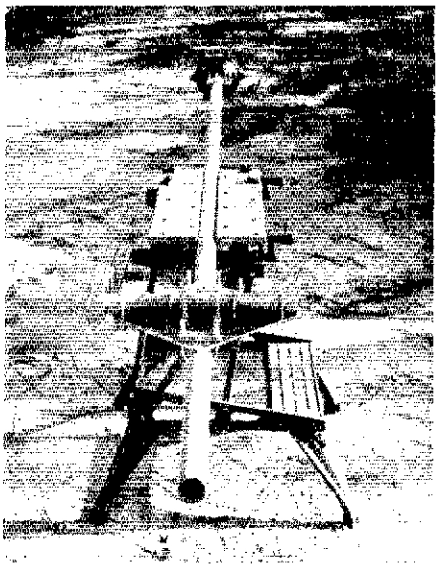
Up It Goes

After we carefully marked all critical dimensions, the antenna elements were removed from the boom. Once the rotator and mast have been secured to the tower, a gin pole is used to bring the adapter plate and pipe to the top of the tower. There, the "top crew" unpins the horizontal pipe and tilts the antenna boom-to-mast plate to place it in the vertical plane. The boom is attached to the boom-to-mast plate at the balance point *of the assembled antenna.* It is important that the boom be rotated axially so that the bottom side of the boom is closest to the tower. This will ensure that the antenna elements will be parallel to the side of the tower during installation, allowing the boom to be tilted without the elements striking the tower.

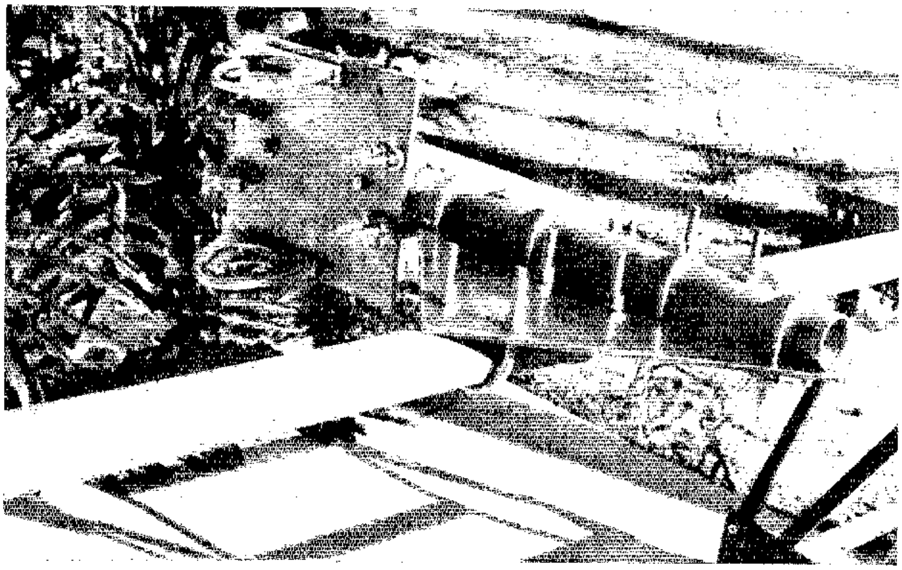
During our installation, it was necessary to remove temporarily one guy wire to allow for tilting of the boom. As a safety precaution, a temporary guy was mounted to the same leg of the tower just low enough so that the antenna would not hit

[1] m = ft × 0.3048

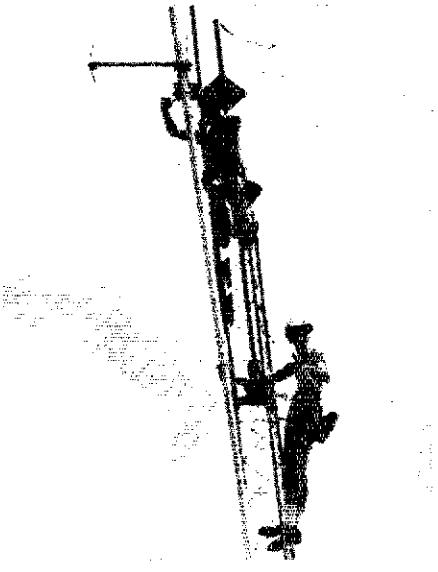
*19620 SW 234 St., Homestead, FL 33031
**15440 Hayes Ln., Leisure City, FL 33033



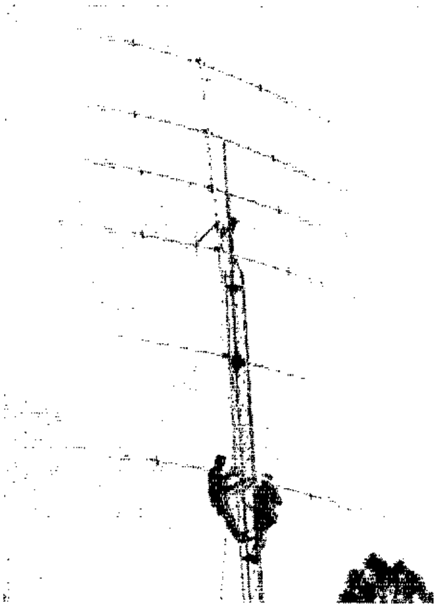
The PVRC mount, boom-to-mast plate, mast and rotator ready to go. The mast and rotator are installed first.



Close-up of the PVRC mount. Two of the four locking pins (bolts) may be seen at the midline of the left-hand vertical plate. The other two pins are located along the axis of the short pipe section; the head of the right-hand bolt blends in with the U-bolt lock nut to the rear.

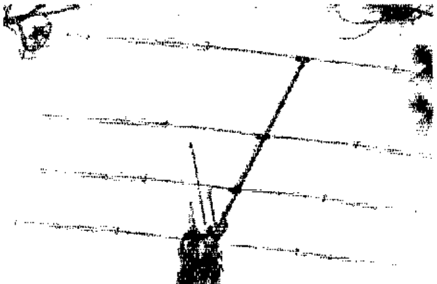


Jim (K1ZX) and Dave (KA5CRL) working at the 70-foot level. A gin pole makes pulling up and mounting the boom to the boom-to-mast plate a safe and easy procedure.



Mounting the last element prior to positioning the boom in a horizontal plane.

The mast-to-pipe U bolts are loosened and the boom is turned to a horizontal position. This puts the elements in a vertical plane. Then, the pipe U bolts are tightened and pinning bolts secured. The boom U bolts are then loosened and the boom turned axially 90°.



Tighten all the nuts, attach the coaxial cable and you're ready to crack the pileups!

it. (In this particular tower installation, three sets of guys were employed and the removal of one top guy presented little hazard.)

The elements are assembled on the boom starting with those closest to the center of the boom, working out alternately to the farthest director and the reflector. This procedure *must* be followed. If all elements are put first on one half of the boom, it will be dangerous (if not impossible) to put on the remaining elements. By starting at the middle and working outward, the antenna weight will never be so far removed from the balance point that tilting of the boom becomes impossible.

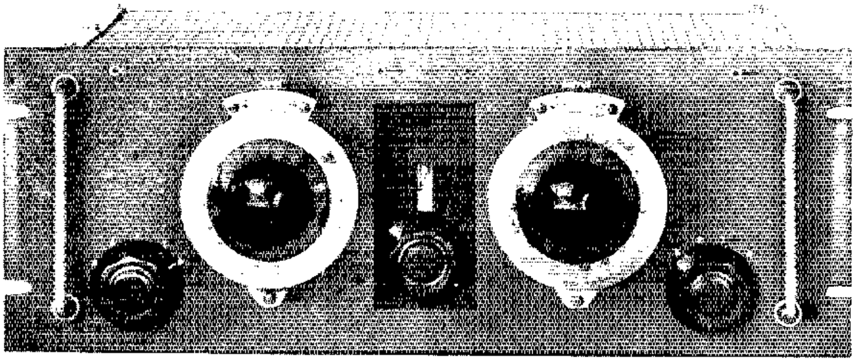
When the last element is attached, the boom is brought parallel to the ground, the horizontal pipe is pinned and the U bolts tightened. All the antenna elements are now positioned vertically. Next, loosen the U bolts that hold the boom and rotate the boom axially 90°, bringing the elements parallel to the ground. Then tighten the boom U bolts and double-check all the hardware.

Summary

Many long-boom Yagis employ a truss to prevent boom sag. With the type of mount just described, the truss must be attached to a pipe that is independent of the rotating mast. A short length of pipe is attached to the boom as close as possible to the balance point. The truss will now move along with the boom whenever the boom is tilted or twisted.

With the participation and enthusiasm of family members and friends like Jim, WA4AMG, and Dave, KA5CRL, projects like this "get off the ground" easily. Have you got a similar tower/antenna situation facing you? Give the PVRC system a try — we recommend it!

Build This L-Match



Is a narrow-bandwidth antenna cramping your style? Broaden your operating range! Dig into your junkbox and build this L-Match.

By Harry R. Hyder,* W7IV

My antenna is sufficiently broadband at 7 MHz and higher to be within the range of the output network of my transceiver. On the 3.5-MHz band it is a different story. My antenna is a trap vertical, and when the trap has been adjusted for some particular frequency, departures of more than 50 kHz on 80 meters are beyond the matching capabilities of the rig. Since I like to operate both phone and cw on the 3.5-MHz band and have plans to load the vertical on 1.8 MHz, a matching network is obviously needed.

What a ham builds is usually influenced by the parts on hand and the personal station arrangement. A five-gang receiving variable capacitor and a number of high-voltage mica capacitors were on hand, and fitted in nicely with an L network, so that is what I built.

Nothing more elaborate than an L network should ever be needed for impedance matching. PI and T networks are capable of giving greater harmonic attenuation, but TVI problems on 1.8 and 3.5 MHz are minimal, and they were to be the primary bands of operation for the L-Match. There is no reason why the L-Match can't be used on higher frequencies; it just was not built with that in mind.

There are eight possible L-network configurations; these are shown in Fig. 1. No single configuration will handle all possible mismatches, but those shown in Figs. 1A and 1B together can match any impedance.

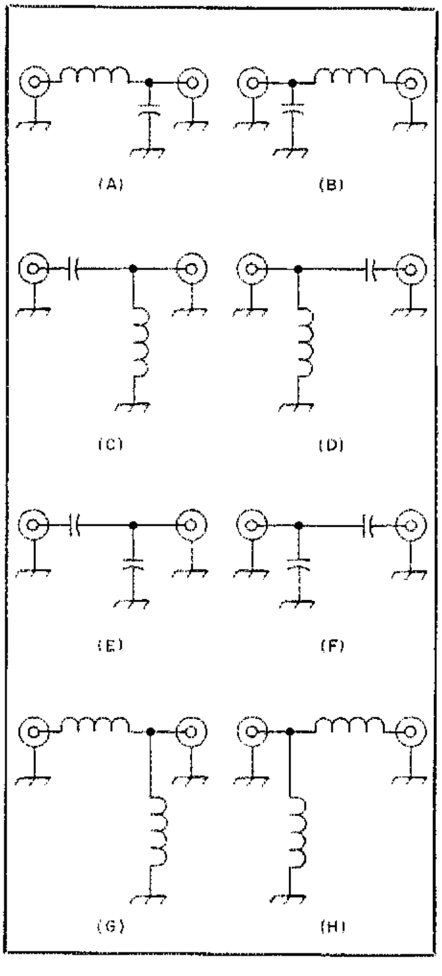


Fig. 1 — The eight possible L-network configurations.

Construction of the L-Match

The L-Match is reversible. That is, to change between the Fig. 1A and 1B configurations, the input and output are interchanged. In my station this is accomplished by an antenna switch in the station control panel, wired as shown in Fig. 2. One switch position bypasses the L-Match.

Component values depend on the degree of mismatch to be accommodated and on the operating frequency. I decided to limit its range to a VSWR of 10 at 1.8 MHz. For these conditions a capacitance of almost 6000 pF and a maximum inductance of 16 μH are needed. Obtaining the necessary inductance was no problem; a surplus roller inductor of 28 μH was on hand. The required capacitance was obtained from the five-gang, 410-pF-per section variable unit and two banks of capacitors, each with five 400-pF, 2500-V mica capacitors in parallel. This provided more than 6000 pF.

Hams may be skeptical of using mica capacitors in circuits carrying heavy rf current, but this is standard commercial practice. In fact, the surplus BC-375 tuning units from which these capacitors had been removed used them in just that way. These capacitors actually have an rf current rating of 1.0 ampere at 3.0 MHz. This is for continuous duty in an extreme environment; for ham use it can be stretched safely to 2 or 3 amperes.

*1638 W. Inverness Dr., Tempe, AZ 85282

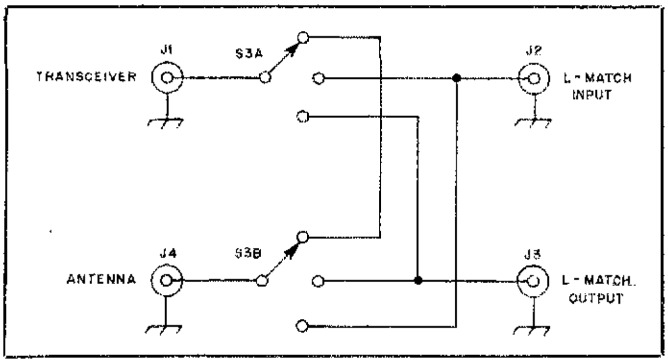


Fig. 2 — Antenna switch in the station control panel used to change the L-Match network from that of Fig. 1A to Fig. 1B. S3 is a two-section ceramic wafer switch.

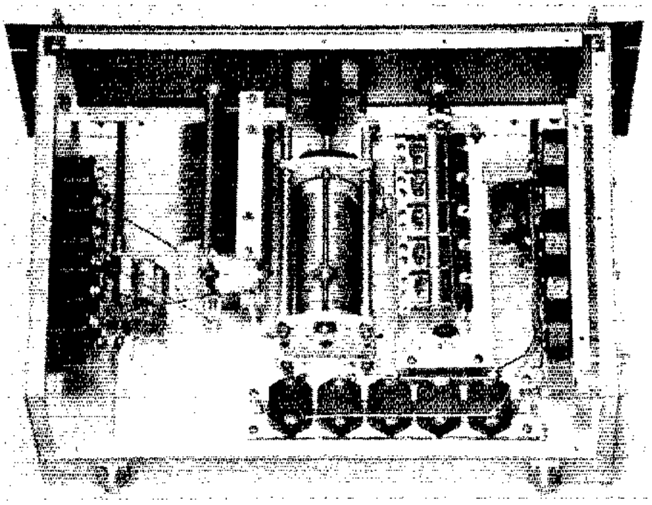


Fig. 4 — Interior view, showing construction details of the L-Match.

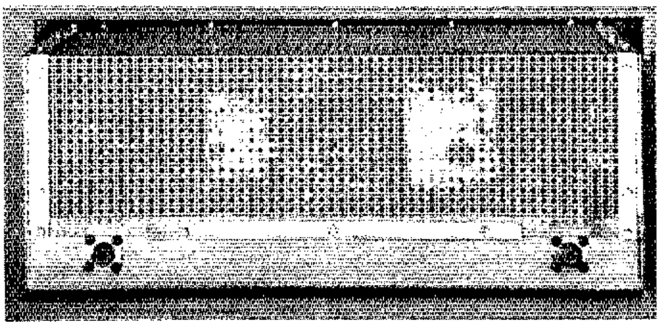


Fig. 5 — Method of attaching the cover, using 1/2-inch-wide aluminum strips.

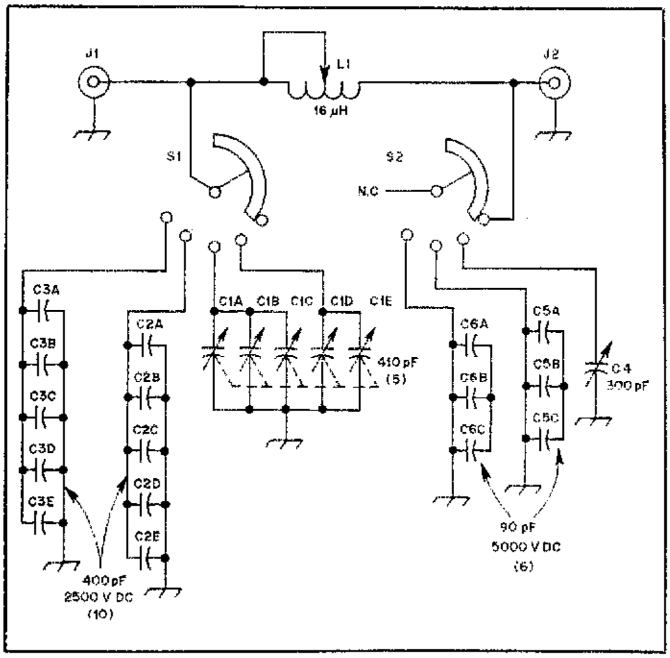


Fig. 3 — Schematic diagram of the L-Match.
L1 — 16-µH (or greater) roller inductor.
C1 — Five-section, 410-pF-per-section variable capacitor.
C2, C3 — 400-pF, 2500-V mica capacitors (CM-55 style), five capacitors each.
C4 — 300-pF variable capacitor.
C5, C6 — 90-pF, 5000-V mica capacitors (CM-65 style), three capacitors each.

Fig. 3 is a schematic diagram of the L-Match. One question that will be asked is why the schematic diagram and photograph show two sets of capacitors if only one is needed in an L network (see Fig. 4). This is another example of designing for a specific set of conditions at a particular ham station. When the network of Fig. 1A is used, with the capacitor on the antenna side of the network, the rf voltage will be higher than at the input, and generally less capacitance will be needed.

My rf power is normally 150 watts. With a VSWR of 10, the peak voltage across the capacitor would be about 400 volts, safe for the receiving capacitor used. I occasionally use an amplifier with an output of 600 watts. The peak voltage could then be 800, and this seemed to be asking too much of the capacitor. Since the 300-pF transmitting variable and the 5000-V mica capacitors were on hand, they were added for safety. The net capacitance is about 850 pF. This is not enough to accommodate all possible VSWR values at 1.8 MHz, but my amplifier does not work on 160 meters. The capacitance is high enough to handle the majority of cases at 3.5 MHz and higher.

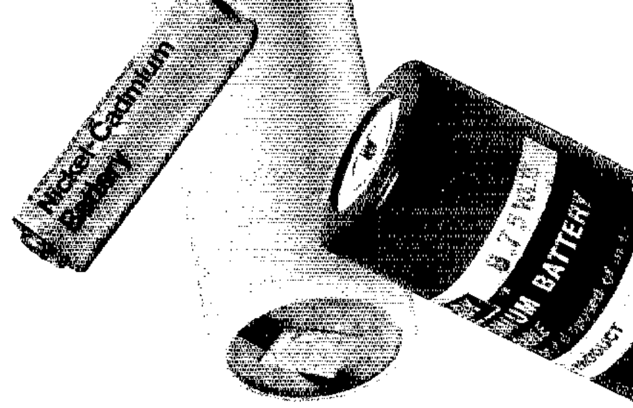
For 200 or 300 watts, receiving capacitors are adequate, and the second bank of capacitors is not needed. In this circuit one or the other bank of capacitors is used — never both. Switch positions remove either bank. The capacitor switches were taken from BC-375 tuning units, and are ideal for the purpose since they progressively short-circuit contacts as they are rotated. S1 was modified by adding a braid pigtail to the rotor and by filing another notch in the detent disk.

Packaging

Most of my homemade gear is designed to be rack mounted. The L-Match uses a 7 × 19-inch panel (mm = inches × 25.4); the chassis is 2 × 12 × 17 inches, employed upside down. The side walls are aluminum, 6-1/2 × 12 inches. The cover is fastened to 1/2 × 1/2 × 1/16-inch aluminum angle stock inside the walls. The cover is aluminum "cane" material, sold in many "do-it-yourself" stores. This material is rather flimsy, so it is held down with 1/2-inch-wide aluminum strips and sheet-metal screws (see Fig. 5).

If you don't have the exact parts described in this article, build an L-Match anyway. Use the parts you have. Isn't that one of the things ham radio is all about?

Nickel-Cadmium Pandemonium



Is the flood of information and misinformation about NiCad batteries driving you to confusion? Then let this treatise show you how to get the most from your NiCad battery pack.

By Budd Meyer,* K2PMA

There has been a marked increase in the utilization of nickel-cadmium (NiCad) batteries in the years since I first addressed the subject in my article, "Charge It," published in March 1977 *QST*. Since then I have read many articles that contain all sorts of ideas and circuits to help us keep our HTs operating. The more sophisticated circuits that I've seen are great fun to use and will do the job admirably but at a cost in complexity and reliability.

Misunderstandings About NiCads

The use of a device to completely discharge and then fully charge NiCads with controlled timing is not a new idea, nor is it a particularly good idea for amateur use. These "cyclers" are used extensively in the operation of model airplanes. They are commercially available for that purpose. Model airplanes, in contrast with Amateur Radio, require comparatively short-term but reliable applications of power.

We are told that NiCads can be cycled up to 1000 times under ideal conditions. A cycle is a complete charge and discharge event. We must not, however, lose sight of the fact that NiCads are, in effect, a sealed chemical factory with finite capacity to supply power. The drawback in using one of the model airplane cycling devices is that, by definition, some of the finite capacity of NiCads is lost by heating the atmosphere and not in communicating with another amateur.

There is nothing electronically wrong with using a cycling charger on your HT battery. The good cyclers will most certainly give you the assurance of having a battery that is fully charged. Understand, however, that the number of times you will be able to use that battery will be reduced. You reduce by one the number of cycles remaining to power your radio every time you discharge the battery into the cycler load resistors.

With the rise in popularity of battery-powered radios, there has been an increase in the variety of chargers that are available. Whether you buy or build a NiCad charger, you must be careful in selecting the device. *Do not* use a battery *eliminator* as a battery *charger*. The eliminator is a constant voltage device, probably using a 7808 or 317 monolithic regulator circuit. Nickel-cadmium batteries require a constant-current charger, as described later. If you bought or built a battery eliminator, use it for the purpose for which it was intended — to power your radio *in place* of the battery.

NiCad Memory

Listening to local repeaters, I've become aware that there are too many users of NiCads who still do not have a full understanding of proper NiCad usage. Two of the most common bits of conversation by HT operators are, "Am I making it?" and "My batteries just went." Let me now address the bugaboo of "memory," the least understood topic.

Memory pertains to a phenomenon unique to NiCads whereby you cannot completely use the rated ampere-hour capacity (designated as C) of the battery (see Fig. 1). For example, operating your HT in the receive mode for three hours diminishes part of the capacity. Use of battery energy in this manner is defined as "shallow discharge." If you charge the unit to full capacity, then use the receiver for only another three hours, repeating this charge-and-listen procedure for many *identical* cycles, the capacity can be temporarily reduced as much as 70%. A memory level is set by many *identical* shallow discharges. Memory is not a major factor in having NiCad batteries go dead at the wrong place and time. If you do not take advantage of the total capacity built into your battery, you're not using your investment wisely. There is a lesson to be learned from this: Do not listen for hours, recharge, listen and then recharge. Do some transmitting!

Another cause for memory is long-term overcharge. Long-term, in this case, is defined as more than several months, such as when your spare battery is not being "exercised" while you are saving it for emergencies. To overcome the memory problem, put your NiCad to work!

Temperature, A Critical Parameter

The case temperature of a NiCad is a

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critical parameter. It is usually ignored in the rush to get an HT on the air. See Table 1. I suggest that you pay attention to the limitations. Note that 41° F is 5° C. Charging at a higher rate than recommended will cause increased internal temperature, which will result in premature loss of capacity. While some batteries can accommodate quick recharging, who knows if your batteries are designed to withstand many cycles of rapid charging?

NiCads, being one of the more forgiving electronic components, will take much short-term abuse, but don't overdo it. The safest and most reliable way to keep your batteries in good health is to charge them at a 0.1C rate for 14 hours between 41° F and 95° F (5° C and 35° C). Do not make the mistake of presuming that less is better. While you can use a trickle charge (0.033C) on a battery that is fully charged, it definitely is not advisable to use a rate of less than 0.1C (except as noted below) to recharge a discharged battery. Otherwise your NiCad will *lose* capacity. If waiting the necessary 14 hours is more than you can stand, buy an extra battery! It will be less expensive in the long run.

Low-temperature charging is also detrimental to the battery. If you have to charge in a cold ambient, reduce the charging current. At 32° F (0° C), instead of 0.1C, reduce the charging rate to 0.075C. This means that for a 500-mAh battery, the charge rate should be about 35 mA; for a 225-mAh battery, a 17-mA current is satisfactory. It is easy to plug these numbers into the formulas given in the original article.

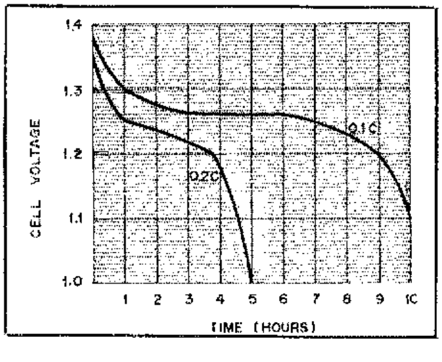

Fig. 1 — Discharge curve of standard nickel-cadmium batteries for 0.1C and 0.2C at −4° F (20° C). Note almost constant voltage output for 10-hour discharge time. This graph is representative of all nickel-cadmium batteries.

A Cause of Dead Cells

Another phenomenon associated with NiCads causes much consternation — discovering one or more dead battery cells. More often than not, dead cells are caused by "cell reversal" as opposed to an electrical short circuit. Cell reversal results from millions of individual cells being manufactured and then bundled in groups of eight or nine to form batteries, one of which is installed in your rig. The manufacturer should select a group of cells that have closely matched characteristics — particularly capacity, C. What happens in cell reversal is that, as the battery discharges, one or more cells will discharge more than the others. A point is reached where the lower capacity cell becomes the recipient of charge from the remaining cells, and its potential becomes zero volts or may reverse polarity. In a discharge mode, the cell is being charged in the reverse direction. There isn't much you can do about this when buying the rig complete with battery, except hope that the HT manufacturer didn't buy his batteries from the "lowest, lowest" bidder.

There is something you can do after you own the radio. *Take care* of the battery. You'll hear stories of some "smart" amateurs allowing the voltage of their batteries to drop to less than 1 volt per cell consistently and supposedly getting away with it. Considering the discharge characteristics required by current HTs, I consider 1 volt per cell to be the recommended minimum cutoff voltage.

Should you suspect a reverse charged cell, put the battery pack in a charger and give it a full 14-hour charge at 0.1C. If the reverse didn't exceed −0.5 volt, the chances are that no permanent damage has been done.

There is another minor annoyance associated with NiCads, but this is easily reversible. As a sealed chemical factory, NiCads exhibit a self-discharge rate of a little over 1% per day at 77° F (25° C). Again, this rate is temperature related. At 104° F (40° C) your battery will lose about 50% capacity in two weeks. This should tell you something about storing NiCads. Keep them in a refrigerator, not a freezer. Give them a full charge before you use them again.

Charging

A word must be said once more about fast-charge batteries. The cell voltage and case temperature have to be monitored carefully. Cell-case temperature should be restricted to between 59° F (15° C) and 113° F (45° C). The charge voltage per cell must be limited to 1.5 V maximum. Also be sure the batteries are of the fast-charge type. There should be some indication on the label or on the cell itself.

Clearing an Electrical Short

I'd like to comment on the matter of "clearing" an electrical short circuit in a battery cell. Several articles have appeared in our magazines outlining procedures that the authors claim are successful in resurrecting batteries. In general, the process involves charging a capacitor to a much higher voltage than the battery voltage. For example, a charging voltage could be from 20 to 50 volts for a 12-volt battery. After the capacitor is charged properly, the battery is then zapped. Understand, however, that this procedure is only a temporary expedient. The shorts are caused by "whiskers" of metal bridging the battery electrodes. Zapping clears them, temporarily. I don't think I would want to rely on a zapped battery. Something caused the whiskers to grow in the first place; they weren't designed in.

Like it nor not, the basic operation of NiCads is also time dependent. Notwithstanding the fact that your battery may have died during an important QSO, it must be used according to its rules, not yours. If you're wise, you will wait out the time required to charge the NiCad properly. You can get away with a 0.2C or 0.3C charge to a sintered cell every once in a while. But don't abuse the privilege. Charge at 0.2C for seven hours and 0.3C for four and a half hours. These times *are* cast in concrete!

NiCad users should understand what constant-current charging means. This type of charging system, properly designed, will supply a current that is unvarying, regardless of the state of charge of the battery being charged. Believe it or not, there is much confusion over this point. Scaling a charging system for 22 mA makes that system supply 22 mA. As the charge progresses in time, it still supplies 22 mA. The charge current is not reduced at or near the end of charge; neither is it higher at the beginning. The only reading that changes as the battery accumulates charge is the voltage across the battery — with the charger disconnected. At the end of 14 hours at 0.1C rate, the battery will have a potential of 1.4 volt per cell.

Checking With a Voltmeter

Is there a way to check a NiCad to find out if your rig will make it through the

Table 1

Recommended Temperature Ranges for NiCad Storage, Discharge and Charge

	Temperature Range	
Storage	−40° F to +113° F	−40° C to +45° C
Discharge	−4° F to +113° F	−20° C to +45° C
Charge (0.1C)	+41° F to +113 F	+5° C to +45° C

outing? You betcha! A voltmeter will help. There is one time when a NiCad has more than 1.2 V per cell, and that is when it's fully charged. However, that condition lasts but a short time. Note in Fig. 2 that a NiCad with diminished capacity seems much the same on the horizontal axis as a fully charged one. Putting a voltmeter across the battery can show that the potential is above the 1 V per cell cutoff, yet internally the capacity to operate your set just isn't there. Perhaps the best way to understand the concept is to accept the fact that there is a difference between voltage and capacity. In a contest, capacity wins every time.

To check capacity of a battery accurately you will have to go through at least one complete charge/discharge cycle at a standard time and current — 14 hours at 0.1C charge and 10 hours at 0.1C discharge at 77° F (25° C). At the end of the discharge part of the cycle — 10 hours — the voltage shouldn't be less than 1 V per cell; carefully note the voltage during the test and do not let it go below that or your cell may go into a reverse charge. By multiplying current by hours when the voltage reaches 1 V per cell, you will arrive at the capacity of the battery. If it's less than about 75% of its rating, start looking for a new battery.

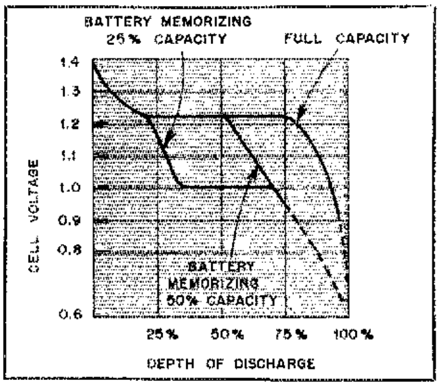

Fig. 2 — This graph shows how capacity in ampere hours is reduced when the memory phenomenon affects the battery. The horizontal axis is also time and current related, indicating that, should memory effect take place, the Ah capacity of the battery is reduced as shown. This happens rarely in Amateur Radio use because we seldom discharge to identical points on any of the curves.

Don't think you can just hang a resistor across the battery to discharge it. If you do, you will note that as the voltage drops near the end of capacity, so does the current. The law states I = E/R — always. Unless you compensate for this, your great experiment will give your incorrect results. How about using a nonlinear resistor like a small lamp? Yes, that's the way it's done.

The Definitive Treatise

The nickel-cadmium battery is a rugged, efficient source of power. If treated according to its rules, not yours, it will provide a long-term bunch of fun as a power supply for your HT. I hope that this article is *the* definitive treatise on NiCads.

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New Books

☐ *DX IS! The Best of the West Coast DX Bulletin,* edited and published by C. Allen, W5DV, and J. Allen, W6OGC, 1200 3rd Ave., Suite 1200, San Diego, CA 92101. Soft cover, 6 × 9 inches, 188 pages, $7.95 + $1.50 shipping. Foreign orders add postage for 1-lb shipping weight.

It has been over two years since the *West Coast DX Bulletin* published its final issue, leaving 3200 subscribers mourning the loss. Originally conceived in 1968 by Hugh Cassidy, WA6AUD, the *WCDXB* was to be limited to a few hundred subscriptions. Despite efforts to limit circulation, the work load became too much for Cass and his wife Virginia to handle. In July 1979, the final issue was mailed, and the labor of love had thus ended. The bulletin left behind an impressive record — over 600 issues to its credit — 11 years of continuous publication without skipping a single issue!

The reason for the *WCDXB's* popularity became obvious to all DXers who glanced at a single issue. The publication provided up-to-date information on which DX stations were active and which ones were to be expected. In addition, the *Bulletin* provided DXers with accurate propagation information and forecasting. In this respect, the *Bulletin* was not much different from others available at the time. It was the truly unique editorial style of Cass that singularly propelled the *Bulletin* to success.

Cass chose to write his editorials in short-story fashion, and included them at the end of each *Bulletin*. Most often, the stories consisted of a dialogue between himself and one of the local QRPers — individuals who worked DX but did not truly understand the art of DXing. It was through these conversations that Cass made his statements about DX issues.

The *Bulletin* left not one stone unturned. It addressed a wide variety of DX controversies including list operations, DXCC rules, bootleg stations and the "woodpecker." Although some of the issues are no longer in debate, most of Cass' editorials posessed a timeless quality, which allows them lasting significance in the world of DXing.

The editors have recognized that many of Cass' stories were DX classics and were much too good to be forgotten. Through the cooperation of Cassidy, Allen and Allen have searched through the entire 11-year run of the *Bulletin*, over 600 issues, and extracted what were thought to be the best editorials. These extractions were organized loosely into chapters, each dealing with a specific topic and *DX IS!* is the result. All of the material in the book, except for the editor's notes, preface and introduction, is presented exactly as it originally appeared in the *WCDXB*.

Veteran DXers will delight in the reminiscence that *DX IS!* will provide. Newcomers who are not familiar with Cass' writings will also benefit from their timeless nature. All readers will certainly appreciate the insight and understanding of DXing and the true-blue DXer that only Cassidy could provide. — *Dennis Lusis, W1LJ*

Build an FM-Receiver Clone

One fm receiver to receive two frequencies simultaneously? Without degradation of performance? Less than $15?

By John M. Gebuhr,* WBØCMC

As with most repeater groups, our needs often exceed our financial resources. We needed a means for linking a satellite receiver with our 2-meter repeater, but the potential expenses boggled the mind: hardline, antenna, transmitter strip, receiver strip and all manner of filtering. I conducted some initial tests by linking our 220-MHz and 2-meter repeaters. A 220-MHz transmitter served as the link between the remote receiver and the repeaters.

This was an economical approach, but the drawbacks far outweighed the savings. Then I had an inspiration: why not use the existing 220-MHz-repeater receiver to receive simultaneously the regular repeater frequency and a second closely spaced link frequency? Would it work? How much would it degrade performance?

Basic Receiver Theory

The rf and first mixer stages have about 20 to 30 dB of gain and a bandwidth of 6 to 9 MHz at 220 MHz (Fig. 1). The 10.7-MHz i-f and second mixer are not as wide, and also have 20 to 30 dB of gain. The 455-kHz i-f has a bandwidth of approximately 20 kHz, largely because of its ceramic filter.

From this it is easy to see that up to the ceramic filter any input signal on 222.34 MHz, or up to 100 kHz either side of it, should appear at the mixer output. In other words, if two or three signals fall simultaneously within the 200-kHz bandwidth they (or their resultants), should all be amplified the same amount and maintain the same frequency spacing and modulation characteristics when they appear at the second-mixer output, provided neither is strong enough to cause the amplifiers to go into limiting. That point is approximately 900 μV for the Clegg FM 76, Midland 13-509 and Cobra 200. What this means is that a signal on 222.28 MHz would produce i-fs of 10.640 MHz and 395 kHz.

It should be easy to build a 395-kHz i-f and detector with audio, squelch and COR circuits. The technical problems were not nearly as great as the logistical ones. Unfortunately, 455-kHz i-f transformers do not operate at 395 kHz without adding extra capacitance (ceramic filters for that frequency do not seem to exist).

By changing the crystal in the second LO from 10.245 MHz to 11.155 MHz, 222.34 MHz still produces 10.7 MHz, which results in 455 kHz, *but* 222.28 MHz now yields 515 kHz. All of the 455-kHz transformers I tried would tune slightly above this with no modification. (The lowest tuned to 525 kHz.)

Perhaps the most difficult thing was the method of coupling the 515-kHz signal out of the mixer. The best way was to cut the collector lead and put the primary of a (now) 515-kHz i-f transformer in series (see Fig. 2). Two i-f transformers must be used at this point to give a narrow enough bandwidth. They can be selected to give a turns ratio step-up. The two used in the amplifier should also be selected for this characteristic. They can be removed from discarded a-m transistor radios and should be the type with yellow or white

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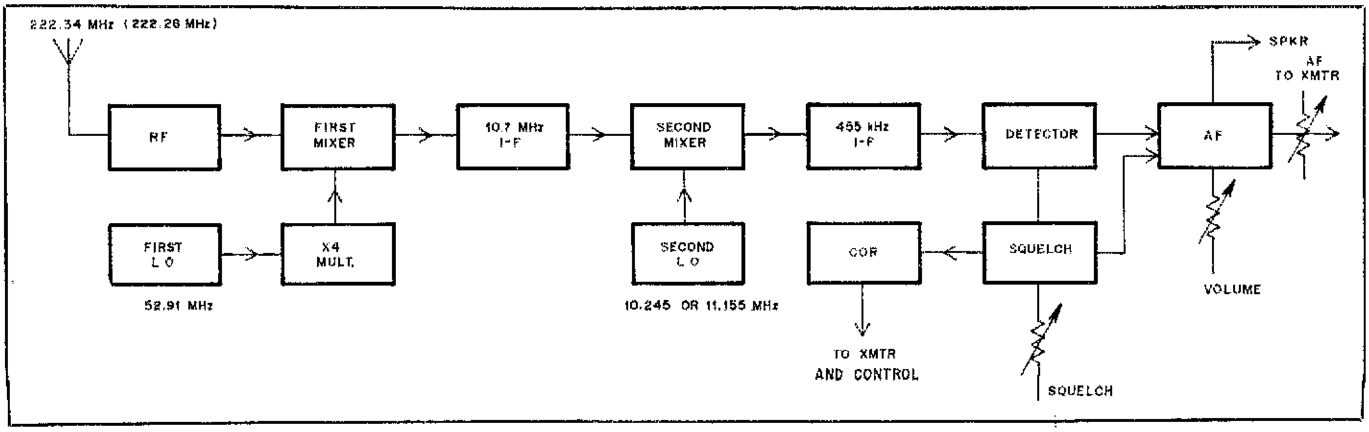


Fig. 1 — Block diagram of basic fm receiver. See text for discussion.

cores. By selecting two that give an overall step-up ratio, several decibels of noise-free gain can be had. They should both be located as close to the mixer as possible.

Next, the I-F

The heart of the i-f is an RCA or National CA3089E, which has a three-section, 90 dB i-f amplifier with agc, afc, squelch, metering and audio outputs. It is driven by a single transistor i-f amplifier which provides the additional gain necessary for the desired sensitivity (Fig. 3).

The detector on the CA3089 is a quadrature type. Board layout, particularly at this range of frequencies, is of the *utmost importance*. The one in Fig. 4 is very stable. All polarized capacitors associated with the CA3089 must be tantalum types with the shortest possible leads. This IC has about 100 dB of gain in a 3/4-inch space; therefore, short leads on all components connected to it are mandatory or severe oscillation may result. The on-board squelch seems to be a bit "squirrely" so the actual squelch voltage comes from the meter output (pin B). It is also available at the top end of a 2.7-kΩ resistor used as a test point (T.P.) for signal strength. The agc and afc outputs are not used. The agc is bypassed and terminated in a 22-kΩ resistor. If it isn't bypassed and terminated, lower gain results.

The 1-μF bypass capacitor on pin 13 (metering) may be larger if desired; it is required to keep the gain of the IC at maximum. This pin-13 voltage is also applied to the base of the dc-amplifier transistor, Q2, which controls the COR and squelch. When the voltage at pin 13 reaches 0.6 to 0.7 V, Q2 turns on, removing voltage from pin 5 (squelch) and triggering the 555, Q3 and the PTT line to unsquelch the audio. As long as Q2 is turned on, it keeps the supply for the timing capacitor low. When the metering voltage drops below 0.6 to 0.7 V, Q2 shuts off, allowing the timing capacitor to charge. Then the 555 times out, releasing the PTT line. This also drives pin 5 high,

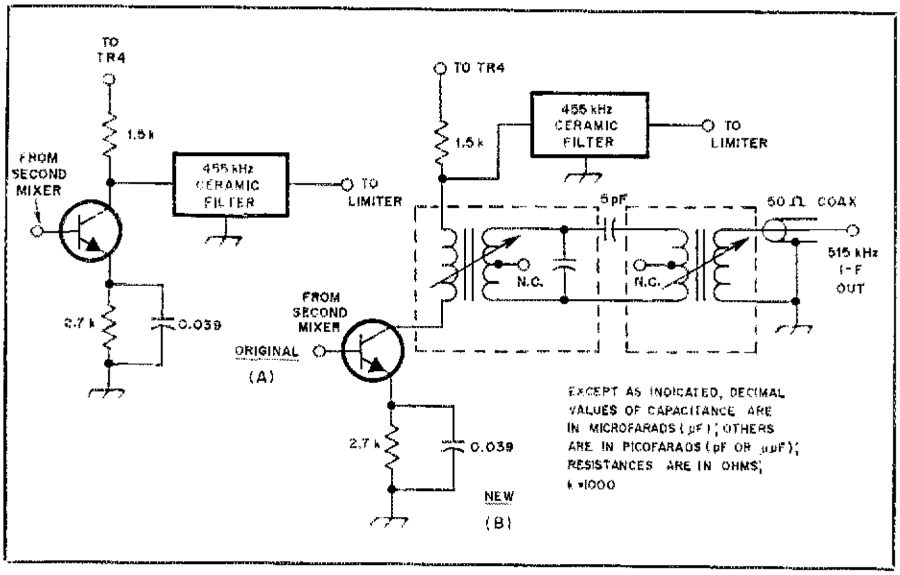


Fig. 2 — At A, the second mixer as originally configured in the repeater receiver. At B, the new version of the second mixer with outputs to both second i-fs.

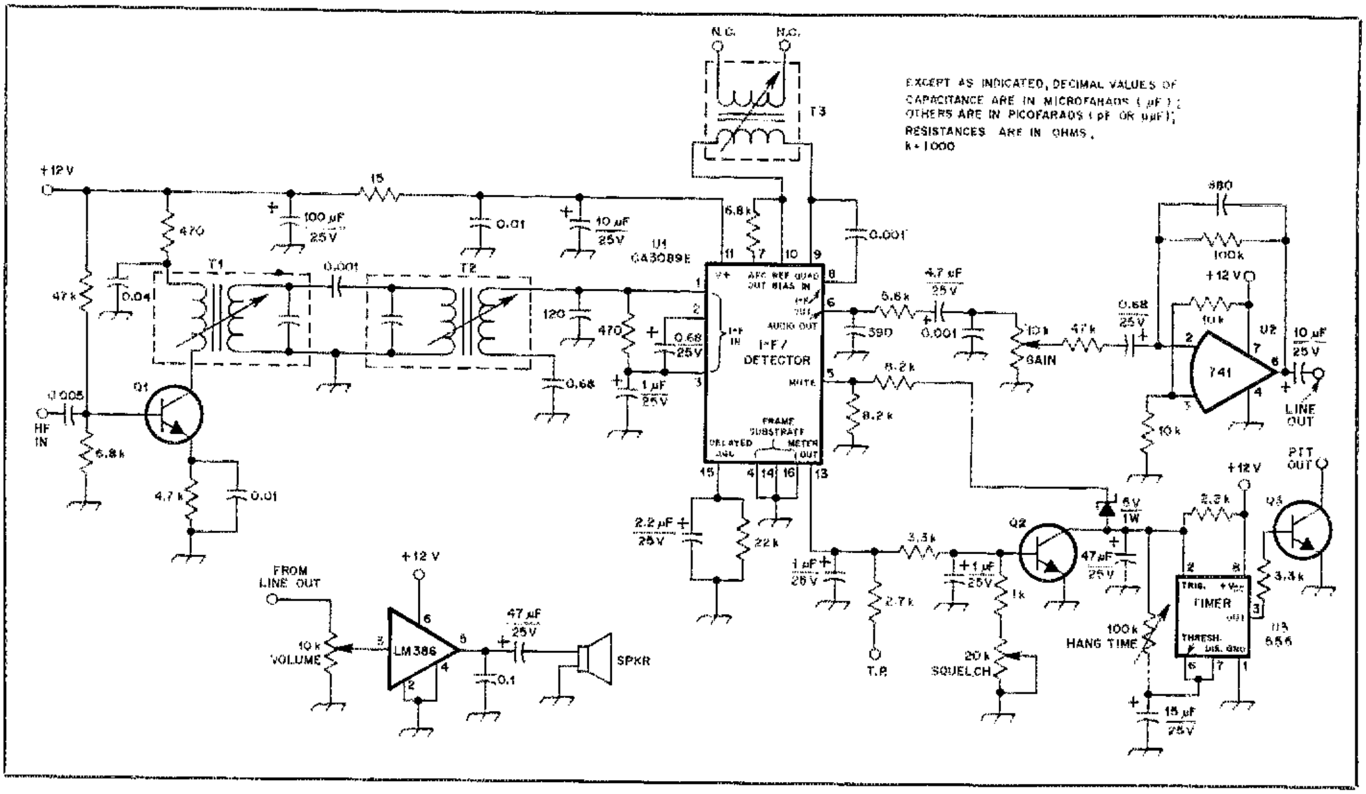


Fig. 3 — Schematic diagram of the additional second i-f and audio circuits. All capacitors are disc ceramic, except those with polarity markings, which are tantalums. Fixed-value resistors are 1/4-watt carbon composition types. Variable resistors are linear-taper composition controls.

Q1-Q3 — Silicon npn switching bipolar transistor 500 mW, 2N2222 or equiv.
T1-T3 — 455-kHz i-f transformers (see text).
U1 — Monolithic i-f/detector IC, CA3089 or equiv.
U2 — Operational amplifier IC, 500 mW, type 741 or equiv.
U3 — Timer IC, type 555 or equiv.
U4 — Low voltage audio power amplifier IC, type 386 or equiv.

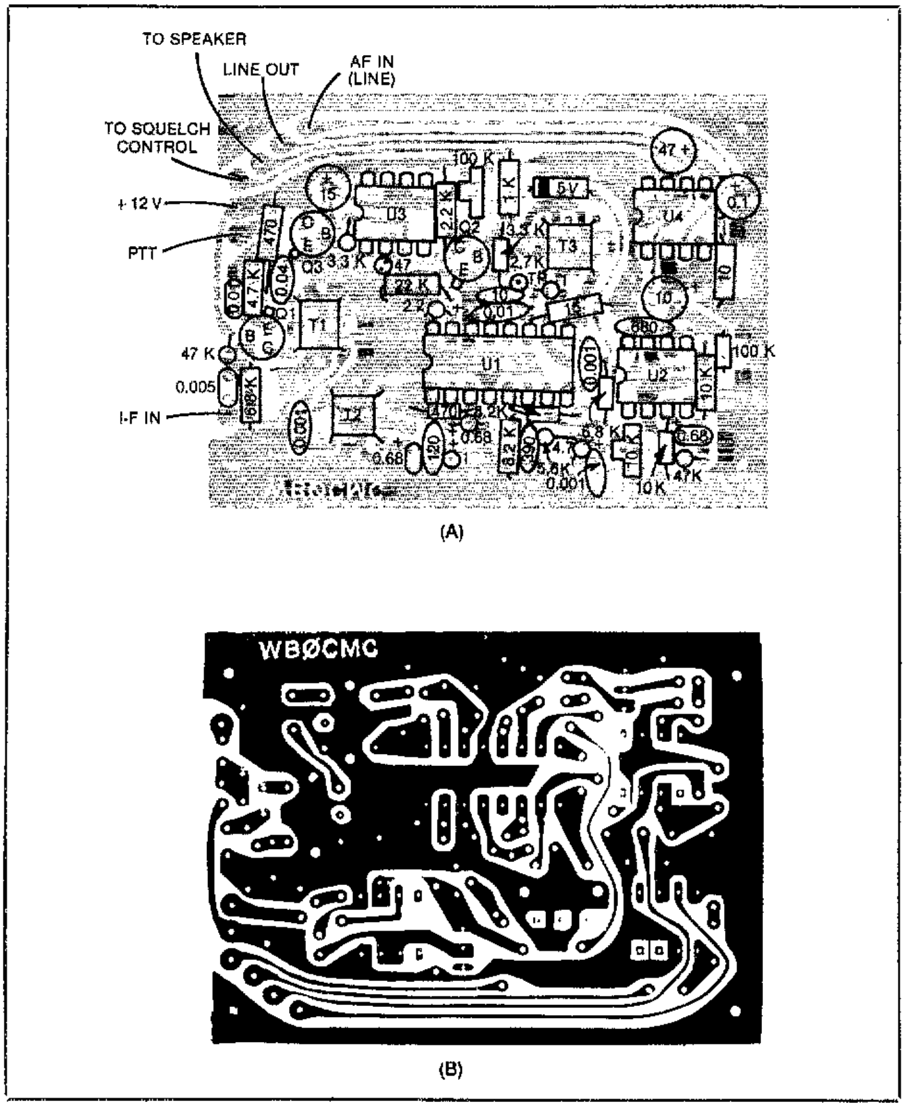


Fig. 4 — (A) Parts-placement guide for the receiver clone i-f and audio board. Components are placed on the nonfoil side of the board; the shaded area represents an X-ray view of the copper pattern. (B) Etching pattern for the receiver clone. Black represents copper; the pattern is shown at actual size from the foil side of the board.

squelching the audio. The T.P. (2.7-kΩ resistor near pin 13) may be used to tune all i-f transformers for a peak, except the one used as a quadrature coil. The RC network between pins 2 and 6 on the 555 determines the hang time for the PTT line (see Fig. 3).

The RC network from pin 6 of the CA3089 is for deemphasis and dc blocking prior to the audio gain control. The LM741 is used as a line driver and preamplifier. The 680-pF capacitor between pins 2 and 6 determines its upper frequency response. It is capable of driving the inputs of most repeaters. The LM386 is a speaker amplifier. It is nonessential to the operation of the rest of the circuit and may be deleted if desired.

Measurements taken on the overall system showed no measurable change in the original receiver: 0.25 microvolt for 20 dB of quieting, and ±12-kHz bandwidth. Our primary receive frequency of 222.34 MHz had suffered no degradation whatsoever. Next, testing on 228.28 MHz showed 0.25 microvolt for 20 dB of quieting, but because LC filters were used the bandwidth was wider. This results in better fidelity but degraded adjacent-channel rejection. I boosted the 222.28-MHz signal to 1000 microvolts; the 222.34-MHz receiver did not suffer degradation. Again, because of the shape factor of the LC i-f, a 300-microvolt signal on 222.34 MHz begins to affect the new receiver circuit performance. The closer the carrier moves to 222.28 MHz, the lower the level required to disrupt performance: 120 μV at 222.33 MHz, 90 μV at 222.32 MHz, 50 μV at 222.31 MHz, 20 μV at 222.30 MHz and 10 μV at 222.29 MHz. I plotted a similar curve below 222.28 MHz; it was nearly a mirror image of the above measurement results. With a signal on 222.34 MHz at 0.15 μV (near squelch threshold), it takes 900 μV simultaneously on 222.28 MHz to degrade this. With 0.15 μV on 222.28 MHz it takes 900 μV on 222.34 MHz to degrade the 222.28 MHz receiver. Not bad for scavenged parts and spare time! If another pair of i-f transformers were used, the bandwidth should improve further. They were not needed for my purpose. This system allows the use of the same duplexer, feed line and antenna as the main repeater, with no tuning changes.

Alignment is Simple

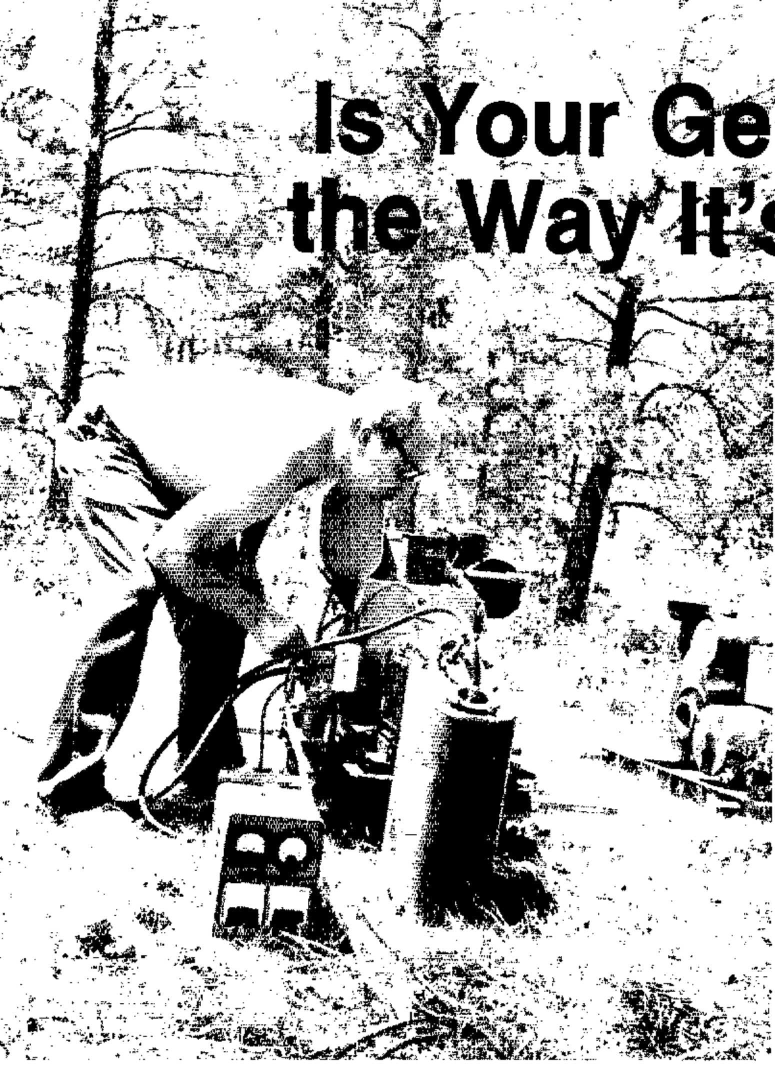
Attach the probes of a voltmeter (2.5-V scale) to the test point and ground. Inject a signal into the receiver input on the desired frequency and at a level sufficient to see the meter deflect. Tune each i-f coil for maximum (except the quadrature coil). Set the af Trimpot to midrange. Remove input signal to receiver and tune the quadrature coil (T3) for maximum noise (coarse adjustment). The squelch may need to be disabled for this by grounding pin 5 on the CA3089. With a modulated signal applied to the antenna input, the quadrature coil may be adjusted for the best symmetrical sine wave at the audio output. An audio-distortion analyzer will allow fine tuning. The ear or oscilloscope is adequate as a tuning indicator in most cases. The only thing left is to set the gain where desired and the hang-time potentiometer for the desired delay.

Additional Notes

If you are troubled by power-line noise, pin 13 or the T.P. may be used as a deemphasized a-m output for verification. This is useful data when you are asking the local power company for help in tracking down the noise. My total cash layout was about $10.

I have just obtained a 500-kHz ceramic filter, which greatly improves adjacent-channel and bandwidth performance. It is a TAF-01C made by Vernitron Piezoelectric Division, 232 Forbes Rd., Bedford, OH 44146. The 3-dB bandwidth is 12 kHz and the 30-dB bandwidth is 40 kHz. The skirts are ideal but the bandwidth is a bit narrow for ±5-kHz deviation, which requires 16 to 18 kHz for good audio quality. As a result I have narrowed the deviation of the link transmitter to about 2.7 kHz (equivalent to the 12-kHz bandwidth) and changed the carrier to 222.95 MHz, retuning the four i-f transformers to 500 kHz. This results in good audio quality, the same sensitivity, but a 6 dB S/N degradation caused by the lower modulation. The overall system is still better than with only the LC transformers. Filter cost is $17.95 at the 100-lot level.

It may be true that "there ain't no free lunches," but the receiver clone would certainly qualify as a "deep discount lunch." If your needs are similar, and if the receiver frequencies are close enough, why not try this system. The performance is excellent and the cost is low. What have you to lose?



Is Your Generator "Genin" the Way It's Supposed To?

Worried about equipment damage from a malfunctioning generator on Field Day? This test circuit will lay your fears to rest.

By Wayne Stump,* WB4AHZ

On Field Day I take along a generator test box that I've had for several years. It has a voltmeter and a vibrating reed frequency meter. The frequency meter is built in a panel-meter type of case with a rectangular window through which you can see the ends of several resonant reeds. A coil surrounds the reed assembly; when ac is connected to the coil, the reed that is resonant for that frequency will vibrate. Vibrating-reed frequency meters are scarce and expensive, but there are other ways to check generator frequency.

Frequency Indicators

One safe way is to connect two 117- to 6-V transformers and a 12-V lamp, as in Fig. 1. Plug one transformer into the generator and the other into the wall socket. You now have a beat indicator with isolation between the two sources of power. If the lamp blinks twice a second there is a two-Hz difference between the generator and commercial power. This will not tell you if it is 58 or 62 Hz, so tweak the governor adjustment and see if the situation gets better or worse.

If you don't have commercial power to use as a standard, you still can check your generator. Plug an electric clock, with a large second hand, into the generator. Compare the clock second hand with that of a watch of known accuracy. If the electric clock is running fast, the generator is running fast. Slow down the engine a little and give the situation another look.

Fig. 2 is the schematic diagram of a frequency indicator that is easy to build. It isn't very expensive, and is accurate enough for Amateur Radio use. The output of U2, at pin1, is a 60-Hz square wave that turns Q1 on and off. The output of the generator goes through T1 and D1 to supply a half wave rectified voltage to DS1. When the voltages coming from U2 and D1 are in phase, DS1 will light at full brilliance; as the phase changes, DS1 will dim. When the voltages are 180° out of phase, DS1 will not light.

Adjustments

The only adjustment in this unit is the oscillator frequency. The best way is to connect the vertical input of an oscilloscope to pin 1 of U2. Turn the horizontal switch to LINE. Now turn C3 very slowly until the Lissajous figure stands still. If you don't have a scope, the best thing to do is plug the tester into a source of commercial power and adjust C3 for the longest time interval between blinks of DS1.

The tester is built in a 3 × 4 × 5-inch (75 × 100 × 125-mm) aluminum box. T1 and DS1 are mounted to the box; everything else is on a piece of perf board. Parts layout and wiring are not critical.

When working on a generator it is best to load it at one-half to three-quarters of rated output. A bank of lamps is a good load for a small generator, and heating elements are suitable for large generators. It is not wise to use your rig as a load because accidents do happen! If you were to sneeze while working on the governor adjustment, you could pull the throttle valve open and make the engine race: The generator could put out a couple hundred volts for a second or so! It's a lot easier

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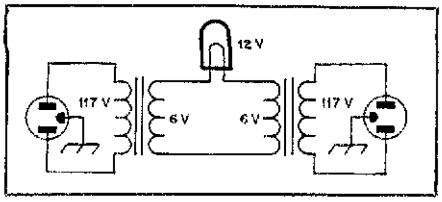


Fig. 1 — Simple circuit for checking the frequency of a generator using commercial power mains as the standard. The two transformers are small filament types, such as Radio Shack 273-1384. The lamp is a 12-V type, Radio Shack 272-1143 suitable.

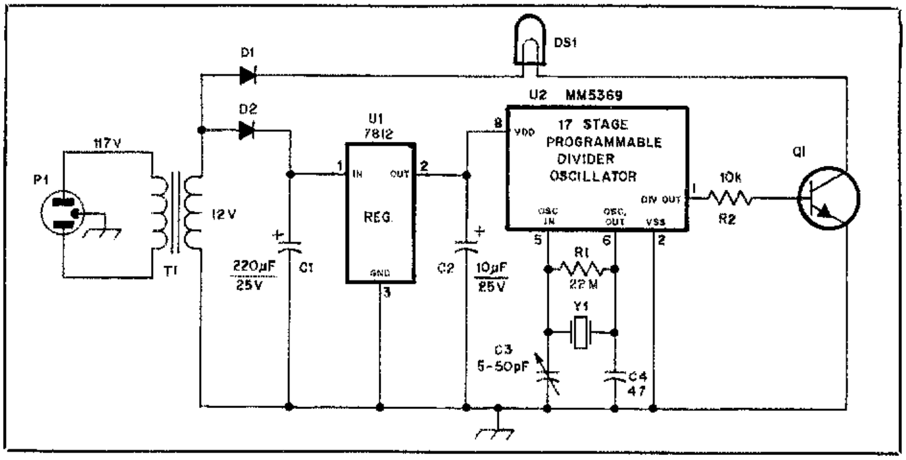


Fig. 2 — Schematic diagram of circuit for checking the frequency of a generator when commercial standards are not available for comparison.

D1, D2 — Silicon power diode, 1 A/100 PIV, type 1N4000.
DS1 — Incandescent lamp, 12 V, 250 mA, Radio Shack 272-1137 or similar.
Q1 — Silicon npn power-switching transistor, 500 mW, 2N2222 or equiv.
T1 — Power transformer, primary 117 V, secondary 12.6 V/1 A, Radio Shack 273-1505 or similar.
U1 — Monolithic three-terminal voltage-regulator IC, 5 V/ 1 A, type 7805 or equiv.
U2 — 17-stage programmable divider oscillator IC, type MM5369 or equiv.
Y1 — 3.579-MHz color-burst crystal, Radio Shack 272-1310 or equiv.

and cheaper to replace a couple of 117-V lamps than to replace electronic components.

A generator operating at the right frequency provides a safe form of emergency ac power. Power sources providing frequencies other than 60 Hz can damage electronic equipment. If you want to play it safe on Field Day, check your frequency!

Strays

TA PROFILES

☐ We are pleased to introduce our first (and only, at this time) Canadian ARRL Technical Advisor, John S. Belrose, VE2CV. His advisory services as an antenna expert (and author of numerous *QST* articles) are appreciated.

Jack has been a licensed radio amateur for more than 30 years. Although his main interests in Amateur Radio are antennas, modeled antennas and deployment at full scale (for use on Field Days and for communication on trips), Jack is also concerned, both from Amateur Radio and work-related points of view, with practical aspects of hf, vhf and uhf communications. His particular interest is in automation (such as radio-to-telephone interconnect) to improve circuit reliability and availability. One project he is currently interested in is amplitude companded sideband (ACSB), which could provide a significant improvement in spectrum utilization in the vhf/uhf land-mobile bands. For the amateur, ACSB offers a decided decrease in battery drain and hence longer life between charges for hand-helds, as well as increased range over fm.

Residing in Aylmer, Quebec, Jack is a research scientist and director of Canada's Radio Communications Laboratory, Department of Communications, Ottawa, Ontario. He received his BASc and MASc degrees in Electrical Engineering from the University of British Columbia, and his PhD degree in Radio Physics from Cambridge University, Cambridge, UK. Jack has spent most of his research career studying low-frequency propagation, and by various techniques the media in which these radio waves propagate. His keen interest is in antennas, however, particularly electrically short antennas, vertical antennas and wire antennas of various types. His article on short center-loaded whips (*QST,* September 1953) was one of the first theoretical analyses of this antenna.

TA John Belrose, VE2CV

Most of Jack's leisure time is spent in writing antenna articles. However, he does find time to enjoy travel-camping, swimming and walking his Irish setter. — *Marian Anderson, WB1FSB*

DIRECT-BROADCAST SATELLITE TALK ON TECHNICAL NETWORK

☐ Another in the series of monthly experimental programs linking the NY-NJ-CT metropolitan area on 2-meter fm is scheduled for March 3 at 8:30 P.M. Wilbur L. Pritchard, president of Direct Broadcast Satellite Corp., of Bethesda, Maryland, will address the Long Island section meeting of IEEE from Old Westbury, New York. His talk will be broadcast simultaneously on the IEEE/LIMARC Technical Network on 147.375 MHz, thereby covering the entire New York City metropolitan area. The first net session, in November, drew more than 40 check-ins for a talk on satellite earth terminals.

For additional information, contact Ed Piller, W2KQP, net director, at 516-349-2530.

BEGINNER'S BENCH

Some Basics for Equipment Servicing

Part 4 — Knowing how to use the oscilloscope effectively as a troubleshooting tool will move you to the front of the equipment servicing class.

By Norman H. Bradshaw,* W8EEF

The two most useful instruments for troubleshooting ham gear are the VTVM (vacuum-tube voltmeter) or FET voltmeter, and the oscilloscope. Of the two, the voltmeter is probably number one, with the scope a close second. Normally, the voltmeter is used to ensure that the operating voltages are correct. If you are unable to detect a malfunctioning component from the voltage tests, the oscilloscope is used to trace a signal from the input to the output of each stage or module, thus locating the problem area.

Oscilloscope Fundamentals

Before using your oscilloscope for equipment servicing, you should be familiar with some fundamentals. A block diagram of a typical oscilloscope is shown in Fig. 1. This scope has two vertical-input channels and is commonly called a dual-trace scope. Each channel operates separately, allowing you to observe two signals at the same time. You can use channel 1 for checking the input signal of the stage under test while displaying the output signal by using channel 2. Either channel may be used as the trigger source to control the horizontal timebase. This trigger signal is used to lock the horizontal system to the vertical signal so that the trace on the screen of the cathode-ray tube (CRT) is stable.

The horizontal timebase is a calibrated sweep system that moves the electron beam across the CRT at a precise rate. This rate is selected by changing the setting of the time-base switch.

The vertical input signal is scaled by the vertical attenuator to limit the input to the preamplifier. This attenuator is necessary to keep the preamp from being overdriven and to limit the size of the trace on the CRT. A front-panel-controlled diode switch and display control section allows you to select either or both of the input channels. The vertical signal then passes through the delay line. A delay line is a very valuable feature because it allows the horizontal sweep, initiated by the vertical trigger pulse, to start before the vertical signal information arrives at the CRT. This enables you to view the leading edge of the signal. Delay lines vary in delay time from one manufacturer to another and can range from 50 or 60 nanoseconds up to 150 or 200 nanoseconds (1 nanosecond is 10^{-9} seconds). The longer the delay, the more of the signal leading edge you can observe. After passing through the delay line, the signal is amplified in the vertical deflection amplifier and then applied to the vertical deflection plates of the CRT.

Now on to the horizontal system. A triggered sweep is much more desirable than the older, recurrent system. In the recurrent, or free-running sweep, the horizontal circuit had to be adjusted to run at (or at a submultiple of) the vertical-signal frequency in order to lock the trace on the CRT. The triggered sweep system is controlled by a sample of the vertical signal, using special circuits to start the horizontal sweep in synchronization with the vertical signal. Today, most oscilloscopes use this system.

Accurate timebase calibration is

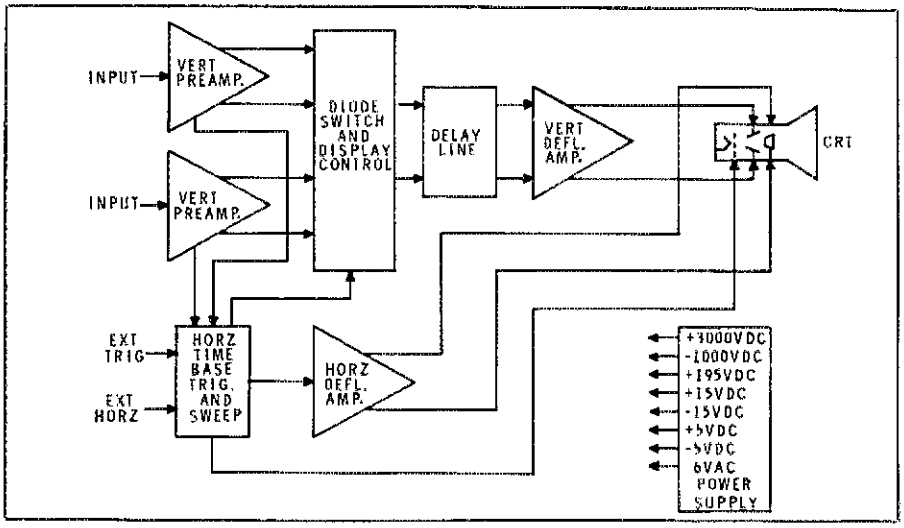


Fig. 1 — Block diagram of a dual-trace oscilloscope.

*646 E. Glenlord Rd., Saint Joseph, MI 49085

necessary if you intend to use the scope for frequency measurements. If you have the timebase switch set for, say, 1 ms/cm, you need to be certain that the sweep is really moving at that rate. Frequency is the reciprocal of time ($f = 1/t$); if your sweep speed is 1 μs/cm and one cycle of the signal waveform occupies 1 cm on the CRT, the frequency is

$$f = 1/10^{-6}\,s = 1 \times 10^{6} \text{ Hz or } 1 \text{ MHz}$$

Being able to determine the frequency of the signal you are viewing is very useful during troubleshooting.

Selecting an Oscilloscope

There are many considerations involved in the selection of a new or used oscilloscope, including:

1) Vertical sensitivity.
2) Bandwidth.
3) Single- or dual-trace capability.
4) Accuracy.

The sensitivity of the vertical amplifier determines the minimum signal amplitude that can be measured. For example, with a 1-mV/cm preamp and a 10× probe, only a 10-mV signal is required to produce a 1-cm screen deflection. However, with a 5-mV/cm preamp, a 50-mV signal would be required.

A major consideration is the bandwidth of the oscilloscope. You should buy a scope with as wide a bandwidth as you can afford. Limited bandwidth will reduce your ability to check accurately for harmonics and spurious oscillations. An older scope with a wide bandwidth, in good condition, is a better buy than a new one with a limited response. Regardless of the type of scope you chose, a flat response from dc to the −3 dB bandwidth limit of the scope is important.

You should also consider a scope with dual-trace capability. It is more versatile than a single-trace unit because you can simultaneously view both the input and output signals of a stage to determine gain and phase shift. (See Fig. 2)

Finally, the accuracy of the oscilloscope measurements is important. The vertical attenuators in most scopes have an accuracy specification of 3%. Some are worse, but few are better than that. To meet this specification, most scopes contain some type of calibration signal. This signal is used when adjusting the preamp gain; therefore, the accuracy of your measurements will depend on the accuracy of the calibration signal.

High quality oscilloscopes can be obtained new, used or in kit form. Heath Company has a good selection ranging in bandwidth from 5 to 35 MHz. Most of the displays shown in this article were made using a Heath IO/SO 4510 scope. This is a dual-trace unit with a bandwidth of 15 MHz. It does not have a dual timebase. For comparison, the display shown in Fig. 6 was made using a Tektronix 7704 main frame with 7A26, 7B80 and 7B85 plug-ins. The Tektronix is a very high quality oscilloscope with a bandwidth of over 100 MHz.

Transceiver Troubleshooting with Your Scope

Before using the oscilloscope, be sure you have isolated the problem as much as possible by using the troubleshooting charts supplied with the service manual (a typical troubleshooting chart is shown below). Are the power supplies operating properly? Does the receiver section work? Or, are the transmitter and receiver sections both dead? If both are inoperative, check the circuits common to both

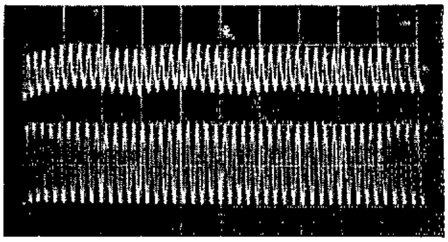


Fig. 2 — A dual-trace oscilloscope allows you to view two signals at the same time. The upper trace shown here is the i-f input signal to a receiver mixer (10 mV/div). The lower trace is the local oscillator input to the same mixer (1 V/div). With all commonly available dual-trace scopes the sweep rate is the same for both traces; in this display the sweep rate is 0.2 μs/div.

TRANSMITTER

Problem	Condition	Probable Cause(s)
(1) No power output	(a) IC OK, but no power output	* Defective L_1, L_2, L_9 * Shorted VC_1, VC_2 Defective C_{66} * Low bands only: Defective $C_5 - C_8$ * Defective RL_2
	(b) IC OK, but no output on a particular band	* Cold solder joint between band switch and tank coil * Defective band switch
	(c) No IC indication	* Defective 6146B * ACC plug not correctly wired or improperly seated * No screen voltage at 6146B because of defective L_{1804}, band switch
	(d) Idling IC OK, but no drive	* Defective 12BY7A * No screen voltage because of defective R_{1603}, C_{1009}, $R_{1007} - R_{1009}$ * Defective Q_{105}, Q_{106} or Q_{405}
(2) Poor TX	(a) No power output on LSB only	* Defective X_{502}
	(b) No power output on USB only	* Defective X_{503}
	(c) No power output on both USB/LSB	* Defective RL_{501}, Q_{502}, D_{2402} * No vox operation: defective or grounded MIC or PATCH jack * Defective Q_{503}, Q_{504} or Q_{512}
	(d) No power output on CW/TUNE	* Defective X_{504}, Q_{401}, D_{2402}
	(e) No CW keying	* Defective mode switch, Q_{1001}, and associated circuit * Defective D_{506} if carrier hangs up
	(f) No modulation on AM	* Defective $Q_{2401} - Q_{2407}$, D_{2401}, X_{2401}
(3) Abnormal meter	(a) Cannot set ALC meter	* Defective C_{1016} * Defective Q_{405}, VR_{401} * Defective meter switch or RL_1

This section of the FT-101ZD troubleshooting chart is typical of that found in the better service manuals available for amateur transceivers.

transmit and receive. The i-f system is common to both, so activate the internal crystal calibrator (or use a crystal oscillator if the transceiver is not equipped with a calibrator) and tune the receiver to a point near one of the 100-kHz or 25-kHz divisions on the dial. Usually the calibrator is inserted at, or near, the antenna input. The calibrator is designed to have an output signal rich in harmonics, so do not expect to see a pure sine wave on your oscilloscope. Fig. 3 shows the scope display of the calibrator signal in a typical amateur transceiver. Using the scope, trace the signal through the receiver rf amplifier to the mixer circuit. Then check to see if the VFO (variable-frequency oscillator) is working and a good signal is being injected into the mixer (the VFO is also common to both receive and transmit). The VFO waveform normally appears as a sine wave, as shown in Fig. 4. The output of the mixer will be at the i-f of the receiver (Fig. 5).

To prevent loading or detuning, a 10:1 scope probe is almost a *must* when signal tracing in rf and i-f circuits. This probe must be adjusted to the vertical input channel it is to be used with. A fast rise, 1 kHz square-wave signal is normally used when making this adjustment. With the square-wave signal applied, the probe is adjusted to display the best waveform (sharp corners, with no over- or undershoot). This is shown in Fig. 6. If a calibrator signal is not provided on the oscilloscope, the square-wave output of a function generator can be used for this adjustment.

After you have found the circuit where the signal goes in, but nothing comes out, use your high-impedance (10 megohm or greater) voltmeter to check the voltages on the transistor leads. There are times when voltage measurements will not prove a transistor is bad, so you may have to turn the rig off and use an in-circuit transistor tester. Under certain conditions, an in-circuit transistor tester will give an erroneous reading, perhaps showing a short when the transistor is, in fact, good. This may occur when there is a diode, a very low value resistor, or another direct-coupled transistor in the circuit. Unfortunately, the only way to be sure is to unsolder the base lead from the circuit board and recheck the transistor. The base lead is the only one that has to be disconnected, as it is the control element of the transistor. Also be sure that the polarity switch on the tester is in the correct position. Checking a pnp transistor with the tester in the npn position will show an open every time, as the transistor junctions will be reverse biased.

With equipment containing tubes, the first step after locating the defective stage is to change the tube. If this does not cure the problem, check the voltages at the tube socket. Be sure to check the voltage on the screen grid, if the tube has one. Without screen voltage, the tube will not conduct.

If the VFO and mixer circuits are operating properly, continue tracing the signal back through the unit to the i-f stages. Check crystal oscillators, mixers, buffer amplifiers and filters (ssb and cw) to be sure they are working. Remember, the malfunction almost has to be in the i-f section if both the transmitter and receiver are inoperative (assuming that the power supplies are working).

You may wish to try a troubleshooting technique that I have used for many years. When I find a circuit that is operating properly, I move back through the circuit four or more stages. If that stage is not operating, I move ahead two stages and test again. You can cut the number of tests needed in half by using this procedure.

Suppose the transmitter is working and loads up properly into your dummy load, but no sound is heard from the speaker during receive. The first item you should check is the speaker. Disconnect it from the rig and use an ohmmeter to test for continuity. If it is okay, and your S meter indicates a signal, the problem is most likely to be in the audio amplifier. Fig. 7 shows the oscilloscope display of the audio signal at the demodulator output. As there are only two or three stages in the audio section, the problem should be easy to locate. A reading on the S meter is a good indication that the circuits from the antenna through the i-f stages are operating.

Because the carrier signal is present, transmitter problems are often easiest to locate when the rig is in the cw (or tune) mode. This also eliminates the problem of having to connect an audio signal generator to the microphone input. Of course, if the rig works on cw but not on phone, the problem must be in either the VOX (voice-operated switching) or microphone amplifier, which means your search

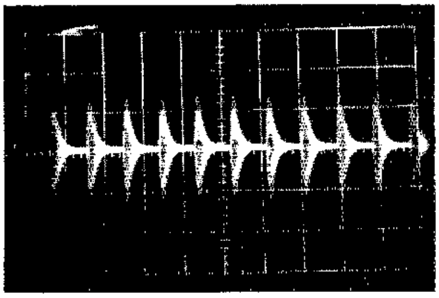


Fig. 3 — Oscilloscope display of the calibrator signal in an amateur transceiver. The calibrator signal is a useful signal source during signal tracing. Each horizontal division represents 20 μs (20 μs/div) and the vertical divisions are 100 mV (100 mV/div).

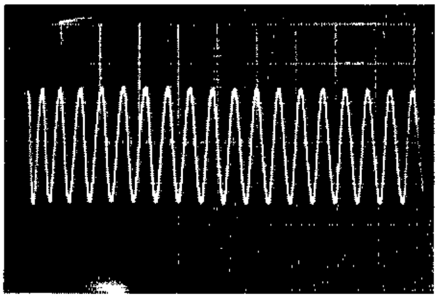


Fig. 4 — The VFO signal should appear as a sine wave. Shown here is the VFO input signal at the first mixer of an FT-101ZD. Oscilloscope sensitivity is 50 mV/div and the sweep rate is 0.1 μs/div.

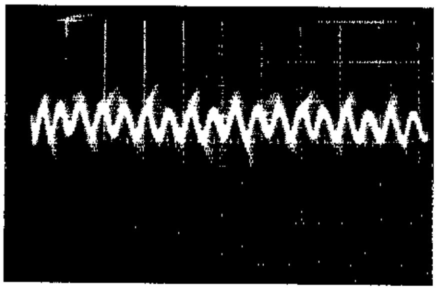


Fig. 5 — Using the calibrator as a signal source, the output of the receiver mixer appears as shown here. (10 mV/div and 0.1 μs/div). Traces of the calibrator signal can be seen "riding" on the mixer output signal. While normal for this rig, this may not occur in other equipment.

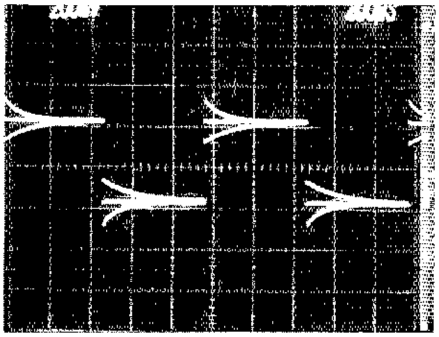


Fig. 6 — High-impedance, or 10:1, probes must be adjusted for the vertical input channel they are used with. The display shown here is a triple exposure. The upper and lower traces show over and under compensation, respectively. The center trace is the correct waveform. This display was made using the Tektronix 7704 oscilloscope.

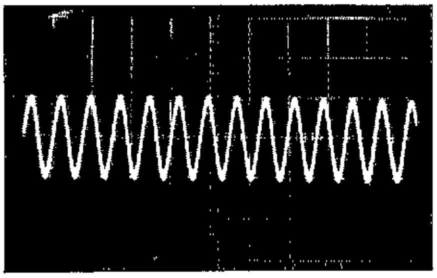


Fig. 7 — The audio output of the receiver demodulator should appear as shown here (50 mV/div and 20 ms/div).

has been narrowed to a couple of stages. Remember, the microphone could be bad! If you have a hybrid transceiver, one with vacuum tube driver and "finals," make sure that the filaments are lit. Also make sure that all voltages in these areas are correct.

Be careful — working near high voltages is dangerous! Look at the rf choke in the final amplifier plate circuit to see if it is damaged. A shorted final or loss of grid bias can overload the choke, causing an open circuit. If you are unable to detect any damage visually, shut the rig down, wait a few minutes for the power supplies to bleed off, and then check the choke with an ohmmeter. If the choke is okay, turn the rig on and check the final-stage screen voltage. Without screen voltage you will have little or no output.

Because of the high dc voltage, direct connection to the driver plate circuit could damage the probe or the oscilloscope. Placing a 10× probe *near* the driver tube plate tank circuit (or near the glass tube envelope) will give a good indication of rf on the scope if the stage is functioning properly. The display shown in Fig. 8 was obtained in this manner. Transistor drivers and final stages are current-operated devices, so you can usually probe these stages without fear of damage to the scope or probe.

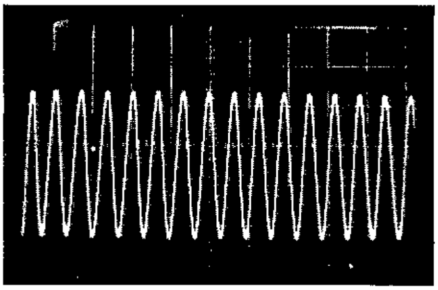


Fig. 8 — This display was obtained by placing a 10:1 probe *near* the glass envelope of a 12BY7A driver tube while the transmitter was being operated into a dummy load. The power output was adjusted to 50 W. A fairly high scope sensitivity (0.2 mV/div) was used with a sweep rate of 0.2 μs/div.

Suggestions

You will need the service manual for your rig if you are serious about doing your own repair work. Most manuals contain block diagrams showing the transmit and receive signal paths through the unit. These allow you to see the overall signal flow and are very helpful during signal tracing (see Fig. 9). The manual will also include a detailed description of each circuit, and most will provide a troubleshooting chart to help you isolate a problem in minimum time. There will be times when your particular symptom does not appear to be covered in the chart; this is when your scope and voltmeter become most valuable in tracking down the problem.

If you do not already have them, extender boards and/or cables are a good investment. With them you can get the suspected circuit out where you can work on it. It is almost impossible to troubleshoot modern transceivers with all the circuit boards in place. When inserting or removing boards, be sure the power to the rig has been turned off. You may end up with more trouble than you started with if you don't!

A very serious suggestion — if you want to realign your transceiver, be *sure* your equipment is adequate for the job. The signal generator used should be of "lab quality" frequency accuracy. It should also be "rf tight." That is, there should be no signal leakage from the box except for the signal coming from the output connector. The generator should also have an accurately calibrated attenuator. Several

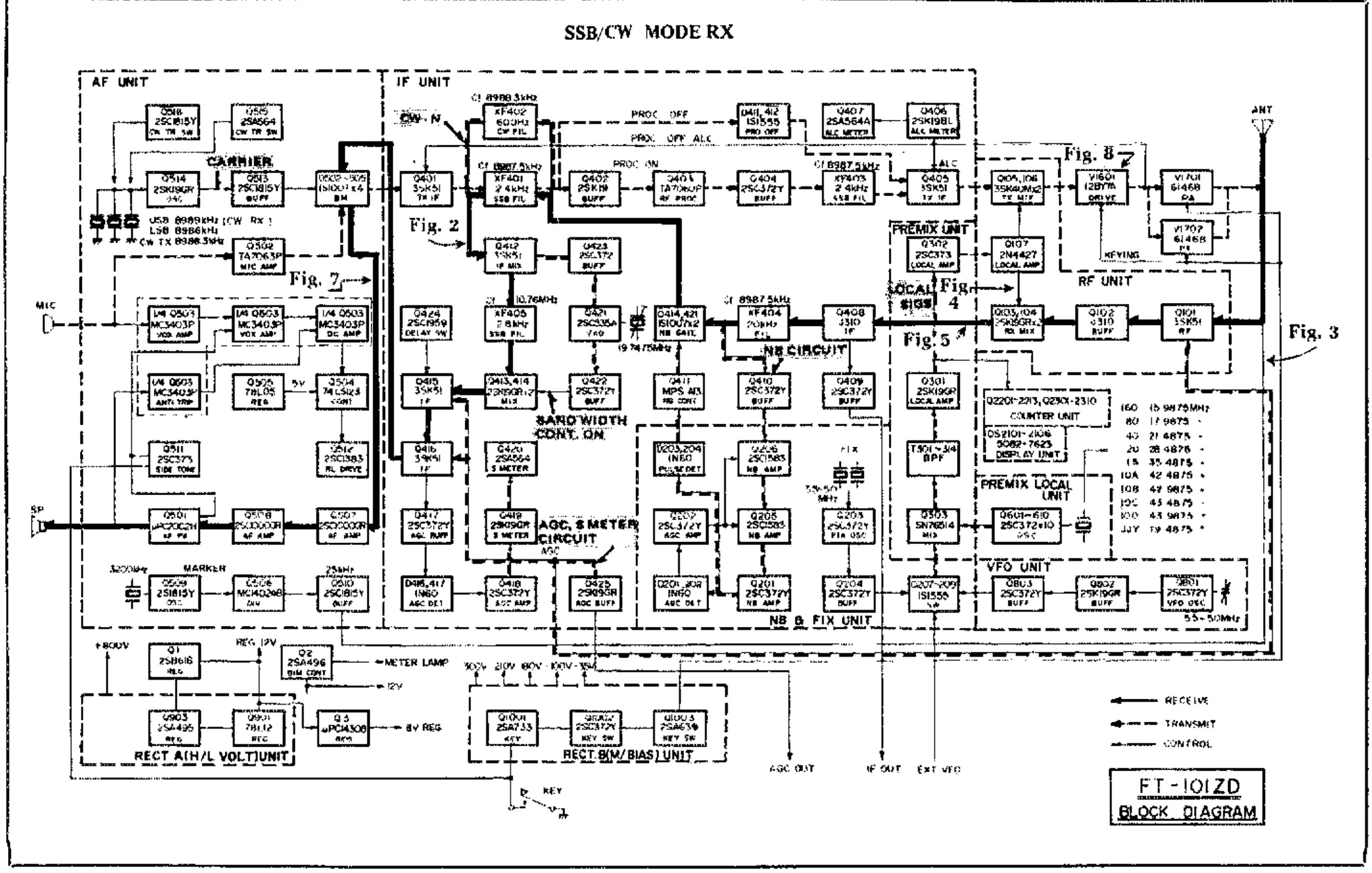


Fig. 9 — The block diagram of the FT-101ZD transceiver. It is representative of those found in most service manuals. The figure numbers shown on the diagram indicate the points at which some of the oscilloscope displays were made.

Glossary of Terms

Bandwidth — The range of signal frequencies that can be displayed with a specified accuracy. Typically, the frequency at which the scope response is 3 dB less then the response to a low-frequency signal of the same amplitude is considered to be the upper bandwidth limit. Most scopes respond to dc signals; thus, the lower bandwidth limit is dc (or 0 Hz).

Delay Line — An electrical circuit through which the passage of a signal is delayed by a fixed length of time.

Diode Switch — A circuit in which diodes are used to select a particular signal path. These electronic switches are controlled by dc voltage levels and are capable of rapid switching.

Dual-trace — The capability of simultaneously displaying two signals. Normally, two identical vertical amplifiers are provided. Electronic switching is used to select the vertical amplifier output to be displayed.

Horizontal sweep/timebase — Movement of the electron beam (and visible spot) across the cathode-ray-tube face in a uniform, horizontal motion. The horizontal timebase is the circuitry used to produce this motion.

Horizontal sweep-rate — The rate, in seconds per cm or division, at which the horizontal sweep occurs.

Probe, 10× or 10:1 — An oscilloscope probe that attenuates the signal applied to the vertical input by a factor of 10. In addition to reducing the signal amplitude, a 10× probe also provides a higher input impedance (typically 10 MΩ).

Probe compensation — 10× scope probes contain an adjustable frequency-compensating circuit to ensure a constant attenuation factor over the frequency range of the probe.

Rise time — The length of time required for a signal to increase in amplitude from a low level (10% of the maximum amplitude) to a high level (90% of maximum).

Triggered sweep — A triggered sweep system uses a trigger signal to begin the horizontal sweep, thus synchronizing the sweep and the trigger signal. The trigger signal is normally derived from the vertical input signal.

X-Y display — The display of two signals, one producing vertical deflection in the normal manner, while the second signal is applied to the horizontal-deflection input. No horizontal sweep is required for this type of display. An X-Y display allows two signals to be compared in terms of amplitude, frequency and phase.

other pieces of equipment, such as an rf voltmeter, scope, dummy load and an accurate power meter, are almost necessities if you are to do a good job. Trying to do the alignment with mediocre equipment can result in a rig so badly misadjusted that it has to be returned to the service center for calibration. So beware before you start turning adjustment screws! This also applies during troubleshooting; don't change adjustments if the rig is not working. 99.9% of the time the problem is a bad component and not incorrect adjustment.

Final Notes

A systematic approach to troubleshooting will minimize the time necessary to repair your equipment:

1) Observe the symptoms.

2) Remove the covers and use your eyes and *nose* to locate the problem area before turning the rig on.

3) Check the symptoms and probable causes in the troubleshooting charts contained in your service manual.

4) Measure the power supply voltages to be sure they are all within tolerance.

5) Follow the signal-tracing procedures outlined in this article.

6) Safety first — exercise caution whenever you must troubleshoot circuits with the power applied.

Here is to successful troubleshooting. May your rig last forever and you never need to repair it! But, if you do, I hope this article will get you started in the right direction.

Acknowledgments

I wish to express my sincere thanks to Heath Company and to Yaesu Electronics Corp. for their permission to use material from their service manuals.

Strays

MIXED-BAND DXCC WITH 2 WATTS

□ Achievement, in whatever form, suits amateurs. That's the real "bottom line" for our interesting pastime. For some, this comes when designing equipment, earning a top score in contests or having the loudest signal in town. For others, this form of achievement is seen in QRP operation in quest of WAS, WAC or even DXCC. Although some operators of high power have been heard sending CQ CQ CQ, NO QRP STNS PSE, a stigma should not be attached to the low-power operator: He or she must work even harder to reach a specified operating goal than those with 100- or 1000-watt transmitters.

Hans Meurer, W2TO of Ridgewood, New Jersey, is but one QRP enthusiast who garnered 100 countries for a DXCC award. His rig was a Heath HW-8 transceiver (approximately 2 watts of output), which uses a direct-conversion receiver. Ordinary dipole antennas were used to confirm the first 76 countries (antenna height was 45 feet). A TA-33 tri-band Yagi served as the antenna for the remainder of his needed countries. He had 60% of his contacts on 15 meters, 35% on 20 meters and 5% on 40 meters, along with a J3 QSO on 80 meters. Hans made some of his contacts by squeezing into big DX pileups! That's where patience and skill of operating become significant for QRPers.

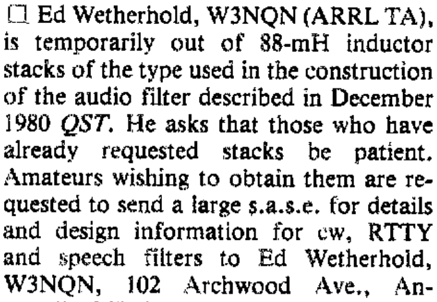
It took roughly 1-1/2 years of somewhat casual operating to collect the 100 cards for DXCC. After 47 years as a licensed amateur, Hans offers this advice: "For a truly exciting challenge, the kW boys, keyboard wizards, Honor Roll elite, OSCAR ops and 2-meter buffs should switch to QRP DXing." He may have a good point! — *Doug DeMaw, W1FB*

AMSAT SOFTWARE EXCHANGE

□ Need a Phase III orbital prediction program? The first program offered by the AMSAT Software Exchange was written by AMSAT President Dr. Tom Clark, W3IWI. It is available for the TRS-80 disk and cassette, Apple/II diskette, Microsoft BASIC and Digital Research PL/I-80. For a complete description and ordering information, send an s.a.s.e. to AMSAT Software Exchange, Box 338, Ashmore, IL 61912. Proceeds will be donated to AMSAT in support of the Phase III satellite.

INDUCTOR STACK SHORTAGE

□ Ed Wetherhold, W3NQN (ARRL TA), is temporarily out of 88-mH inductor stacks of the type used in the construction of the audio filter described in December 1980 *QST*. He asks that those who have already requested stacks be patient. Amateurs wishing to obtain them are requested to send a large s.a.s.e. for details and design information for cw, RTTY and speech filters to Ed Wetherhold, W3NQN, 102 Archwood Ave., Annapolis, MD 21401.

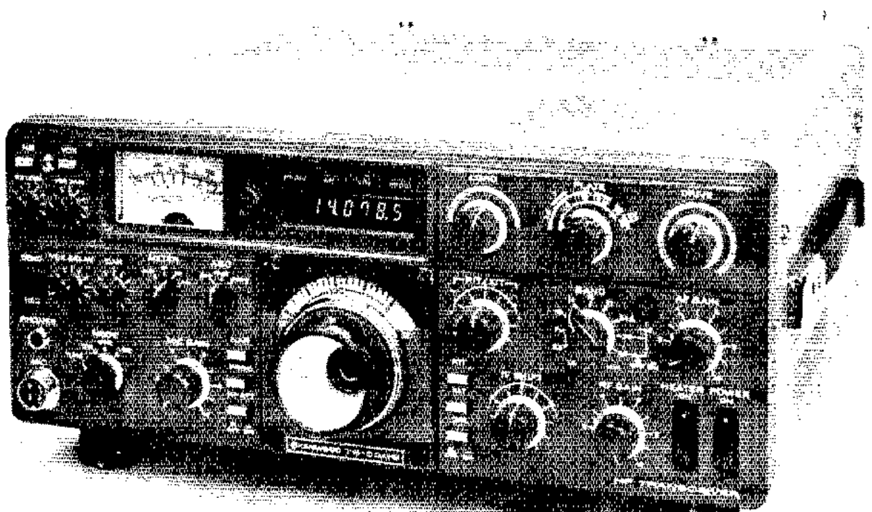


Dick Plety, K6SVP, takes a break from his slow-scan TV position at the W6VIO commemorative operation during the Voyager I Flyby of Saturn last October. Over 8600 contacts were made during the event; the Jet Propulsion ARC, Pasadena, California credits this success to thorough planning and, of course, Voyager I's spectacular flight. *(K6PGX photo)*

Conducted By Paul K. Pagel,* N1FB

Kenwood TS-530S HF Transceiver

Have you ever wondered how equipment manufacturers choose model numbers? Is it a numerical series based on an engineering concept, or do they pull a number out of the air? Who knows, but many of us would assume that a model number like TS-530S would be an improved version of the popular '520 series. The '530 is improved, but the circuit design is also vastly different. Kenwood engineers have taken advantage of advances in technology to provide a transceiver with superior performance at a price comparable with that of its older cousin.



Features

Frequency coverage of the TS-530S includes all the amateur bands from 1.8 to 30 MHz, including the three WARC assignments at 10, 18 and 24 MHz. The receiver section features passband tuning, a noise blanker with an adjustable threshold level, selectable ssb and cw bandwidths (with optional filters installed), RIT and wide dynamic range. Vacuum tubes are used in the transmitter driver and final amplifier stages. There's an audio speech processor for ssb, and transmitter incremental tuning (XIT). A fluorescent blue readout displays the operating frequencies to the nearest 100 Hz.

The VOX delay and gain controls, and noise blanker threshold, require adjustment when operating conditions vary. These are located on the front panel, increasing operating ease. Other front-panel controls include switches for NARrow/wide bandwidth selection, speech PROCessor on/off, rf ATTENuator in/out, and 25 kHz CALibrator on/off, among others. The screen-grid switch, located on the rear panel, is used to defeat the final amplifier screen voltage during the neutralizing procedure or when the transceiver is used with an external transverter. The '530 has no provisions for transverter interconnection, although there are two holes punched into the cabinet, no doubt for owner addition of transverter jacks. Two DIN jacks supply a means of connection to an external power amplifier, tape recorder, and remote VFO. Also included are a 1/8-inch[1] external speaker jack, 1/4-inch key jack, a two-wire ac line cord, the fuse holder, and an SO-239 rf connector. The RF VOLT (meter control), ANTI-VOX and BIAS controls are also located on the rear panel, as these require only periodic adjustment. The final amplifier fan is the quietest I have heard on any piece of equipment!

Some Circuit Features

The '530 uses a single-conversion receiver with an 8.895 MHz i-f. A single crystal PLL synthesizer generates the HFO signals, which, along with the 5.5- to 6-MHz VFO signal, provide all the injection frequencies required by the transceiver. The I-F SHIFT control enables the operator to move the center point of the

Kenwood TS-530S HF Transceiver Serial No. 1090166

Manufacturer's Claimed Specifications	*Measured in ARRL Lab*
Frequency coverage: 1.8 to 30 MHz including 10, 18 and 24 MHz	As specified plus a minimum of 70 kHz additional at each band edge.
Modes of operation: Ssb, cw	As specified.
Frequency display: Six 0.25-inch fluorescent blue digits and analog dial.	As specified.
Resolution: Analog, 1 kHz; digital, 100 Hz.	As specified.
kHz/turn of tuning knob: Not specified.	25.
Backlash: Not specified.	Nil.
RIT range: Not specified.	± 2 kHz.
Receiver attenuator: 20 dB.	As specified.
Audio power output: 1.5 watts (8 ohms).	As specified.
Power consumption: Transmit, 295 watts; receive, 32 watts.	Not measured.
Transmitter rf power output: Not specified.	Greater than 100 watts except on 10 M — 100 W.
Spurious suppression: Better than 40 dB.	− 68 dB worst case.
Harmonic suppression: Better than 40 dB.	− 42 dB on 160 m (see photo).
Carrier suppression: Better than 40 dB.	As specified.
Transmitter third-order IMD: Not specified.	− 28 below PEP (see photo).
Frequency stability: Within 100 Hz during any 30-minute period after warm up. Within 1 kHz during the first hour after 1-minute warm-up.	130 Hz from cold start to 1 hour later
S-meter sensitivity (μV/S9): Not specified.	Ranging from 72 to 92 μV.
Receiver sensitivity: 0.25 μV for 10 dB S + N/N	Receiver dynamics measured with YK88C 500-Hz i-f filter:

	80 m	*20 m*
MDS (dBm):	− 135	− 136
Blocking DR (dB):	112	120
Two-tone third-order IMD DR (dB):	88	90

Size (HWD): 5.3 × 13.3 × 13.3 in.
Weight: 28.2 lb.
Color: Gray.

[1]in. × 25.4 = mm; lb × 0.454 = kg
*Assistant Technical Editor

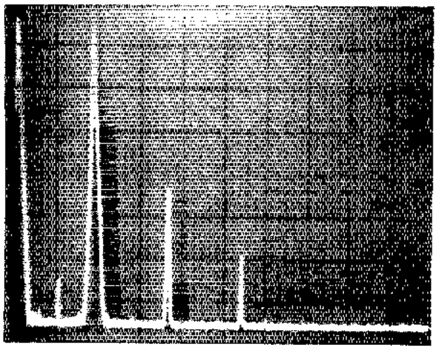


Fig. 1 — Spectral display of the Kenwood TS-530S. Vertical divisions are each 10 dB; horizontal divisions are each 1 MHz. Output power is approximately 100 watts at 160 meters. The worst-case spurious emission is approximately 42 dB down from the fundamental.

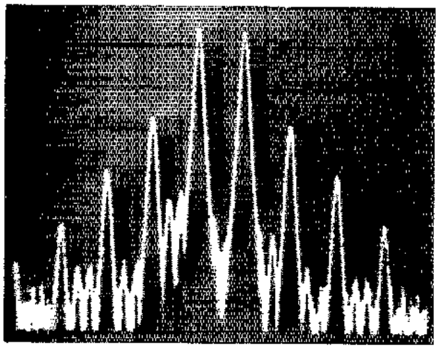


Fig. 2 — Spectral display of the TS-530S output during transmitter two-tone third-order IMD test. The third-order products are approximately 28 dB below PEP and fifth-order products are about 40 dB down. Vertical divisions are each 10 dB; horizontal divisions are each 1 kHz. The transmitter was being operated at rated input power on the 20-meter band.

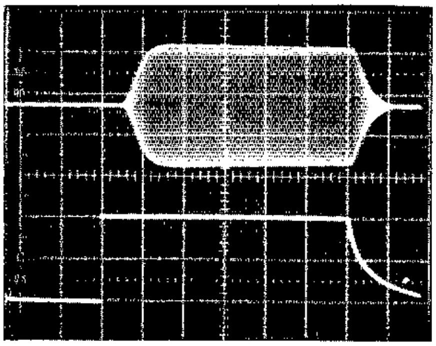


Fig. 3 — Cw keying waveform of the TS-530S. Upper trace is the rf envelope; lower trace is the actual key closure. Each horizontal division is 5 ms. The carrier level was adjusted for an alc meter reading of zero. Higher amounts of drive tend to sharpen the wavefront.

receiver passband without changing the pitch of the incoming signal. This is accomplished by "pulling" several of the internal oscillators in unison, to shift the entire i-f passband nearer to the edge of the crystal filter, helping eliminate QRM.

On-the-Air Operation

After testing the '530 in the ARRL lab, I decided to try the ultimate test — Field Day. Our operation was by no means typical, with 15 transmitters on six bands, all with kilowatt amplifiers, on a single generator! My operating assignment was 80-meter cw. We planned to have a phone and a cw transmitter on each band, 80 through 10 meters. I was skeptical of this operation, but decided to try it. As the contest began, strange noises caused by overload and cross-modulation spewed forth from the transceiver speaker. I quickly switched in the rf attenuator, and the overload effects disappeared. Sensitivity remained more than sufficient and I heard nothing from our other transmitters for the duration of the event.

My shack, located in Newington, is probably similar to that of the average apartment dweller. The wiring in the building is two-wire ac, and the shack is located on the second floor. Even without a good ground system, the transceiver did not cause TVI for my co-inhabitants! A leaky insulator on a nearby power pole provides an almost constant S7 receiver noise level, but the '530 noise blanker eliminated the problem. (The noise blanker level control must be adjusted carefully or a severe reduction in dynamic range will result). My popular "hideout" is on 40-meter cw, and the transceiver is able to handle the tremendous signals present on that band. The optional cw filter (500-Hz model provided) is quite sharp, with no excessive leakage noted. I found the ability to switch to a wide filter a great asset, especially when looking for a clear frequency.

RTTY

I recently purchased a piece of RTTY gear, and was eager to try it with the TS-530S. The '530 manual recommends that the final amplifier power input be reduced to 100 watts when using RTTY or SSTV, and at that input power the "finals" were slightly warm after transmissions. On 14 MHz, the RTTY stations seem to stick closely to 14.090 MHz, sometimes generating fierce QRM. The i-f shift control came into its own, eliminating QRM within the passband.

Observations

Any amateur in the market for a transceiver will certainly be looking for a rig that offers a good price-to-performance ratio. Does the TS-530S fit the bill? I think so. The equipment is well built, and performs well during both contest and casual operating. No flaws appeared during the review period, not even a blown fuse. For those wishing to expand the '530 station, two remote VFOs are available — the VFO-230, a 20-Hz-step digital unit, and the VFO-240, a standard L-C circuit type styled to match the transceiver. The TS-530S is available from Trio-Kenwood Communications, 1111 West Walnut, Compton, CA 90220. Price class: TS-530S, $800; VFO-230, $310; VFO-240, $170; YK88C 500-Hz filter, $63; YK88SN 1.8-kHz filter, $63. — *Gerry Hull, AK4L*

McKAY DYMEK DA100D ACTIVE ANTENNA

☐ Active antenna? What's that? An amateur phoned Hq. recently and asked, "Is an active antenna one that moves about in the wind?" Although most amateur antennas are "active" in that respect, the term "active antenna" is applied to small receiving antennas that contain, as an intergal part, an amplifier. Such is the case with the DA100D system.

Where and how might we use an active antenna? The applications are varied, but for amateur work we may find a small antenna of this variety well suited to short-wave listening when a full-size aerial can't be erected. Some apartment and motel residents might appreciate the usefulness of such a system.

Under certain propagation conditions a small active antenna is capable of enhancing reception in some of the amateur bands. This is because it responds to various angles and polarities of incoming waves more satisfactorily than might be the case during a given period when using the regular station antenna. Also, depending on the source of various forms of man-made noise, the active antenna can discriminate against the noise better than the main antenna can. Such was the case during particular periods of reception on 14 MHz at W1FB: Prior to and while the band was going out, a signal improvement of 3 to 6 dB was observed while using the DA100D, as compared to a triband Yagi at 55 feet.[1]

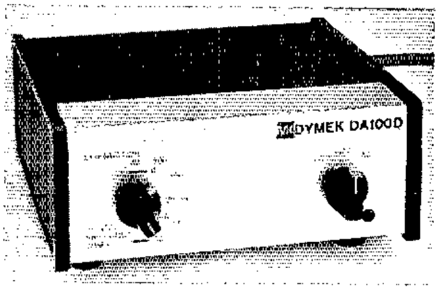
The Yagi was pointed toward the source of the signals (Europe) and the active antenna was mounted on a mast which placed the DA100D some 10 feet above ground. In addition to an improvement in signal strength, a marked reduction in fast QSB was noted. Some signals that could not be copied Q5 on the tribander were perfectly readable when using the active antenna.

This is not meant to suggest that an active antenna will always provide reception as good as or better than the normal station antenna. To the contrary, the improved reception is more apt to be the exception than the rule. Reception on 40 meters, for example, was inferior to that which resulted while using the half-sloper. The DA100D was more responsive to noise and generated a number of "intermod" products across the band. It is not unusual to encounter IM products when using a broadband amplifier, such as that in the DA100D. The trade-off for bandwidth (50 kHz to 30 MHz for the DA100D) is poor rejection of strong in-band and out-of-band signals, which cause IM products to be generated within the amplifier. A preselector would greatly improve the IM performance, but would restrict the antenna to a narrow band of frequencies.

DA100D Characteristics

This system comes in two pieces — a plastic-encased masthead amplifier and telescoping whip antenna, and a station control unit that contains a step attenuator and power supply. Operating voltage for the amplifier is fed through the 50-ohm coaxial cable that is supplied with the system. The DA100D can be operated from the 117-volt ac line, or from a 12-volt dc source, to permit portable or mobile

[1] m = ft × 0.3048



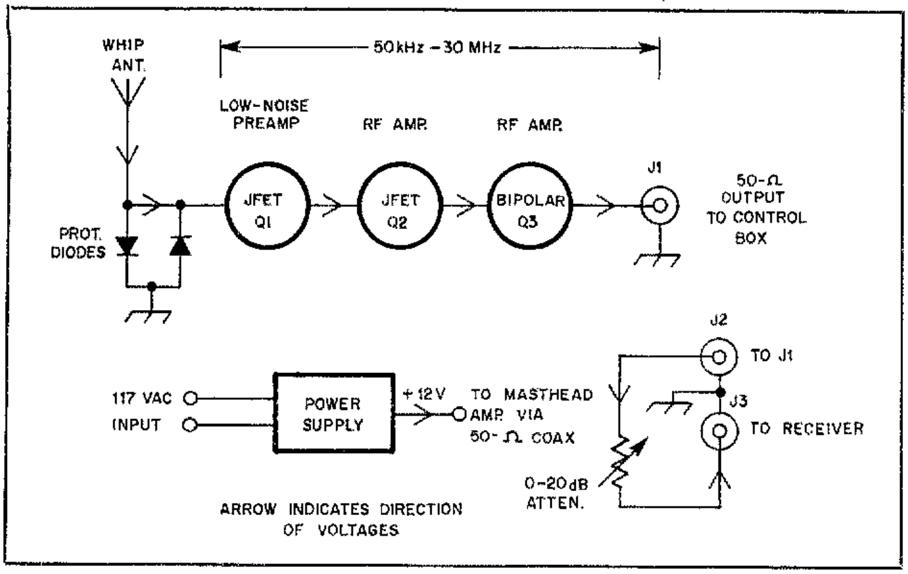


Fig. 4 — Block diagram of the DA100D broadband active antenna for 50 kHz to 30 MHz.

use. The extended length of the whip antenna is 4 feet, 8 inches. A fiberglass whip is offered as an option for those who live near salt water. A photograph of the masthead section of the DA100D can be seen in the advertisement on page 134 of September 1981 *QST*.

The manufacturer was unwilling to have the circuit published in *QST*, but we can show the general lineup in block-diagram form (Fig. 4). It can be assumed that a low-noise preamplifier is used, and that the subsequent amplifiers are employed to compensate for the normal inefficiency of a short whip antenna. Signal output from the system can be level-adjusted to suit the receiver in use.

Attenuator steps of 0, 10 and 20 dB are provided for 50-ohm operation. The control-box attenuator has positions also for interfacing the system to 100- and 500-ohm loads at 0-dB attenuation.

Burnout-protection diodes are located at the input to the masthead amplifier, but there is no strong-signal protection at either end of the coaxial cable that joins the masthead assembly to the station control box. I burned out an attenuator section and the output transistor of the amplifier module when operating 40-meter cw at the 1-kW level. Apparently the coaxial cable and overall system was resonant at or near 40 meters, and parasitic coupling to the nearby station antenna placed excessive rf energy on the system. The feed line from the station to the masthead amplifier was about 5 feet above ground during the event. Had the cable been lying on the ground or buried in the lawn, the catastrophe might not have taken place. It would be a simple matter to add protective diodes inside the control box.

Performance specifications are not listed by the manufacturer in the *QST* advertisement. Therefore, it was not feasible to perform laboratory tests to provide comparative figures. Furthermore, the high impedance (approximately 1 megohm) input of the DA100D would have made it incompatible with our laboratory test equipment. On a relative basis, however, the system performed well across the specified operating range. It should be an asset to those who travel or live where other antenna types are prohibited. It is likely that under certain adverse band conditions the active antenna would provide good reception when the regular station antenna failed to do so. This might be especially true of 80- and 160-meter operation, where noise is an almost constant threat to weak-signal reception.

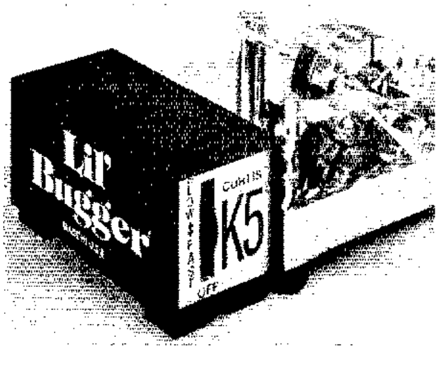
The DA100D is manufactured by McKay Dymek Company, 111 S. College Ave., P.O. Box 5000, Claremont, CA 91711, tel. 800-854-7769. Price class: $150. Unit color: satin-aluminum and black. — *Doug DeMaw, W1FB*

CURTIS ELECTRO DEVICES LIL' BUGGER

☐ "Cute" is the first word that came to mind as I held the tiny keyer in my hand for the first time. But — if that's a keyer, where are the knobs, buttons and LEDs? Well, are fingertip access to keying weight, sidetone level and pitch, and message memories really needed? Message memory keyers excepted, most of the time the only keyer control many cw operators *really* need immediate access to is the SPEED control. The Lil' Bugger provides this with a front panel thumbwheel control that also acts as an ON/OFF switch. Keyer weighting, sidetone level and pitch are variable to suit your personal tastes, but are internal adjustments.

Physical Aspects

The rear panel sports a phono jack, two subminiature jacks and a rubber grommet through which key-connection wires pass. A single-conductor shielded cable with a phono plug at the keyer end is inserted into the XMTR phono jack. The other end of the key line is terminated in a plug that matches the key jack of your transmitter or transceiver. An 8-ohm dynamic earpiece, equipped with a 2.5 mm[3] plug, may be connected to the PHONE jack to monitor the keyer sidetone. Should you wish to drive an external speaker or require dc decoupling of the sidetone output, these can be accomplished by means described in the accompanying literature.



If an external supply is to power the Bugger, it should be terminated in a 2.5-mm plug with the positive lead connected to the plug tip and connected to the 9V jack. You can install a 9-V battery (alkaline type preferred for longer life) to power the unit. The keyer cover is a friction fit so it's easy to gain access to the interior. No battery holder is provided and none is needed — the battery simply rests atop the pc-board components.

A short four-wire "tail" uses three leads to connect the Bugger to the paddle dot, dash and common leads. The fourth lead is attached to the lever of a straight key that is part of a combination paddle/straight key. If a separate straight key ("hand pump") is used, you'll need a jumper wire between the paddle common and the other terminal of the pump. If you don't intend to use a straight key, you can insulate the fourth lead and tie it back. However, it could be used as a convenient means of creating a key-down condition for transmitter tuning purposes.

Inside the Lil' Bugger

What makes the Bugger tick is the Curtis 8044 keyer IC. Two transistors, six diodes and a tungsten-contact relay (along with the required resistors and capacitors) support the IC functions. The relay contacts have a voltage and current rating of 500 V and 1 A, 50 VA maximum. You don't have to worry about key jack voltage polarity with the relay.

The 8044 and 8044B ICs offer two slightly different methods of iambic (squeeze) keying in addition to single lever (non-squeeze) keying.[4] When using the 8044 IC, the dot or dash being sent when the paddles are released is completed and nothing else is sent. With the 8044B, the dot or dash being sent upon paddle release is completed and is followed automatically by an opposite element — a dot after a dash or dash after a dot. Because the IC is socketed, it is changed easily. Either IC type may be selected when ordering the keyer; specify the K5 for an 8044 IC or the K5B for the 8044B IC. A color-coded dot on the rear panel of the keyer identifies the IC type installed: green dot for the 8044, red dot for the 8044B. Non-squeeze-key operators using a single-lever paddle need not concern themselves about IC type.

Debouncing networks are included as part of the keyer circuit. These serve to compensate for any irregularities in contact closure. Both dot and dash inputs of the IC are diode protected, and an arc suppression circuit is placed across the relay contacts to help prevent contact arcing.

The maximum keyer speed is factory set at 50 wpm. An internal adjustment permits the operator to select maximum speed limits from about 10 to 100 wpm; a procedure is detailed in the accompanying instruction sheets, which are well written and complete. The printing is clear and well defined, but some OTs may have a bit of difficulty reading the small type.

[3]inches = mm ÷ 25.4
[4]L. Fay, "The Iambic Gambit," *QST*, July 1981, p. 52.

A quiescent current drain of 50 μA is drawn by the keyer. During keying, an average of 20 mA is required. If the optional mercury-wetted contact relay is substituted for the standard relay, current drain approaches 40 mA during keying.

Although the external power input jack is labeled 9v, the Lil' Bugger will operate with voltages within the 5- to 15-V range. At the low end of the range, an onboard relay current-limiting resistor must be shorted out. For operation at the 15-V level, the manufacturer cautions that the internal battery (if used) be removed first.

In Use

The Bugger is so small that it can be attached directly to the side of the paddle using the double-stick tape provided. This eliminates using long, 3- or 4-wire connections between the keyer and paddle.

Keyer operation is smooth — an accepted fact for the keyers I've had using Curtis ICs. Even if you already have a keyer, you might consider adding a Lil' Bugger to your operating position. It makes a neat package for portable or mobile operation, too. Curtis has shown that, indeed, "good things come in small packages." Price class: $40 (plus $2 shipping). Manufacturer: Curtis Electro Devices, Box 4090, Mountain View, CA 94040. — *Paul K. Pagel, N1FB*

CUSHCRAFT A743 40/30-METER ADD-ON KIT

☐ When Glenn Whitehouse of Cushcraft offered to send the 40-meter adapter for the A3 Tribander,[5] I gladly accepted. Forty meters is a favorite haunt of mine and the idea of having a rotatable 40-meter dipole was alluring. The addition provides a means of having at your disposal a 4-band antenna (40 through 10 meters) that is fed by a single run of coaxial cable.

Description and Assembly

The add-on kit contains a pair of 20-meter traps, a pair of capacitance "hats," a heavy-duty driven element center insulator, aluminum tubing element extensions and a driven element support-mast assembly. Installation of the kit requires that the driven element of the A3 be disassembled at the center insulator and at points outboard of the 15-meter traps only. The addition may be configured for use on either 40 or 30 meters. On the 30-meter band, the capacitance hats are not used. All hardware is stainless steel or aluminum, and worm-gear clamps are supplied for securing the element sections.

In my opinion, the instruction sheet left something to be desired. The text does little more than refer you to the accompanying illustrations. And, while "a picture may be worth a thousand words," I felt another 100 words or so would have helped a great deal. The information is there, but close examination of the pictorials is required to avoid making a mistake. Two minor instruction sheet errors were noted. Fig. 6A has the identification of the FD and FG element sections reversed and the length of the machine screw (item 40, Fig. 5) incorrectly stated as 3/4 inch; it should be 1-3/4 inches. The manufacturer has taken steps to correct these errors.

[5]"Cushcraft A3 Triband Antenna," Product Review, *QST*, May 1981, p. 40.

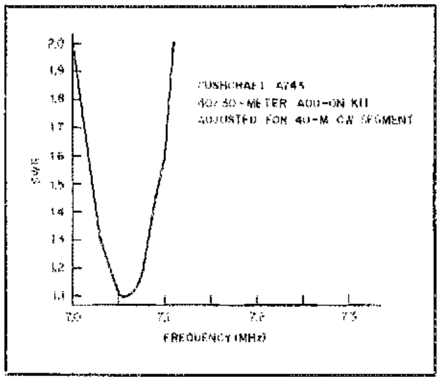


Fig. 5 — SWR curve for the Cushcraft A743 40/30-meter add-on kit for the A3 tribander.

Replacement of the center insulator is the first installation step. The new G-12 fiberglass insulator has a wall thickness of 1/4 inch (mm = inches × 25.4)) — about double that of the one supplied with the A3 originally. Additional strength is needed here because the overall length of the driven element is increased by approximately 12 feet and two traps are added that also serve to increase the weight of the element. A large portion of this additional weight is borne by the driven element support-mast assembly. This consists of a vertical tubing section (clamped to the boom) and a support line that is attached at points between the 15- and 20-meter traps. According to the manufacturer, this line is specially imported from Denmark, has more than adequate strength, and will not stretch. I have not noticed any subsequent sag in the driven element since it was installed. (In fact, to me the antenna looks even better now than it did without the adapter kit installed! I've puzzled over this for some time now and have yet to figure out *why!*)

Once the driven element has been reassembled, it is adjusted for length. Three sets of element lengths are given for the cw, center and phone segments of the band. I chose to use the cw segment lengths. I found it necessary (after initial SWR measurements were made) to trim the lengths of each side of the element by adding about an inch to the measurements given in the instruction sheet table. Fig. 5 shows the SWR curve for the antenna on 40 meters. The 1.5:1 points occur at the edges of the band segment I normally use.

Performance

Comparisons made between the A743 and my 40-meter dipole have shown a small increase in received signal strength when using the '743 (oriented in the same direction as the wire dipole), no doubt because of a slight increase in antenna height (about 10 feet). But, the primary advantage of the '743 is that it can be rotated — that does make quite a difference. Many signals that are "down in the mud" with the fixed dipole because of antenna orientation are now up to a comfortable level when the '743 is used and properly positioned. Operation on the 20- through 10-meter bands does not appear to have been affected by the addition of the A743.

If you're looking for a flexible antenna system, the A3/743 combination is one worth considering. The ability to work four bands with one antenna and one piece of coax, and to have a rotatable 40-meter dipole, might interest you. If you own a Cushcraft A4, the A744 add-on kit can be used. Price class: $80. Manufacturer: Cushcraft Corporation, 48 Perimeter Rd., P.O. Box 4680, Manchester, NH 03108. — *Paul K. Pagel, N1FB*

B & W ANTENNAS BNR 2-METER QUAD ANTENNA

☐ The BNR has a distinctly home-made "flavor." The three directors, driven element and reflector are made of no. 14 copper wire strung on plastic spreaders. The spreaders are mounted on a 6-ft aluminum boom. At construction time, the builder chooses either vertical or horizontal polarization by proper positioning of the driven element.

Quad construction is straightforward. The plastic dowel spreaders are separated into five groups of two, according to length. The shortest pair is used for the third director, the next shorter pair is used for the second director, and so forth. Assembling each element consists of inserting the appropriate pair of elements into predrilled holes in the aluminum boom and stringing no. 14 solid copper wire through the holes in the spreader tips. For all elements except the driver, the wire ends are soldered to form a closed loop one wavelength long.

The instructions do not provide the loop dimensions. The builder must center the spreaders in the boom and string wire through predrilled holes, drawing it taut without bending the spreaders. Perhaps this would be adequate if each spreader locked into the boom exactly at the center: they do not. I taped them in place to keep them from sliding around. A small geometry exercise indicates that the loop perimeter varies by as much as 20%, as the intersection point of the spreaders deviates from the centers. Depending on the builder's skill, this can range from a minor inconvenience to a fatal flaw.

The kit includes an SO-239 connector for attaching 50-ohm coaxial cable. A modified gamma-match stub provides the match between the driven element and the feed line. The SWR curve (Fig. 6) indicates that the quad is a relatively broad-band antenna.

The quad performance is adequate. Informal observations indicate that it has good front-to-back and front-to-side ratios.

The structure is reasonably sound. If the builder puts it up and leaves it alone, it should be okay. I would not recommend it for someone who wished to put it up and take it down frequently. It would not tolerate that much abuse.

Price class is $45. For more information, contact Don Brooks, B & W Antennas, 2540 CR181, Clyde, OH 43410. — *Peter O'Dell, KB1N*

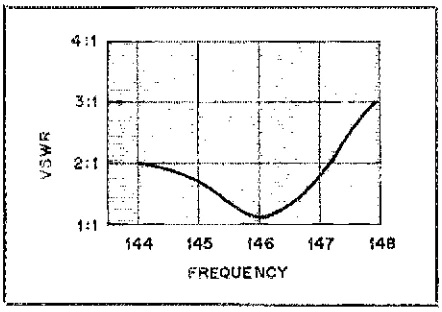


Fig. 6 — VSWR vs. frequency for the BNR quad. The quad was mounted in the clear about 10 feet above the roof of a house.

Technical Correspondence

Conducted By
Doug DeMaw,* W1FB

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

FREQUENCY-STANDARD ACCURACY

□ In the July 1981 *QST*, a reader suggested a method of frequency locking a counter time base to WWV for absolute accuracy. The editor correctly pointed out in a footnote that propagation variations limit this system to no better than a few parts in 10^7. Also recommended was the use of very narrow i-f filtering since "only carrier is wanted." This would also be a source of instability if any temperature change of the filter occurred. The center frequency of a narrow crystal filter can easily drift 5 Hz per degree C temperature change. This would impart a phase shift in the signal path, which is equivalent to a frequency drift while the temperature change is occurring.

QST readers might be interested in some of the practical problems associated with keeping an accurate house frequency standard. While a ham may not need accuracy better than one part in 10^7, going much beyond that is a whole new ball game.

My first and only entry into the now-discontinued ARRL frequency measuring contest was with a tube type of frequency synthesizer as the beat oscillator. I ran it for a week straight before the FMT, calibrating its internal standard against 5 MHz WWV. My five measurements submitted were either 1 Hz high or right on the umpire's frequency. That is about 1 part in 10^7 accuracy, which is all one can expect.

To make the change to accuracy better than 1 part in 10^{10} required the following system improvements: A solid-state, oven-controlled oscillator that could be run 24 hours a day, 365 days a year. Our oscillator, a Sulzer 5A, actually has a proportional oven inside a proportional oven inside a glass vacuum bottle! Needed next is a battery back-up system to keep the oscillator on for at least eight hours with no ac power. Before battery back-up was installed in 1979, a power outage of three hours caused the following shift in June 1978. May and June offset average 9×10^{-10} low, July average offset 129×10^{-10} low! (The very newest oscillator designs from Hewlett-Packard have made these power-outage shifts less of a problem.)

To keep track of an oscillator requires some type of phase receiver, using either TV burst, WWVB on 60 kHz, or possibly Omega or Loran C. One can make rapid measurements using TV burst, but phase jumps have to be taken into account, and live network must be readily available. In the Mountain time zone, we use WWVB out of Fort Collins, Colorado, because very little live network is aired here. Unlike TV burst at 3.58 MHz, a comparator at 60 kHz requires several hours of tracking, preferably a reading every 24 hours at high noon!

To make readings over many hours or days requires a chart recorder to keep track of the phase plot and to be sure no glitch has occurred, invalidating the data. Taking a reading once a day at the same hour minimizes variations in the ionosphere, and system changes, such as whether your receiving loop is in the sun or not. A 20-degree change in loop temperature will change the resonant frequency, shifting the phase and giving a measurement error.

After one has spent between $500 and $5000, depending on one's luck at surplus buying, the fun begins in watching your system work and trying to learn why your phase plots sometimes look like an earthquake recorder instead of a straight-line plotter. With WWVB, the farther one is from Colorado, the more problem one will have with daytime to nighttime phase shifts, plus weak signals. The closer in one is, the more apparent are the limitations of vlf transmission. In Denver, we could generally plot a nice smooth line, with the 45° phase shift every hour for five minutes as proof one was really tracking WWVB and not some buzzing light dimmer! But then at times up until December 1980, wiggly plots would almost obscure the 45° (2.08 μsec) phase shift. A call to Fort Collins revealed that the wind was blowing over 40 mph, causing their antenna to blow around, which produced a phase shift in their transmitted signal.

Throughout 1981 a phase shifter was installed at WWVB to compensate for the antenna blowing around, but at times I still saw wiggles in my plot. The more one refines the receiving system, the more one resolves the limitations in the whole loop from cesium standards at WWV to the chart recorder final output.

What kind of accuracy can you expect? Throughout December 1980 we plotted the following offsets, all times 10^{-10} parts low: 2.3, 1.5, 0.8, 0.6. All measurements were for 22 to 48 hours in duration. On March 1, 1981 it was 3.2×10^{-10} high. Thus the drift rate of this particular oscillator is about 1.5 parts in 10^{10} upward in frequency per month. That is very good, but then this oscillator is about 20 years old, and has been aging for a long time.

Frequency/time keeping is a fascinating subject, and the more experience one has, the more one sees that there is more to learn. The Bureau of Standards and Hewlett-Packard both have booklets on the subject available at no charge. Sometimes I have so much fun watching the recorder plot out, and calculating the offset, I get behind in my lab work, which is why the oscillator is run in the first place! — *Robert Sherwood, WB0JGP*

TOWER FEED WITH A GAMMA MATCH

□ I receive a lot of questions at Hq. and while on the air. One of the more common questions concerns proper configuration of the shunt arm when exciting a tower as a vertical antenna. Amateurs ask, "How long is the shunt arm? How far should it be spaced from the tower? What is the best conductor diameter for the gamma or shunt arm? How do you match the arm to the feed line?"

If the tower and antennas atop it do not form a resonant quarter wavelength at the desired operating frequency, the dimensions for a shunt arm aren't especially critical (Fig. 1A). My best results have been obtained when running the shunt arm halfway up the tower, or even to the top. Any spacing from, say, 1 to 2 feet from the tower leg or side will provide satisfactory results. Any reasonable conductor size can be used for the shunt arm, with the larger sizes (diameter) preferred. I have had good results when using RG-59/U coaxial cable as the drop wire. The center conductor and the shield braid are joined at each end of the shunt arm (paralleled). The major penalty paid for using a nonresonant shunt-fed tower is restricted bandwidth. The matching network has to be readjusted when moving more than a few kilohertz on the lower bands (160 and 80 meters). Generally, a nonresonant shunt-fed tower is not nearly as effective as a properly matched resonant system. I have found T or L networks quite suitable for matching a 50-ohm feed line to the lower end of the shunt arm. The

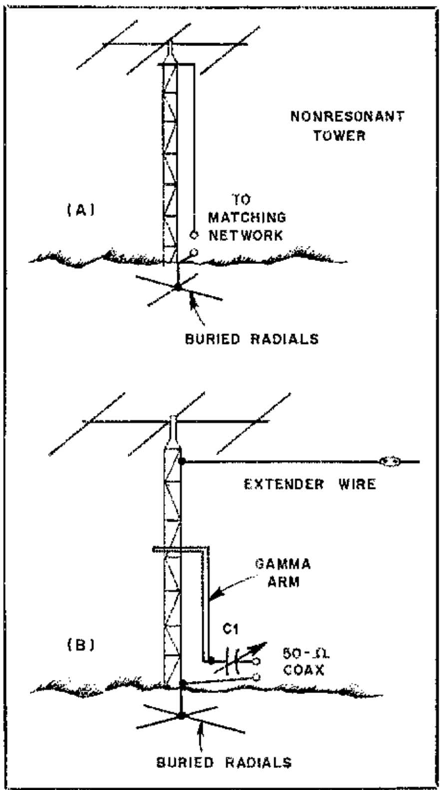


Fig. 1 — Illustration A shows a nonresonant tower vertical that uses shunt feed that extends to the top of the tower (see text). At B is a resonant tower vertical that has a gamma match for 50-ohm coaxial feed line to the station.

*Senior Technical Editor

least effective nonresonant verticals I have used were those less than 90 degrees, electrically. Some fine results were obtained with two models that were somewhat in excess of 90 degrees (quarter wavelength).

If the overall tower system can be adjusted for quarter-wave resonance by means of a top resonator (loading coil and capacitance hat) or horizontal extender wire, one can use a standard gamma match to feed it. *The ARRL Antenna Book* provides approximate starting dimensions for gamma matches (transmission line chapter). I have used them with success in shunt feeding a number of resonant towers. The easiest way to explain the procedure for gamma matching is to use an example. Assume that the tower in Fig. 1B was structured for operation at 1.825 MHz by means of an extender wire that provided an overall tower/wire length roughly 3% shorter (1830.5 kHz) than the desired resonant length (shortening necessary for gamma feed). Imagine that the tower has an outer diameter of 12 inches (mm = in. × 25.4). The gamma arm will be approximately 0.045 wavelength long (24 feet). The diameter of the gamma arm needs to be roughly 0.33 to 0.5 the tower diameter. For 1.825 MHz it will be between 4 and 6 inches. Since this is a fairly large diameter for the types of stock that are available (to say nothing of practical considerations!), a 4-inch diameter gamma arm can be fashioned from several lengths of copper antenna wire, birdcage fashion. Pieces of pc board can be used as spreaders, with the wires soldered to each spreader as they pass through it. The center-to-center spacing for the tower and arm will be on the order of 0.007 wavelength, or 3 feet, 9 inches.

The series gamma capacitor (C1 of Fig. 1B) will require about 7 pF per meter in order to provide a match between 50-ohm feed line and the gamma arm. Since 1.825 MHz is actually 164.39 meters, the required capacitance will be 1150 pF. These calculations are based on the assumption that the feed impedance of the antenna is set for approximately 25 ohms. It is assumed also that a buried radial system is attached to the base of the tower. In a practical situation it may be necessary to experiment with the length of the gamma arm and the setting of C1 to obtain a VSWR of 1:1.

Gamma feed can be used also with nonresonant towers, but the length of the gamma arm, the spacing of the arm from the tower and the value of series capacitance will probably differ greatly from those values calculated for a resonant vertical antenna. I hope this information will be helpful to those who have pondered the matter of shunt feeding towers for DX work. — *Doug DeMaw, W1FB*

PI NETWORKS FOR TRANSMATCHES

☐ I'd like to point out that the use of a pi network in antenna tuners (Transmatches) offers the capability of specifying the loaded Q (Q_L), as is done when designing pi networks for the output of transmitters. Ordinarily, the antenna-matching network is designed to accommodate the impedances involved, which results in accepting whatever Q_L results.

For example, suppose the VSWR with a 52-ohm feed system is 3:1. Limiting-impedance values producing a 3:1 VSWR are: 17.33 + j_o (minimum resistance value), 156 + j_o (maximum resistance value) and 86.67 + j69.33. Consider the minimum-resistance case.

Reactance Values for Pi Network in Fig. 3

Coax Z	Desired Q_L	X_1	X_2	X_3
17.33 + j_o	3	18.38 Ω	24.51 Ω	12.26 Ω
156 + j_o	3	18.38 Ω	45.80 Ω	30.59 Ω
86.67 + j69.33	3	18.38 Ω	44.41 Ω	25.12 Ω
86.67 − j69.33	3	18.38 Ω	44.41 Ω	35.02 Ω
17.33 + j_o	5	10.61 Ω	15.82 Ω	6.40 Ω
156 + j_o	5	10.61 Ω	28.08 Ω	18.13 Ω
86.67 + j69.33	5	10.61 Ω	27.25 Ω	15.78 Ω
86.67 − j69.33	5	10.61 Ω	27.25 Ω	19.19 Ω

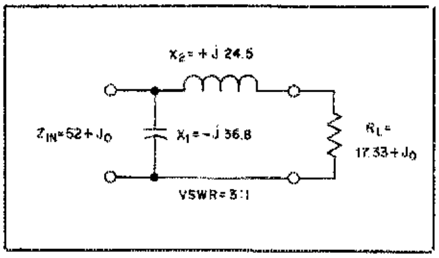


Fig. 2 — Simple L network and reactance values for correcting a VSWR of 3:1.

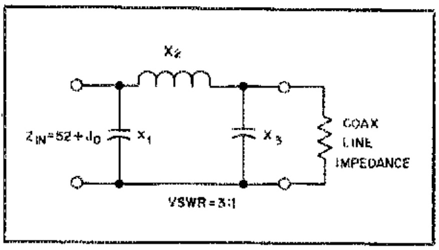


Fig. 3 — A pi network for matching two impedances. With this circuit the loaded Q can be determined in advance.

A simple L network to transform 17.33 + j_o to 52 ohms is shown in Fig. 2. The circuit provides an excellent match, but the Q_L turns out to be only 1.7, thus ensuring relatively little harmonic attenuation.

In contrast, a pi configuration can be designed to provide the same impedance transformation with any desired Q_L, subject only to the practicality of large capacitances. The table indicates the reactance values for the pi network of Fig. 3, and is keyed to the three limiting cable input impedances that correspond to a VSWR of 3.

It should be noted that the value of X_1 depends only on Q_L. The smaller X_1 (larger capacitance) the higher the Q_L. This suggests that the optimum procedure for obtaining an impedance match with the highest Q_L is to adjust X_1 for maximum capacitance, and adjust X_2 and X_3 to obtain a VSWR of 1:1 at the tuner input.

The procedure for calculating X_1, X_2 and X_3 for a given Q_L and specifed antenna-cable impedance is similar to that for calculating pi-network elements in transmitters. A step-by-step procedure is available if you wish. A table of reactance values for various VSWRs and impedances (plus Q_L values) can be prepared readily with the use of a hand-held programmable calculator. — *K. K. Miller, W2KF*

MORE ON THE USE OF TV SWEEP TUBES

☐ DeMaw's article, "Some Thoughts About TV Sweep Tubes," in February, 1980 *QST*, provided primarily information relative to selection of sweep tubes for home-construction projects, touching only briefly on replacement of sweep tubes in existing equipment. Owner replacement of sweep tube "finals" in existing equipment has provided hours of unwanted headaches, especially when attempted with off-the-shelf tubes. The following notes may be useful.

1) If at all possible, where several tubes are operated in parallel, they should be purchased in matched sets. DeMaw mentions the need for close matching of characteristics, and that they (matched tubes) are usually available from the equipment manufacturer at higher cost than tubes purchased locally. The additional cost reflects the time involved in matching. Even so, they will still be a bargain.

2) It is best to stay with the same brand of tube originally supplied in the equipment. The subtle differences in internal construction of tubes from different manufacturers may lead to difficulty in performing the neutralization check, and possible adjustment, which should follow final-stage tube replacement. A circuit designed around a particular manufacturer's tube may not provide the range of adjustment necessary to achieve neutralization. This same problem may occur when attempting replacement with a later "improved" version, e.g., 6JB6A. Since an equipment manufacturer may have used several manufacturers' tubes, perhaps with slight modification to neutralization circuitry, it is best to mention the original tube brand and number when ordering replacements from the equipment manufacturer. If a particular brand is no longer available, the manufacturer should provide a reliable substitute, perhaps with notes on slight circuit changes necessary for its use. It would be wise to request such notes with the order.

3) Follow the equipment manufacturer's recommended neutralization procedure. It is not uncommon, on multiband transmitters, for neutralization to be somewhat a compromise. For best results it must be done on a specific band. The quick test for adequate neutralization is to observe the plate-current dip at resonance, and simultaneously the rf output on a relative or calibrated power indicator. If minimum plate (or cathode) current at resonance and maximum rf output occur simultaneously, neutralization should be adequate. Normally the manufacturer will recommend observing these two conditions while adjusting the neutralizing capacitor, should it be necessary. However, depending on the degree of compromise in circuit design, perfect neutralization may not be observed on other

bands when this same check is performed. Bear this in mind; it is not uncommon. If the plate-tuning capacitor setting varies radically between the current dip and maximum rf output on other bands, the equipment manufacturer should be contacted for assistance.

4) A bias adjustment is routine after replacing final-amplifier tubes. A more accurate bias adjustment is possible when the driver tube is first removed from the socket. Removal of the driver eliminates any possibility of carrier bleed-through from an unbalanced balanced modulator. Carrier bleed-through will result in some additional plate current, and bias adjustments made to set plate/cathode current for a specific value of resting current will be incorrect if carrier bleed-through is present. Since the proper resting current is important to final-stage linearity, remove all doubt by removing the driver tube during bias adjustments. Proper biasing should be done prior to neutralization, and removal of the driver tube may also prevent circuit instabilites caused by insufficient neutralization immediately after the tube change. Don't forget to replace the driver before proceeding with neutralization!

5) Where it is impractical or impossible to obtain matched tubes directly from the manufacturer, careful consideration of the aforementioned hints may still avoid or minimize difficulty and permit off-the-shelf tubes to be used. A friendly tube supplier may consent to let you "borrow" 10 or 12 tubes to enable you to attempt to match a pair, or perhaps several pairs. If you are that fortunate, and succeed in matching more than one pair, you may want to buy an extra pair for spares. A tube supplier really should not do this for you, so if he does, don't abuse the privilege; return any unneeded tubes immediately. To attempt to match a pair (or more), one tube socket should be selected for use by all tubes during evaluation of their transconductance characteristics (g_m). Some final circuits will have the filaments of several tubes wired in series, so it may be necessary to have tubes in all the sockets. Connect only the plate lead to the tube being evaluated. Remaining plate leads should be positioned carefully to prevent short-circuiting and operator danger. BE CAREFUL; LETHAL VOLTAGES WILL BE PRESENT DURING THESE TESTS! Turn the transmitter on and allow the tube to warm up for two minutes. Close the PTT line, and following the manufacturer's recommended bias-adjustment procedure, plus removal of the driver, quickly adjust the bias setting to the proper value for one tube. If the normal value is 100 mA for two tubes, use half that value, 50 mA for one tube, etc. Secure the transmitter power supply, allow time for filter capacitor bleed-off by bleeder resistors (one minute), and then short the plate lead with a ground strap to remove any residual power-supply voltage. Remove the tube just evaluated and return it to its carton, inserting a slip of paper under the end flap, with the resting current marked on it, then set it aside. *Without readjusting the bias,* repeat this sequence with each tube. When all tubes have been evaluated under identical conditions of bias, select those with the closest current values for retubing the final. It should be noted that often the value will differ slightly from one socket to another. It may be possible to improve the match under resting-current conditions by simply swapping the tubes into different socket positions. DeMaw, in his article, recommends grading the tubes at full power current readings, and then accepting as a compromise any mismatch that occurs in the resting currents. I see nothing wrong with this approach, and it may result in slightly improved linearity. If you have not paid for all of the tubes, this method is harder on the tube during evaluation, and this should be considered. In actuality, either method should provide a reasonable match under varying current conditions.

6) Being unable to obtain a sufficient number of tubes to attempt to match a pair, only one practical method remains. It will be necessary to attempt use of off-the-shelf tubes, and to effect a reasonable balance by providing individual bias adjustments. DeMaw's article covers balancing tube currents by this method, and, in isolating the bias supplies to the individual tubes, the article should provide the reader with some ideas on the actual circuit changes that will be necessary. It should only be necessary to make the bias individually variable to one tube, if two tubes are used. The two tubes can be evaluated per the method in paragraph 5, to determine which pulls more current. If the bias-supply circuit to only one tube socket is to be modified and made independently variable, it would be best to install the 10-kΩ series resistor between the 10-kΩ pot and ground, rather than between the pot and the bias-supply line. In this way actual bias voltage to the individually controlled socket could be varied between one-half and full bias, and that grid cannot be run at such a low negative potential during adjustment, that the tube overconducts and destroys or damages itself. It must be remembered that a decrease in bias potential produces an increase in resting current: this is sometimes overlooked. The "hotter" of the two tubes would then be installed in the unmodified socket, and the resting current adjusted with the regular bias-adjustment potentiometer to the correct value for one tube. Then, after connection of the plate cap lead to the remaining tube, resting current can be adjusted to the correct value for two tubes by adjusting the added potentiometer to provide a slightly less negative bias voltage to the "weaker" of the two tubes.

Of all the possibilities mentioned, purchase of matched tubes directly from the equipment manufacturer, whenever possible, certainly presents the best opportunity for a smooth PA tube change where parallel tubes are involved. As DeMaw points out, sweep-tube manufacturers were not concerned with transmitter applications of these tubes during their design. Neither were they concerned in parallel-tube operation, so manufacturing tolerances are not so stringent as with transmitting tubes such as the 6146. Where transmitting tubes are used in parallel operation, normally few problems of mismatch will be encountered if the precaution is taken to purchase a pair of tubes from the same production run, which should be coded either on the tubes, the cartons, or perhaps both. — *Robert G. Wheaton, W5XW/VP1XW/XE2XW*

DON'T FORGET PART 68 OF THE FCC RULES AND REGULATIONS!

☐ We at *QST* let one slip past us when we published the article, "Phone-Line Interface — Do it Solid-State Style" (*QST* for October 1981). The authors unintentionally failed to warn the readers of the FCC regulations (Part 68) concerning attachment of equipment to the phone lines. Furthermore, the editors failed to observe the omission in the article.

As a consequence, AT&T sent a written advisory about the article to FCC, and the Commission in turn called the error to our attention. We were advised that specific technical and procedural standards govern the direct electrical interconnection of all terminal equipment with the telephone network. Part 68, 47 C.F.R., gives complete details, and is available from the FCC along with Form 730 for registering equipment that will be connected to the telephone network.

Amateurs should make certain that phone-patch equipment they use complies with the standards, lest they be in violation of current laws. A special report on this subject was published in April 1981 *Telecommunications* journal. — *Doug DeMaw, W1FB*

CONCERNING POLARITY INVERTERS

☐ I read the October 1981 *QST* article "Polarity Inverter," with interest. But I can't help but believe that the device is unnecessary.

Thirty years ago I bought an MG-TD with positive ground. Fifteen years ago the dash clock became erratic because of the contact plate-over, so in an attempt to reverse the plating and to convert to a more reasonable system, I decided to change the car to a negative-ground electrical system. I was prepared for the worst.

To my surprise, nothing really had to be changed except reversing the battery, flashing the residual magnetism of the armature and firing it up. The gist of the idea is that only those things that are polarity-sensitive need be changed. These things in general contain permanent magnets or rectifiers. The only sensitive component was the zero-center ammeter, but since it works either side, I left it alone. I did reverse the primary leads of the ignition coil (a 10-minute job), but the car would actually run without the change. (Two years ago I crawled under the dash and switched the color of the red and black battery voltage test pin-jacks.)

As you can see, the conversion was made quickly and at no cost. Generators, starters, regulators, lights, horns, etc., need not be changed at all. Only those devices containing permanent magnets or diodes need be considered, and virtually all of them can be modified easily.

From time to time reports are made in auto magazines of polarity changes made at great cost. These are usually ripoffs. — *Robert Span, W3RBL, Ligonier, Pennsylvania*

Feedback

☐ Dr. Beverage points out an error in his letter in Technical Correspondence (December 1981 *QST*, p. 55). Eq. 1 should read

$$T = 0.235 \times 10^{-10} \sqrt{\frac{f}{\sigma}}$$

☐ Gary Legel, N6TO, of Fullerton, California, tells us that while he built the Hartley 210 transmitter (left photo, December 1981 *QST*, page 31), his cousin, Al Estrumse, W4KTS, of Marietta, Georgia, built the 59 Tri-Tet crystal oscillator 801 amplifier transmitter (right photo).

Hints and Kinks

Conducted By Larry D. Wolfgang,* WA3VIL

LIGHTNING ARRESTOR ANTENNA-END INSULATORS

☐ The antenna-end insulator shown in Fig. 1 may provide just the protection your antenna needs. The insulator is cheap, the gap is adjustable and lockable, and leakage paths are quite long. A grounded wire is used on the end not connected to the antenna. Points are formed on the eye bolts using a bench grinder. Set screws are used to lock the eye bolts when the gap is set. It is best to use stainless steel or brass hardware. Thanks to Howard Chapman for building the unit shown in the photo. — *Frank Noble, W3MT, Bethesda, Maryland*

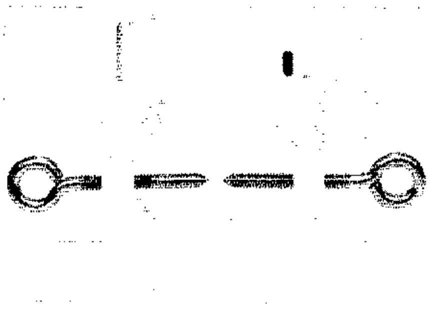


Fig. 1 — Construction details of an antenna-end insulator. The 3-1/2 inch square, 3/4-inch thick block of Lucite, with a 2-1/2 inch hole in the center, is drilled and tapped for the 1/4- × 3-inch eye bolts and 8-32 set screws (mm = inches × 25.4).

STRAIN RELIEF FOR WIRE ANTENNAS

☐ Here's an idea that has helped my temporary dipole withstand wind, snow, ice and birds in Oslo, Norway. When erecting a dipole, using trees as supports, you should provide some type of strain relief to prevent the wire from breaking as the trees sway in the wind. Tying one end to a weighted rope may not work because the rope can snag on bark or between branches of the tree. An excellent alternative is to use a few lengths of the elastic cord for tying bundles on bicycles or motorcycles. These cords have large, convenient hooks on each end, and can be purchased for a few dollars. Attach the cord between the end insulators and the support rope, and you will have an excellent strain relief for your wire antenna. — *Anthony Immorlica, LA0CT/WB6ENI, Flemington, New Jersey*

EXTRA SWITCHES WITH SWR INDICATORS

☐ Why add a switch to an SWR indicator? A switch can key the rig, turn off the amplifier, or reduce TVI or intermodulation of incoming signals. The most common use of an SWR bridge is to indicate the match of the feed line to the load. The transmitter can be keyed with a simple push-button switch on the indicator. If the switch is an NC/NO (normally closed, normally open) type, the relay line to an

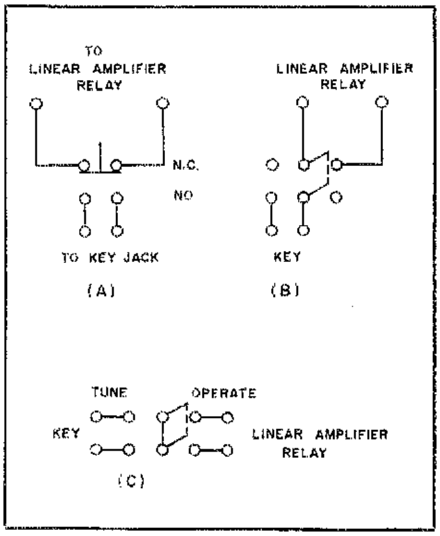


Fig. 2 — (A) A simple NC/NO push-button switch makes a convenient key on the SWR indicator. Push-button action gives a momentary on for the "tune" position. (B) and (C): A dpdt switch can perform the same function.

amplifier can be disconnected simultaneously (see Fig. 2).

One particular control of a Transmatch usually has the most effect when QSYing across a single band. A dpdt center-off switch, connected to a reversing motor that is mechanically coupled to the control shaft, allows remote tuning. One field of a Honeywell (or similar) instrument motor may be reversed conveniently while you are watching the SWR indicator (Fig. 3A). In these days of 12-V dc rigs and power supplies, an inexpensive window-control motor from the automobile junkyard (Fig. 3B) is attractive, and the extra set of switch contacts may be used to key the rig.

Sometimes a load is simply beyond the adjustment range of a Transmatch, and a length of feed line (1/8 wavelength) must be inserted to permit a satisfactory adjustment. Here a dpdt or transfer relay (Fig. 4) may be located remotely and controlled by a switch. Stubs, coils or capacitors may be added similarly.

SWR-indicator unit diodes may generate weak harmonics and add intermodulation to incoming signals. Both effects can be reduced greatly by using the switch to disconnect the dc

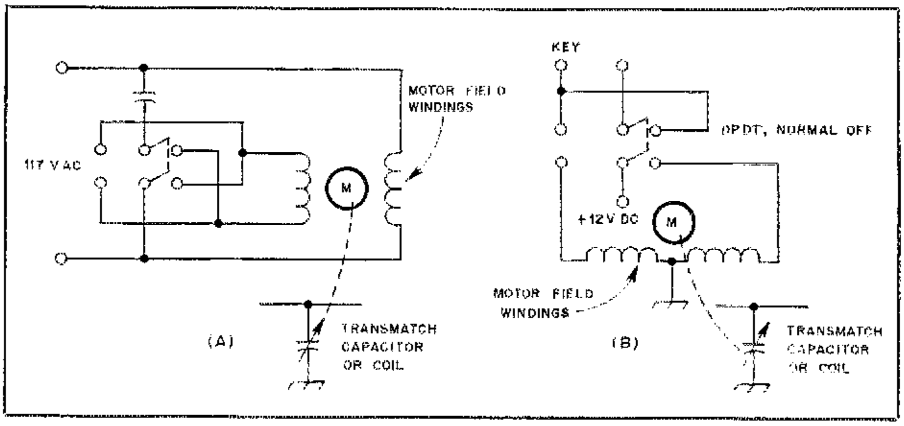


Fig. 3 — A spring-return, center off, dpdt switch allows remote, motor-driven tuning (A) with 117-V ac instrumentation servo motors, and (B) with automobile window-control motors.

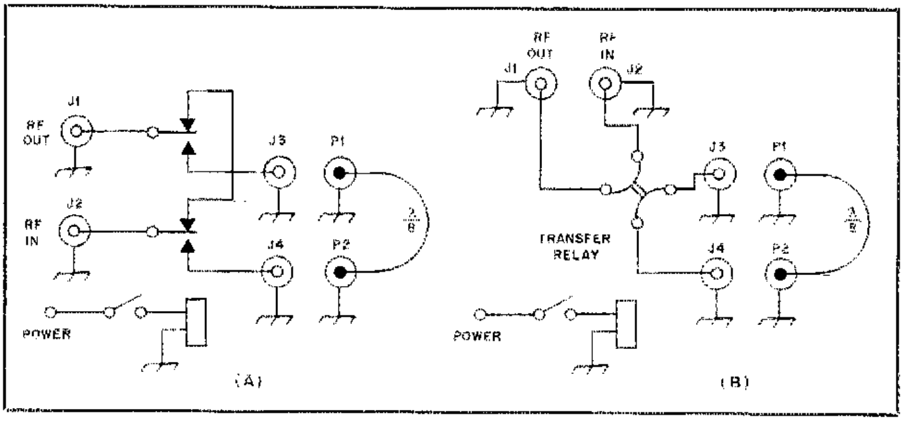


Fig. 4 — An spst switch may control a dpdt relay (A) or a transfer relay (B) to insert matching elements to extend Transmatch range. The contacts of a transfer relay rotate in 90° steps each time power is applied to the coil.

*Assistant Technical Editor

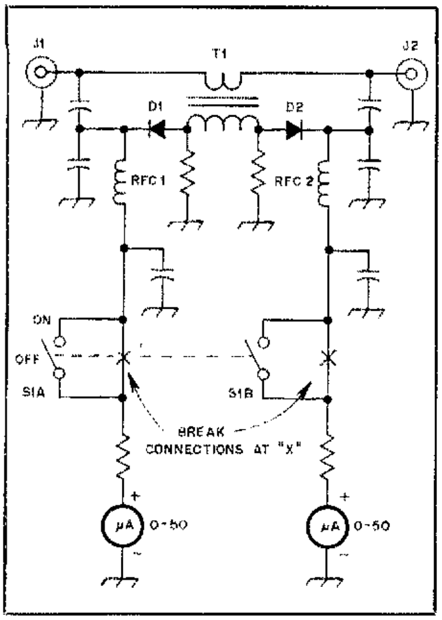


Fig. 5 — Opening the SWR-bridge detector-diode dc return will often reduce TVI and receiver intermodulation. The circuit shown is the VSWR Indicator and Power Meter from the 1981 *Radio Amateur's Handbook*. Many bridges have only a single meter, but the principle is the same.

paths from the diodes when the meter is not in use (see Fig. 5). Use one or more of these ideas to simplify your tune-up procedure. — *David Geiser, WA2ANU (ARRL TA), New Hartford, New York*

AZDEN PCS-2000 MEMORY

☐ When I looked for replacement batteries for the memory backup in my Azden 2-meter transceiver, it became clear that they were going to cost about $20 per year. Memory backup requires approximately 0.5 mA at 3 to 15 V. Almost any NiCad battery will do for this application. I recommend a 100-mAh pack such as stock no. 49F941 from the Newark Electronics Catalog, Chicago, Illinois, costing $7.06. This is a three-cell pack (3.6 V), and is a good size for the available room. Fig. 6A shows the circuit used.

Install the NiCad pack as follows: First remove the control head from the main cabinet. Next remove the top and bottom covers on the control head (two screws for each cover) and the back plate (four screws on back and one on the top pc board). Assemble the battery, resistor and diode as shown in Fig. 6B. Cover the battery with two layers of electrical tape (top, bottom and sides), and cover the resistor and diode with spaghetti or heat-shrink tubing. Solder the wire from the positive side of the battery to the pc-board connection for the positive side of the battery holder, and solder the wire from the negative side to the pc-board connection for the negative side of the battery holder. Slide the battery assembly into the opening under the battery holder, between pc boards. Now locate the +13.5-V input on the lower pc board at the ON/OFF switch. Solder the diode to either side of the switch. Your choice will depend on how power is supplied to the rig. If power is on only when the ignition is on, then wire the diode to the power side. If power is always applied to the rig, wire it to the radio side. Then, of course, the battery will

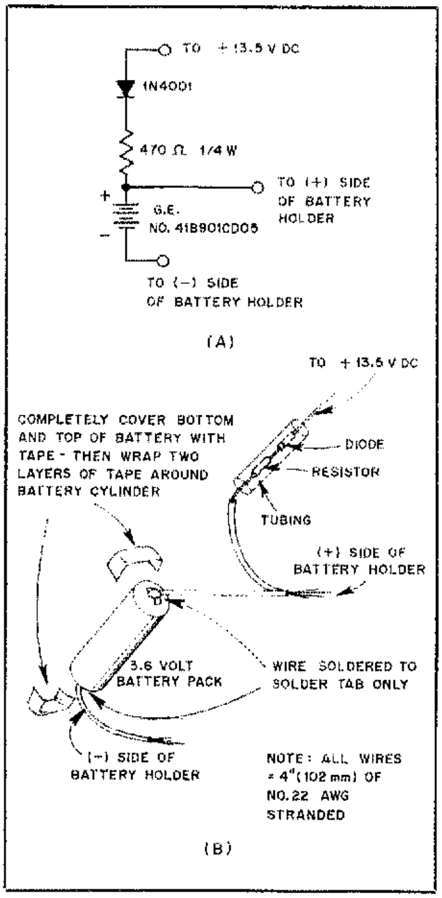


Fig. 6 — At A, a schematic diagram of a NiCad-battery memory backup for the Azden PCS-2000. The battery can be a GE no. 41B901CD05 or similar 3.6-V pack. The assembly details of the battery-charging circuit are shown at B.

only recharge when the rig is turned on. Reinstall the back plate and top and bottom covers. Most NiCad batteries are shipped in an uncharged state. The battery can be charged before installation by a direct connection to an automotive battery overnight, but only in the assembly with series resistor and diode.

If larger-capacity cells are used, the value of the series current-limiting resistor will have to be reduced. With a 470-ohm resistor, approximately 12 mA of charge current is available, just about right for the 100-mAh cells. If 150-mAh cells are used, the series resistor should be 390 ohms, and for 225-mAh cells the proper value is 330 ohms. — *Tom Burnet, W9KTB, Conyers, Georgia*

☐ After owning my Azden PCS-2000 for four months, the silver-oxide cells that power the memory function failed. A quick check of each 1.5-volt cell showed one at 1 volt, one at 0.9 volt, and one at minus 0.1 volt. After a dash to the store for new batteries, it became obvious that my old friend Murphy had been around. No memory function would work! Could the memory chip have been damaged by the reversed polarity of that battery?

Later that evening Gerd Henjes, W2ISB, mentioned experiencing a similar problem with another rig. He suggested removing all power from the rig, waiting a few minutes to bleed it off and then removing the memory batteries. Finally, he told me to short the plus and minus tabs of the battery holder for a minute or two. I followed his instructions carefully, and after replacing the batteries and turning the rig on, the memory worked!

The list price for the silver-oxide cells is $3 each or $9 for a set. I found 1.4-volt cells in the same size case that cost $2.39 for a pack of six. Knowing that the memory chip is CMOS, which will accept a 3- to 15-V supply, these should work fine. — *Clay Holland, KJ2W, Liverpool, New York*

JUNKBOX — A BETTER WAY

☐ One of the best type of storage containers for small electronics parts can be made from 35-mm film containers. For larger items or larger quantities, baby-food jars are very useful. The main drawback of these is that they break easily, but you can see what's inside. If you don't use 35-mm film yourself, the film cans may be obtained from commercial retail film developers for postage and an explanation of the intended use. If there are a few people in a club who want these, join together and use the club name. This may aid in getting the cooperation of the supervisor.

Once the containers are obtained, you have the question of how to mark the items for ease of identification. File dots work very well on both type of containers. These come in a variety of colors and sizes. The 1/2-inch dot size is easy to write on. To ease identification among capacitors, resistors, ICs and other items, use a different color for each of the categories. To break the categories down further use the 1/8-inch color dots to distinguish between Mylar, disc and tantalum capacitors, or between different wattage resistors. With this system you can quickly check a parts list to see what is on hand.

A good way to store the containers is in a chest of drawers. Use of 4-inch wide finger jointed and grooved drawer-siding material will ease construction of the drawers. This material is 3/8- to 1/2-inch thick with a 3/16-inch groove on one side and a 1/4-inch groove on the other side to make it easier to insert a bottom for the drawer. See Fig. 7 for construction details. — *Robert Hicks, KA5BLB, Brenham, Texas*

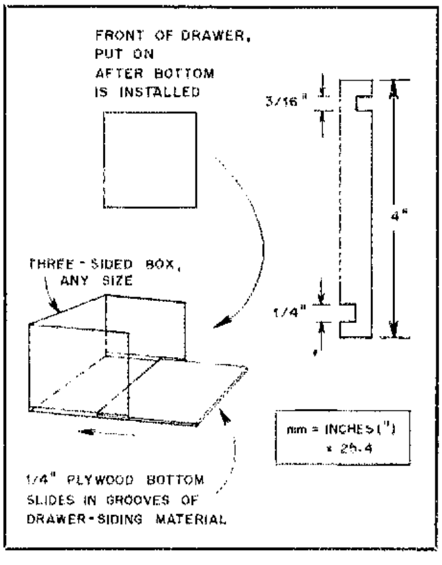


Fig. 7 — Construction of junkbox drawers using finger jointed and grooved drawer-siding material. Dimensions of the drawer should suit the builder.

An Alaskan Adventure

When a good friend asked if I would be his family's Elmer, I accepted. Problem was, it was to be a long-distance relationship with a Novice who lacked both neighbors and electricity.

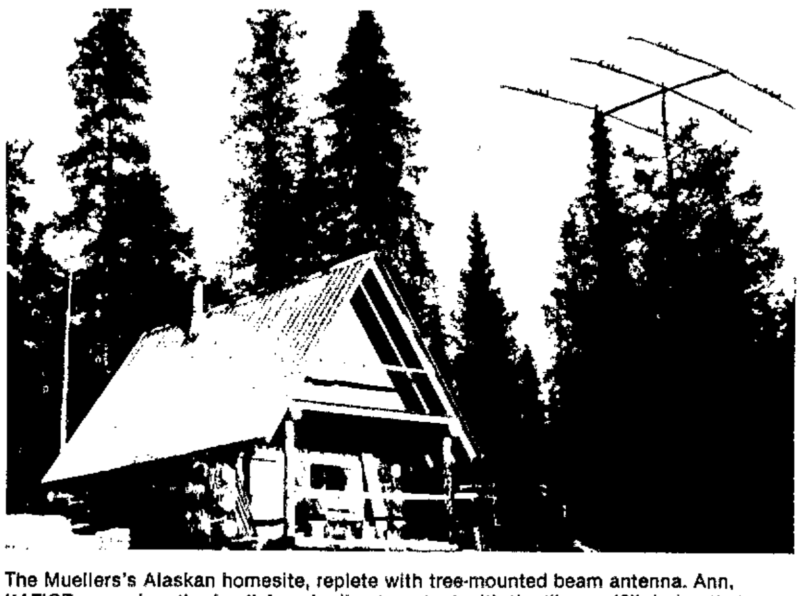
By Roger Barnard,* WAØHAM

Being asked for advice is usually flattering, and most of us are all too happy to give it. Imagine, however, my hesitance, even though I've been a ham for 20 years, to give quick advice on equipment selection to a friend who had just decided to move with his family to the Alaskan bush.

Dwight Mueller, a civil engineer, together with his wife, Ann, a physician, and their two young daughters, had announced plans to carve out a wilderness home in Alaska. Their plan was to live for a year in a log cabin they intended to build on an uninhabited lake. The cabin site was beyond roads, telephones, electricity and people.

Having experienced my share of frustration through the years at portable, mobile and maritime mobile communications on the ham bands, I was tempted to discourage Dwight from relying on Amateur Radio as their means of dependable communication. Several problems occurred to me at once, the major one being a license; my friends were not hams. To my surprise, however, Dwight indicated that both he and Ann had been privately studying for their Novice ticket and felt they were ready for the test.

I was also deeply concerned over the limitations of time. They had set a target date for their departure to allow adequate time for the log cabin to be constructed before the winter snows began to fall. Considering the time it would take for their licenses to arrive, there would be no opportunity for my friends to develop operating technique on the air. Furthermore, the remoteness of their destination would make it impossible for them to receive assistance when setting up their station. With their belongings, they were to be flown in by bush plane to a lake



The Muellers's Alaskan homesite, replete with tree-mounted beam antenna. Ann, KA7IQT, served as the family's only direct contact with the "lower 49" during their one-year stay. *(photo courtesy WAØHAM)*

uninhabited by any other human being. I visualized the family being deposited on their wilderness property with a freshly won Novice ticket, uncrated boxes of the unused radio gear and an unassembled antenna system. I winced at the thought, knowing they would have no experienced hams to help them.

'IQT Arrives

"Eternity," for hams, is that painful wait for the FCC response to a Novice written test. I felt like an expectant father as I anxiously paced the days, weeks and what seemed like months before receiving from Dwight the exciting news of a new call just issued, KA7IQT. It belonged to Ann. Dwight had decided at the last moment not to take his test because so many deadlines were approaching swiftly.

Upon receiving the license with only a few days left before departure, Dwight asked me to accompany them to a local Amateur Radio supply house to purchase the equipment. It was great fun to act as their counselor, especially since cost was not a consideration. They felt they would be unwise to scrimp on equipment quality, since emergencies would demand reliability and performance. An all-transistorized transceiver with a reputable brand name was chosen as the basis of the station. To this was added its companion antenna tuner, a necessity since transistor finals dislike any antenna mismatch. Their antenna arrangements might not always be ideal, especially in an emergency or makeshift arrangement.

Powering the station in a remote area beyond electrical service presented a problem. I had no working experience with solar cells, and their expense, together with the short daylight hours in the far north, caused me to dismiss their use almost immediately. Dwight's engineering ability solved the power supply problem; he designed and built a portable power plant. His arrangement — a belt-driven auto alternator powered by a small gasoline engine — performed flawlessly. Together with an auto regulator, the affair charged a 12-volt car battery. The bat-

*4340 Island Crest Way, Mercer Island, WA 98040

tery proved amazingly adequate for the small transceiver, requiring a charge only after at least a week's use. The battery also served to power 12-volt reading lamps for the family.

At first, we decided on an inverted V antenna matched with the tuner to operate all Novice bands. Having owned and used a Yagi antenna for years, however, I was convinced that its superior performance over the dipole on the higher Novice bands demanded serious consideration, despite the additional expense. Because of its size and weight, a tower to mount the beam on was out of the question. Considering the materials Dwight would have on the property, the obvious solution was to mount the beam atop one of the numerous trees. Dwight was confident he could do it with his family's help if he could find a suitable means of attaching it to the tree and some method of rotating it — without electricity.

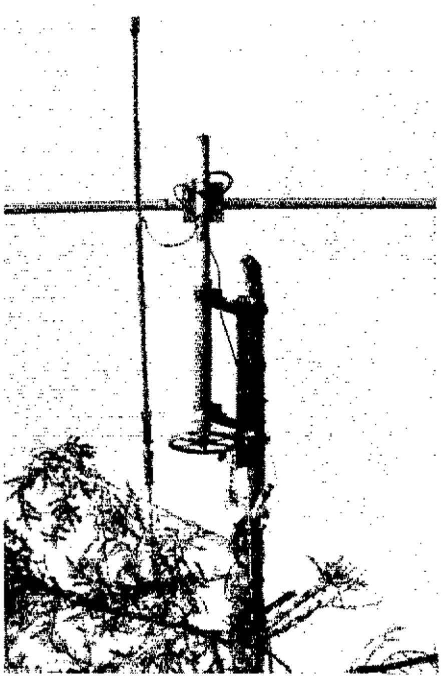
Dwight's Manual Rotator

The problem of antenna mounting and rotation was solved by the fabrication of a manually operated device. The design of the mechanism permitted easy attachment to the top of a tree.[1] This device proved to be extremely simple to affix. A 1/8-in. cable running up the tree trunk permitted easy rotation of the antenna, and Dwight extended the cable from the base of the "tree tower" through the cabin wall to the radio corner. This trick removed the necessity of stumbling through snowdrifts between QSOs.

Prior to the Muellers' departure from Seattle, our anxieties multiplied. Finally, the tandem trailer lumbered on its way north, two days past the target date. Our first sked was set for the Mueller's reasonably anticipated arrival at their new homesite. I agreed to listen each night until I heard their signal. It occurred to me that I might be spending months listening to nothing — unless by some combination of miracle and luck the project came together just right. So many things could go wrong. Every pound of food, clothing, housewares and tools had to be flown in by a float plane from Homer, the nearest settlement on the Kenai peninsula. Between periods of rain and wind, they planned to hastily construct a shack to serve as temporary dwelling for the family until the cabin was erected. I had to remain in suspense until the first successful communication.

Several days passed with no hint of Ann on any of the three bands, 80, 40 and 15. The inverted V antenna, which was to serve for the two lower bands, should have been erected easily, I told myself. Surely Ann would show up on 40 meters sooner or later. Never had the foreign broadcast stations seemed so strong as I listened for even the faintest signal within the 5 kHz of our selected frequency.

[1]A detailed drawing and parts list is available from Hq. for a business-sized s.a.s.e. Address the envelope "ARRL, Rotator Drawing," 225 Main St., Newington, CT 06111.



Close-up view of Dwight Mueller's manually operated antenna rotator. A detailed drawing and parts list for the clever arrangement are available from Hq. for an s.a.s.e.

The First QSO

Never in my ham experience have I felt such excitement as the evening I copied my call being sent with remarkable cw style. Ann had her station assembled and in working order. The Alaska Highway trip and their freight hauling by plane were without serious problems. To my dismay, however, the QSO was not altogether successful. While it established contact between us and proved the family was in no difficulty, strong interference made it impossible for Ann to copy me clearly. I had given instructions on how to deal with various operating problems she might encounter, but I had failed to explain how to request and execute a QSY without losing each other. It took several sessions of 5-wpm struggles to convey the method of changing frequency a few kilohertz.

Ann's inability to copy me during crowded band conditions was a mutual frustration. As long as my signal was free of QRM, Ann was able to copy extremely well. Certainly our crowded Novice bands require superior operating skill for consistently successful communication.

My subsequent contacts with Ann were progressively better. Very quickly Ann's code speed rose to 10, then 12 words per minute. Our schedule favored the use of the 15-meter band for daylight contacts, while 40 meters proved quite acceptable for night communication. While we did not use the 80-meter band extensively, the signals there, though weaker than on 40 meters, were readable.

With few exceptions, our three scheduled contacts per week were successful. Occasionally, I forgot to keep our schedule, and at times Ann would not appear, the mysterious silence suggesting some possible accident to Dwight in his construction of the cabin or of sickness to one of the girls. I knew Ann could reach other hams, who could, in turn, notify authorities for an emergency check by helicopter or bush plane. Nonetheless, I was constantly aware of the four persons isolated from immediate help.

News from the Alaskan wilderness was often exciting. Bear visits were scary, but usually resulted in the bear running one direction and the girls running into the house. We all expressed the hope that this mutual retreat would be a permanent arrangement. The Alaska home study program, taught by the parents who conducted morning and afternoon classes in the log cabin "school" for two pupils, required periodic teacher visits by helicopter. Weather reports were always welcome, especially the tales of "20 below with snow and strong winds."

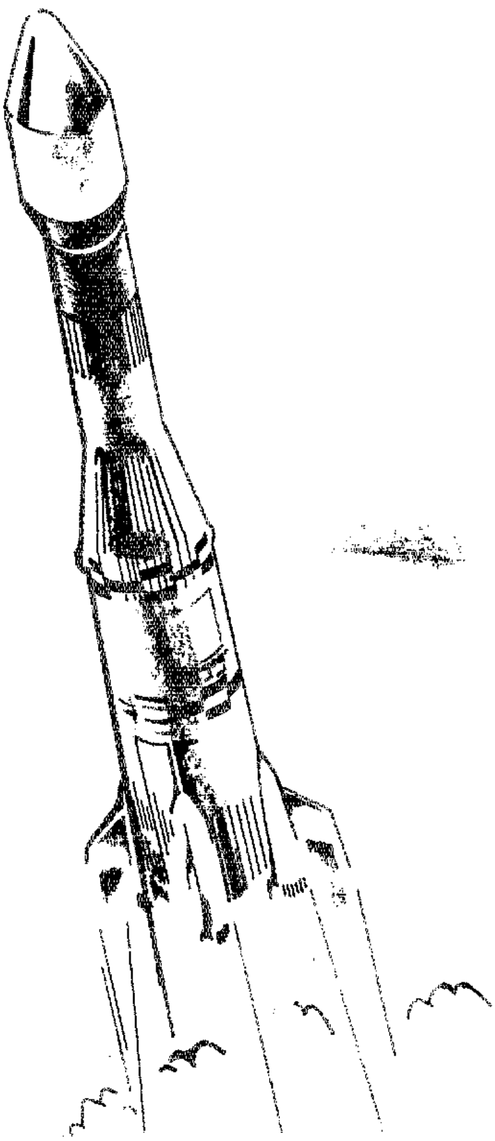
Dwight's infrequent trips to town were reported to me in advance. Weather always made the 13-mile walk to the nearest road, and the additional 20 miles to town, a major undertaking. The three-day round trip left mother and daughters to manage for themselves. The arrival of a new snowmobile made the trip less demanding. The family especially appreciated news passed on by radio from grandparents and friends back home; mail drops by bush plane were infrequent and unpredictable.

Novice-Band Communication Works!

This experiment has verified several things. First, Novice operation can be consistently reliable over long distances. Its success depends largely on the desire and determination of the Novice operator to learn proper operating techniques. Given a decent antenna, wise choice of frequency for time of day and other conditions, and the operators' perseverance, any similar type of operation can succeed. Ann Mueller, KA7IQT, and her husband, Dwight, have proven that conclusively.

The author is pastor of Mercer Island Baptist Church. Aside from ham radio, he indulges in nature photography, fishing, hunting, backpacking, canoeing, ocean sailing, woodworking and auto mechanics.

There's No Such Thing as a Free Launch

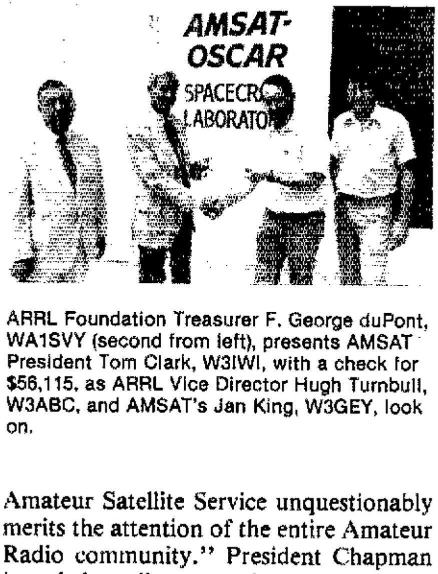


The ARRL Foundation has received fine support in its Twentieth Anniversary Amateur Satellite Fund Drive

By Richard Palm,* K1CE

What do you get when you mix a community of dedicated amateurs, a foundation devoted to the advancement of the radio art, and a goal of long-range, high-performance satellite communications? Answer: results. Thanks to the efforts of the ARRL Foundation and the many members, clubs, foundations and others who provided outstanding support, the satellite program is firmly back on its feet and ready to begin writing another chapter in the history of Amateur Radio.

Earlier this year, ARRL Foundation President Robert York Chapman, W1QV, launched the Twentieth Anniversary Amateur Satellite Fund Drive with these words: "The Officers and Directors of the ARRL Foundation have channeled their energies, in the few short years of the Foundation's existence, to collecting and allocating funding on behalf of programs that they deem worthy of support within the promotion and advancement of the radio art. We are convinced that experimentation and progress within the



ARRL Foundation Treasurer F. George duPont, WA1SVY (second from left), presents AMSAT President Tom Clark, W3IWI, with a check for $56,115, as ARRL Vice Director Hugh Turnbull, W3ABC, and AMSAT's Jan King, W3GEY, look on.

Amateur Satellite Service unquestionably merits the attention of the entire Amateur Radio community." President Chapman issued the call to arms in support of the satellite fund drive. And, in the weeks and months that followed, the amateur community answered the call with both barrels blazing, underscoring the high spirits that exist in anticipation of a new day for satellites and hams in space.

It is in this spirit that an ambassador for the Foundation, Treasurer F. George duPont, WA1SVY, traveled to Radio Amateur Satellite Corporation Headquarters in Washington to present AMSAT President Tom Clark, W3IWI, with a check for $56,115 in support of the fine work being accomplished in the amateur space program. These funds represented the outstanding support the Foundation received from many generous contributors who have provided security for success and a bright future for amateur satellite communications.

The ARRL Foundation

Established by the American Radio Relay League, the Foundation is a nonprofit organization bonded for the "advancement of Amateur Radio." Its affairs are governed by a Board of Directors of distinguished radio amateurs as a separate entity from the League.

The Foundation remains committed to the development of programs that promote Amateur Radio — scholarships, satellites and others that enhance its roles in the national and international telecommunications communities. The successes at WARC-79 were made possible to a large

*Assistant Secretary, ARRL Foundation

The Officers and Directors of the ARRL Foundation gratefully acknowledge the following contributors of over $1000:

Joseph Mullan, W3RLR
San Diego County Amateur Radio Council
American Radio Relay League
Orlando Amateur Radio Club
1980 SEANARC
Joseph Speroni, AHØA
The Margaret W. and Herbert Hoover, Jr., Foundation

The list of contributors to the Satellite Fund Drive includes the Orlando 1981 Hamcation/National Committee. Seated, l-r are KA4ASJ, N4FJD, WB4HAK, W4PIK and WB4AQW. Standing, l-r, are K4JRY, KC4CT, K4VFV, KC4DU, K4VLC and KC4DT.

Joseph Mullan, W3RLR

extent by the Foundation's WARC Fund and the strong support it received from ARRL members.

On the Horizon

With the recent launch of UoSAT OSCAR 9, Great Britain's first amateur satellite, and AMSAT's plan for a Phase III-B launch later this year, the time to leave your mark on tomorrow is now — get a piece of the action today by sending your contribution to the ARRL Foundation Satellite Program, 225 Main St., Newington, CT 06111. What better way to put back something into an avocation that has afforded so much?

Strays

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.

THE "GOOD OLD DAYS"

☐ There seems to be a pretty definite feeling among hams today that the old game has changed within the last few years from the friendly rag-chewing state that characterized it some time ago.

One ham writes as follows:

"It seems to me as if amateur wireless telegraphy is being put too much on a business basis. It seems as if the fellows who do not have messages to get thru are out of the game.

"If I answer a station, the first thing he asks is QRU. If I say NIL, then it's 73 for me. I don't even have a chance to QRA him.

"Where is the fellow who calls his pal in another State and says 'How is the weather?' or 'How does the world treat you?' There are very few of those fellows around."

Now, brother hams, just when was this letter written? Recently? Not so you would notice it! It was written nearly nine years ago, at the hey-day of the spark, and the "good old days" of yore, when J. O. Smith was the Traffic Manager of the League and a transcon needed at least two relays to get across the country. It was written by Hutchinson, 9HR, in March 1920, and published on page 47 of the *QST* of May 1920.

Apparently, the game has not changed so much. We still kick about the same things.

(from QST, December 1928)

CANADIAN POSTAGE UP IN '82

☐ As of January 1, postage from Canada to the U.S. has been raised from 17¢ to 35¢. Postage from Canada to Europe is up from 35¢ to 60¢. Use the correct postage on s.a.s.e.'s. — *Skip Skaptason, VE4SK, Winnipeg, Manitoba*

WATCH FOR NONDENOMINATIONAL POSTAGE

☐ Some countries won't accept mail from the U.S. with stamps that don't have the number of cents printed on them — the ones that say "C," for example. Be careful not to use them on any mail that is destined for Canada, Mexico or anywhere else beyond the U.S. border. — *WB2VAT*

Happenings

Conducted By W. Dale Clift,* WA3NLO

League Asks Commission to Ban CATV Use of Amateur Frequencies

In a formal rulemaking request filed with the Federal Communications Commission January 12, 1982, the American Radio Relay League calls for the prohibition of cable television (CATV) operation on frequencies assigned to the Amateur Radio Service. In its strongly worded petition, the League said that "Amateur Radio operators in many states have suffered severe interference caused by the operation of cable systems which 'leak' radio frequency energy on amateur frequencies . . . Worse, consumers of cable television are subjected to severe interference from amateur VHF stations."

Pointing out that cable interference is the direct result of inadequate shielding, poor-quality components and inferior installation procedures employed by cable companies, the petition draws attention to the increasing magnitude of the problem, its scope and the fact that the problem cannot be resolved in the context of present rules. In calling for the action proposed in the petition, the League points out that "this solution is necessary only with respect to the cable/amateur interference problem, because of the *unique* inherent geographic proximity of the two services in residential areas" (emphasis added). ARRL said that certain cable channels are incompatible with amateur signals, because of (1) the use by cable companies of amateur frequencies in so-called "mid-band" channel arrangements on cable systems that by their nature are subject to some leakage, and (2) amateur stations are located in and operate from residential areas, often next door to, or within the same dwelling as, cable subscribers. "Cable companies do not use the frequencies of any other radio service which is subject to such close geographic proximity," the League said.

While the League acknowledges that the present rules require cable operators to eliminate interference to authorized radio stations, it points out that no rule addresses the problem of interference suffered by cable TV subscribers when poorly shielded "cable-drops" are unable to reject amateur signals. "The amateurs in those situations are blamed and often sued in local courts for 'creating' interference which is not their fault and over which they have no control," ARRL said. It adds that though the present rules, if enforced, would attenuate the increasing volume of interference complaints, budget constraints and the sheer volume of interference cases outpace the Commission's resources to combat the problem effectively on a case-by-case basis.

The League cites as an example, the case in Lompoc, California, where amateur repeater WB6QEV/RPT operating on 145.11 MHz is unusable because of sidebands from cable channel E radiating from the local cable system. "Worse," the ARRL said, "low-powered amateur transmissions, even from hand-held transceivers in that area, destroy channel E cable reception for several city blocks . . . . If thousands of cable subscribers receive interference from a few hundred amateurs, it is easy to see which group is likely to be found responsible by local courts, unschooled in the area of radio frequency interference, to which such complaints are routinely referred."

The League also noted amateurs' experimentation with weak-signal work, and said "even if the cable leakage problem was of a lesser magnitude than it presently is, amateurs would still be inhibited in fulfilling one of the fundamental purposes of the Amateur Radio Service — to continue to contribute to the advancement of the radio art."

The petition summarizes the League's remarks, and reiterates its request for amendment of Part 76 of the Commission's rules to preclude cable television operation at amateur frequencies at an early date.

League Opposes Leakage Increase

In another cable matter, the League filed comments opposing an FCC proposal in Docket 21006 to increase permissible cable leakage levels. Specifically, the Commission, based on a recommendation of its cable leakage advisory committee, proposes to change the present maximum leakage level of 20 microvolts per meter measured at a distance of 10 feet from the cable at frequencies of 54-216 MHz to 100 microvolts per meter measured at the same distance from the cable at the same frequencies. The League calls the action "highly anomalous" and says that the proposal was made "without due regard to the unique *de facto* incompatibility of cable mid-band operation and amateur vhf operation." Further, "the Committee's recommendation constitutes acceptance of poor engineering practices of the cable industry, and encourages expansion of an existing problem."

ARRL cites much of the supporting arguments contained in its petition summarized above, and says that the "solution lies in providing a fundamental, mandatory incentive for cable industry members to bring their systems up to par in accordance with state-of-the-art engineering practices . . . . The solution is at hand, however, by maintenance and exercise of the base-level power of the Commission to terminate cable system operation should harmful interference occur." The League calls for the Commission's exercise of this responsibility, and requests that maximum cable leakage levels not be increased and that FCC examine the unique interrelationship between cable television and Amateur Radio. — *Richard Palm, K1CE*

ARRL ELECTION RESULTS: GREAT LAKES AND PACIFIC DIRECTORS REELECTED

Owing to problems with the candidate statements accompanying Director ballots mailed last fall to ARRL members in the Great Lakes and Pacific Divisions, the ARRL Executive Committee directed Headquarters to reballot in those divisions. The Committee of Tellers met January 20 and have declared Leonard M. Nathanson, W8RC, elected as Director of the Great Lakes Division and William J. Stevens, W6ZM, elected as Director of the Pacific Division.

Director Stevens returns to the Board for a third term, having defeated Michael W. Delich, WA6PYN, by a vote of 2050 to 1246. Bill is a retired electronics instructor and has been a licensed radio amateur since 1934. He has held numerous offices in the Santa Clara ARA, and is a member of the Northern California DX Club and 10-10 International. A Life Member of ARRL and QCWA, Bill is on the DXCC Honor Roll and holds other operating awards such as WAZ and WAC.

Leonard M. Nathanson, W8RC, defeated challenger Joseph E. Miller, K4DZM by a vote of 3221 to 1777. Len returns to the Board for his second term. He is an attorney admitted to the Bar of the State of Michigan, and is a former electrical engineer. Len was first licensed as a radio amateur in 1948, and his present interests include traffic handling, DXing, contesting and RTTY. In 1974 and 1977, Len was a winner in the ARRL SS Contest. His associations in local activities include his having held offices in the Detroit ARA, Oak Park ARC, Park ARC, Army MARS, QMN Net, Radar Repeater Club and the Detroit Area Amateur Radio Council. He is a Life Member of ARRL and QCWA.

ARRL FILES COMMENTS IN DIGITAL PROCEEDING

ARRL has filed comments in a Notice of Proposed Rulemaking (NPRM) in PR Docket 81-699, which deals with the possible liberalization of the amateur rules to permit packet-switching protocols, correspondence and other forms of high-level codes on frequencies above 50 MHz. The League earlier petitioned the

*Deputy Manager, Membership Services, ARRL

FCC to permit the use of new and experimental digital processes by radio amateurs. (See December 1981 *QST*, page 72.)

The League's 6-page filing expressed its thanks to the Commission for recognizing these excellent opportunities for radio amateurs to continue to fulfill one of their primary obligations: the continuation and extension of the amateur's proven ability to contribute to the advancement of the radio art. The League generally shares the Commission's reservations about any reduction in the Commission's and the amateur community's ability to monitor coded transmissions in order to enforce the rules; however, it believes a combination of several factors should be sufficient to minimize the potential for abuse. First, the primarily local nature of communications on the vhf and uhf frequencies involved should limit the potential ability of unscrupulous business users to transmit data on the amateur frequencies. Second, the vigor with which amateurs protect their allocated frequency bands against intruders, well-established direction-finding techniques, and the requirement of open identification will result in effective self-policing of the amateur bands. And finally, the provisions of proposed Rule Section 97.69(c)(3) will permit the Commission to take immediate action against a station suspected of unlawful misuse of the amateur bands via unspecified digital codes.

A proposed rule would permit an FCC engineer-in-charge to require individual amateur stations to maintain records convertible to "plain language" of all coded transmissions sent and received. ARRL is concerned with the practicality of compliance. Conversion of a digitized image or voice transmission or the contents of a computer memory into plain language may be difficult because of the sheer volume of data that would have to be recorded and retained. This amounts to a requirement that a verbatim transcript of coded transmissions be maintained. The League hopes the Commission Field Operations Bureau personnel will interpret such restrictions in reasonable terms.

The NPRM does not address the potential use of modulation schemes other than on-off keying and mark-space frequency-shift keyed emissions. One example of other modulation schemes of interest to amateurs is the use of four distinct tones permitting the transmission of data at an information rate (bits per second) that is twice the signaling rate (baud). ARRL asks that the Commission *not* prohibit the use of these different modulation schemes, provided that bandwidth limitations and other incidental requirements are met.

The NPRM also proposed to replace the term "baud" with the term "bits per second." Widespread confusion exists with respect to the use of these terms, and it is important to distinguish between the two. The term "baud" refers to a signaling rate, the inverse of the unit-pulse time. "Bits per second" refers to information transfer. The data rate in bits per second does not have to equal the baud rate of the transmission. Thus, a limit specified in bits per second does not necessarily limit bandwidth. Furthermore, ARRL is concerned that, by changing the wording of the rules from baud to bits per second, the Commission is closing off a prime area of legitimate technical interest and experimentation by amateurs — the search for more efficient methods of transmitting data at high speed within existing bandwidth restrictions. The League's comments ask that the Commission reexamine the proposed change in light of this concern.

The FCC's NPRM also expressed concern that any international communications using unspecified digital codes may violate the "plain language" requirement of Article 41 of the regulations of the International Telecommunication Union (ITU). The proposal therefore specifically limits the use of such digital codes to domestic communications. The League points out that there is at present a great deal of interest in linking packet repeaters between Canada and the United States. It suggests that final rules for additional digital codes provide that, should the governments of, for example, Canada and the United States specifically agree, vhf or uhf digital communications across national borders be permitted.

The League ended its comments by urging the FCC to act soon on the proposal. It also acknowledges with appreciation the helpful assistance of Ed Kalin, K1RT, and Robert Parnass, AJ9S, in the preparation of these comments.

ARRL SUPPORTS CHANGE IN REPEATER POWER RULES

ARRL has filed comments in response to the Notice of Proposed Rulemaking (NPRM) in PR Docket 81-697 in support of raising the maximum effective radiated power (erp) limits for repeaters operating on the 6-meter band and reducing the maximum erp allowed for repeaters on the 10-meter band. As to the first proposal, to increase maximum erp limits on frequencies between 52 and 54 MHz, the League is supportive without reservation. Its comments make the point that the new rule will allow amateurs more reliable communications capabilities on the 6-meter band.

Table 1

PR Docket 81-697 would establish the following effective radiated power limits for stations in repeater operation on the 29.5-MHz and 52.0-MHz bands. Erp limits presently in effect for the other repeater subbands would not be affected.

Antenna height above average terrain in meters	
Below 32 (105 ft)	800 watts
32-160 (105-525 ft)	400 watts
160-320 (525-1050 ft)	200 watts
Above 320 (1050 ft)	100 watts

As to the second proposal, to limit the erp of repeater operation between 29.5 and 29.7 MHz, the League is supportive, but with some reservation. In imposing limitations where none previously existed, the Commission cites as a basis the benefit of such limitations on other bands in preventing interference. The Commission does not set forth a present, existing need for the extension of the limitation to the 29-MHz band. Nonetheless, there is no dispute as to the *potential* for cochannel interference in that band, and the League is unaware of any objection to this proposal having been raised by its members.

FAX AND TV PERMITTED IN ADDITIONAL FREQUENCY BANDS

Effective February 22, 1982, radio amateurs will be permitted to use facsimile (emission types A4 and F4) and television (emission types A5 and F5) transmissions on additional amateur frequencies. The Report and Order in PR Docket 80-252 makes these emissions legal on the following amateur frequencies: 3775-4000 kHz, 7150-7300 kHz, 14,200-14,350 kHz, 21,250-21,450 kHz, 28,500-29,700 kHz, 50.1-54.0 MHz, 144.1-148.0 MHz and all amateur frequencies above 220 MHz.

The Report and Order also establishes some limitations on the use of these emissions on frequencies below 225 MHz. Sections 97.65 (d), (e) and (f) have been amended to read as follows:

(d) On frequencies below 50 MHz, the bandwidth of A4, A5, F4 and F5 emissions shall not exceed that of an A3 single sideband emission.

(e) On frequencies between 50 MHz and 225 MHz:

(1) The bandwidth of A4 and A5 single sideband emissions shall not exceed the bandwidth of an A3 single sideband emission.

(2) The bandwidth of A4 and A5 double sideband emissions shall not exceed the bandwidth of an A3 double sideband emission.

(3) F4 and F5 emissions shall utilize a peak carrier deviation no greater than 5 kHz and a maximum modulating frequency no greater than 3 kHz or, alternatively, shall occupy a bandwidth no greater than 20 kHz. (For this purpose the bandwidth is defined as the width of the frequency band, outside of which the mean power of any emission is attenuated by at least 26 decibels below the mean power level of the total emission. A 3 kHz sampling bandwidth is used by the FCC in making this determination.)

(f) Below 225 MHz, an A3 emission may be used simultaneously with an A4 or A5 emission on the same carrier frequency, provided that the total bandwidth does not exceed that of an A3 double sideband emission.

STAFF NOTES

Stu Leland, W1JEC, Retires

We are proud to salute a fine gentleman, Stu Leland, W1JEC, on his retirement from the ARRL Headquarters staff. A highly competent Technical Department staffer, Stu is a good friend to many, not only at Hq., but also throughout the League membership, where he was well known for his thorough, personal treatment of members' requests. Stu conducted the *QST* "Hints and Kinks" column, and edited the League's book of the same name and *QST* technical articles.

An active ham, Stu has been a cornerpost on the 160-meter band for many years, and still "resides" on top band for a major part of his Amateur Radio operations. Now that he is retired, Stu has more time to devote to the airwaves — and to gardening, his favorite pastimes. He first arrived at Newington in November 1976, and served the League for five years as Assistant Technical Editor until his retirement this past December. Stu's friendly

nature was exemplified by his providing a fresh supply of donuts for other "tech" staffers. We'll all miss his calm and gentlemanly nature and professional competence. This writer will fondly remember the late Friday afternoon visits of Stu Leland, java dispenser in hand, to freshen up the coffee mug and wish a good weekend respite. Good luck, Stu — from the entire ARRL Hq. gang. — *R. K. Palm, K1CE*

FCC AMATEUR EXAMINATION SCHEDULE

[Editor's Note: According to the FCC, this schedule is subject to change. For applicants who must travel a substantial distance to take an examination, we *especially* advise that they call the FCC field office to confirm the schedule.]

The schedule in the accompanying table indicates how frequently the examinations are given at the FCC field offices. If an appointment is not necessary, you may appear at the time indicated by this schedule. An appointment is necessary when specifically indicated in this schedule, if you are blind, or if you are part of a group of 10 or more.

Exam Schedule

Examinations are not conducted on Saturday, Sunday and legal holidays.

ALASKA, Anchorage 1011 East Tudor Rd., Rm. 240 Anchorage 99510 Phone: 907-276-7455	At least twice monthly. Call or write for an appointment. Do this at least two weeks in advance.
CALIFORNIA, San Diego 7840 El Cajon Blvd., Rm. 405 Le Mesa 92041 Phone: 714-293-5478	At least twice monthly. Call or write for an appointment. Do this at least two weeks in advance.
CALIFORNIA, Long Beach 3711 Long Beach Blvd., Rm. 501 Long Beach 90807-3393 Phone: 213-426-4451	Requiring code — Wednesday, 8 A.M. and again at 12 noon. Not requiring code — Tuesday, Wednesday and Thursday, 8 A.M. to 2 P.M.
CALIFORNIA, San Francisco 423 Customhouse 555 Battery St. San Francisco 94111 Phone: 451-556-7701	Requiring code — Wednesday, 8:30 A.M., 10:30 A.M. and 12:30 P.M. Not requiring code — Wednesday, 1 P.M.
COLORADO, Denver 12477 West Cedar Dr. Denver 80228 Phone: 303-234-6977	2nd & 4th Wednesday of each month. Requiring code — 9 A.M. Not requiring code — 10 A.M.
FLORIDA, Miami 919 Federal Bldg. 51 SW First Ave. Miami 33130 Phone: 305-350-5542	Requiring code — Thursday, 9:30 A.M. Not requiring code — Tuesday, 9 A.M. to 12 noon Thursday, 10:30 A.M. to 12 noon.
FLORIDA, Tampa Interstate Bldg. Rm. 601 1211 N. Westshore Blvd. Tampa 33607 Phone: 813-228-2872	At least twice monthly. Call or write for an appointment. Do this at least two weeks in advance.
GEORGIA, Atlanta Rm. 440, Massell Bldg. 1365 Peachtree St. NE Atlanta 30309 Phone: 404-881-3084	Requiring code — Tuesday, 8:30 A.M. Not requiring code — Tuesday, 9 A.M. to 12 noon.
HAWAII, Honolulu 7304 Prince Kuhio Fed. Bldg. 300 Ala Moana Blvd. P.O. Box 50023 Honolulu 96850 Phone: 808-546-5640	Requiring code — Wednesday, 8:30 A.M. Not requiring code — Wednesday, 1 P.M.
ILLINOIS, Chicago 3940 Fed. Bldg. 230 S. Dearborn St. Chicago 60604 Phone: 312-353-0195	Tuesday and Friday — 9 A.M. to 1 P.M.
LOUISIANA, New Orleans 1009 F. Edward Hebert Fed. Bldg. 600 South St. New Orleans 70130 Phone: 504-589-2095	Requiring code — 1st and 3rd Tuesday of each month, 8 A.M. Not requiring code — 1st & 3rd Tuesday & Wednesday of each month, 9 A.M. to 12 noon.
MARYLAND, Baltimore George M. Fallon Fed. Bldg. Rm. 1017 31 Hopkins Plaza Baltimore 21201 Phone: 301-962-2728	Requiring code — Monday 8:30 A.M. Not requiring code — Monday, 8:30 A.M. to 12 noon.
MASSACHUSETTS, Boston 1600 Customhouse 165 State St. Boston 02109 Phone: 617-223-6609	By appointment only. Applications for examinations must be received no later than one week prior to the desired date of examination.

Examinations at Other Locations

The FCC also travels to designated examination points in cities that do not have a conveniently located FCC office. The following schedule lists the cities by state. The month in which the examination will be given is in parentheses, and the FCC field office administering the examination is in brackets. It is necessary to make an appointment with the FCC field office that gives the examinations. To make an appointment, mail your application to the field office at least two weeks before the beginning of the month in which the examinations are given. The FCC field office will notify you when and where to appear for the examination. ALABAMA: Birmingham (Feb.) [Atlanta], Mobile (Jan., Jul.) [New Orleans], Montgomery (Aug.) [Atlanta]. ALASKA [Anchorage]: Fairbanks (Apr., Oct.), Juneau (May), Ketchikan (May). ARIZONA [Long Beach]: Phoenix (Apr., Jul., Oct.), Tucson (Apr., Oct.). ARKANSAS [New Orleans]: Little Rock (Mar., Oct.). CALIFORNIA [San Francisco]: Fresno (May, Nov.). CONNECTICUT [Boston]: Hartford, (Apr., Oct.). FLORIDA [Atlanta]: Jacksonville, (Jul.). GEORGIA [Atlanta]: Albany (Sep.), Savannah (Jan.). GUAM [Honolulu]: Agana (will advise). HAWAII [Honolulu]: Hilo (May). IDAHO [Portland]: Boise (Apr.), Pocatello (Jun.). ILLINOIS [Chicago]: Rock Island (Nov.). INDIANA [Chicago]: Fort Wayne (Feb., Aug.), Indianapolis (Jan., May, Sep.). IOWA [Kansas City]: Des Moines (Mar., Sep.). KANSAS [Kansas City]: Wichita (Apr.). KENTUCKY [Chicago]: Louisville (Apr., Oct.). Maine [Boston]: Bangor (Nov.), Portland (May). MICHIGAN: Grand Rapids (Mar., Nov.) [Detroit], Marquette (Mar.) [St. Paul]. MINNESOTA [St. Paul]: Duluth (Apr.). MISSISSIPPI [New Orleans]: Jackson (Jun.). MISSOURI [Kansas City]: St. Louis (Feb., Oct.). MONTANA [Seattle]: Billings (Sep.), Helena (Apr.). NEBRASKA [Kansas City]: Omaha (Jan., Jul.). NEVADA: Las Vegas (Jul.) [Long Beach], Reno (Oct.) [San Francisco]. NEW MEXICO [Denver]: Albuquerque (May, Oct.). NEW YORK: Albany (Jun., Dec.) [New York], Syracuse (Mar., Sep.) [Buffalo]. NORTH CAROLINA [Norfolk]: Charlotte (Aug.) Greensboro (Mar., Jun., Sep., Dec.), Wilmington (May). NORTH DAKOTA [St. Paul]: Bismarck (Sep.), Fargo (Jun.). OHIO [Detroit]: Cincinnati (Feb., Jun., Oct.), Cleveland (Apr. Aug., Dec.), Columbus (Jan., Sep.). OKLAHOMA [Dallas]: Oklahoma City (May, Oct.), Tulsa (Feb., Aug.). OREGON [Portland]: Medford (May). PENNSYLVANIA [Philadelphia]: Pittsburgh (Jan., Apr., Jul., Oct.), Wilkesbarre (Mar.). SOUTH CAROLINA [Atlanta]: Columbia (May). SOUTH DAKOTA: Rapid City (Apr.) [Denver], Sioux Falls (Feb.) [St. Paul]. TEXAS: Austin (Jan.) [Houston], Corpus Christi (Jun., Dec.) [Houston], El Paso (Sep.) [Dallas], Lubbock (Apr.) [Dallas], San Antonio (Mar., Sep.) [Houston]. TENNESSEE [Atlanta]: Chattanooga (Apr.), Knoxville (Jan., Jun.), Memphis (Jun., Dec.), Nashville (Mar., Sep.). UTAH [San Francisco]: Salt Lake City (Jun., Dec.). VERMONT [Boston]: Burlington (Feb.). VIRGINIA [Norfolk]: Roanoke (Oct.). WASHINGTON [Seattle]: Spokane (May, Nov.), Tri-Cities (Mar.). WEST VIRGINIA

MICHIGAN, Detroit 1045 Fed. Bldg. 231 W. Lafayette St. Detroit 48226 Phone: 313-226-6078	1st, 2nd and 3rd Wednesday and Friday of each month. Requiring code, 9 A.M. Not requiring code, 9 A.M. to 1 P.M.
MINNESOTA, St. Paul 691 Fed. Bldg. 316 N. Robert St. St. Paul 55101 Phone: 612-725-7810	3rd and 4th Friday of each month, 9 A.M.
MISSOURI, Kansas City Brywood Office Tower Rm. 320 8800 East 63rd St. Kansas City 64133 Phone: 816-926-5111	1st & 3rd Tuesday of each month. Requiring code — 20 wpm — 10 A.M., 13 wpm — 11 A.M. 5 wpm — 11:30 A.M. Not requiring code — 8:30 A.M.
NEW YORK, Buffalo 1307 Federal Bldg. 111 W. Huron St. Buffalo 14202 Phone: 716-846-4511	Requiring code — Friday, 9 A.M. Not requiring code — Friday, 10 A.M.
NEW YORK, New York 201 Varick St. New York 10014 Phone: 212-620-3437	Wednesday — Extra class, 9 A.M. General/Advanced class, 10 A.M. Technician class, 12 noon.
OREGON, Portland 1782 Fed. Office Bldg. 1220 SW 3rd Ave. Portland 97204 Phone: 503-221-4114	At least twice monthly. Call or write for an appointment. Do this at least two weeks in advance.
PENNSYLVANIA, Philadelphia 1 Oxford Valley Office Bldg. 2300 E. Lincoln Hgwy. Rm. 404 Langhorne 19047 Phone: 215-752-1324	Requiring code — Tuesday, 9 A.M. Not requiring code — Tuesday and Wednesday 10 A.M. to 12 noon.
PUERTO RICO, San Juan Fed. Bldg. & Courthouse Rm. 747, Avenida Carlos Chardon Hato Rey 00918 Phone: 809-753-4567	Requiring code — Wednesday, 10 A.M. Not requiring code — Wednesday and Thursday, 8:30 A.M.
TEXAS, Dallas Earle Cabell Fed. Bldg. Rm. 13E7 1100 Commerce St. Dallas 75242 Phone: 214-767-0761	1st & 3rd Tuesday of each month. Requiring code — 20 wpm — 8:30 A.M., 13 wpm — 9 A.M., 5 wpm — 9:30 A.M. Not requiring code — 8:30 to 12 noon.
TEXAS, Houston 5636 Fed. Bldg. 515 Rusk Ave. Houston 77002 Phone: 713-226-5624	2nd & 4th Wednesday of each month. Requiring code — 20 wpm — 8:30 A.M., 13 wpm — 9 A.M., 5 wpm — 9:30 A.M. Not requiring code — 10 A.M. to 11:30 A.M.
VIRGINIA, Norfolk Military Circle 870 North Military Highway Norfolk 23502 Phone: 804-441-6472	Requiring code — Thursday, 9 A.M. Not requiring code — Thursday, 10 A.M.
WASHINGTON, Seattle 3256 Fed. Bldg. 915 Second Ave. Seattle 98174 Phone: 206-442-7653	At least twice monthly. Call or write for an appointment. Do this at least two weeks in advance.

[Baltimore]: Charleston (Apr., Aug., Dec.). WISCONSIN [Chicago]: Milwaukee (Jun., Dec.).

K4MME, W1GM — FCC TAKES FURTHER DISCIPLINARY ACTION

The FCC has issued an Order of Revocation and Suspension dated January 28, 1982, in the matter of malicious interference to net operations on 14.313 MHz caused by Leonard R. Boucher, K4MME, of Florida, and Gerard J. Morin, W1GM, of Maine. The chief of the FCC Private Radio Bureau, James C. McKinney, has ordered that the license for Amateur Radio Station K4MME be revoked effective January 28, 1982, and that the previous order suspending Mr. Boucher's Amateur Extra Class operator be affirmed. Mr. Boucher was given 15 days from the issuance of the order to forward his license to the Commission. Further, the chief of the Private Radio Bureau ordered that the Amateur Extra Class operator license of Gerard J. Morin be suspended for one year. Mr. Morin also had 15 days from the date of the Order to forward his license to the FCC. Additionally, Mr. Morin's license is modified for the remainder of the license term to prohibit radio operation between the frequencies 14.295 and 14.330 MHz.

The Order cites a "split-frequency scheme" that Boucher and Morin entered into that was designed to deliberately and maliciously interfere with radio nets operating on 14.313 MHz. According to the Order, one would shift his transmitter to the upper sideband mode at a frequency adjacent and below that of the net. The other would shift to lower sideband on a frequency adjacent and above the net. The result was a boxing in of radio operators using the frequency in between. The Commission issued Morin a Notice of Violation on February 26, 1981, alleging malicious interference, and Boucher received a similar Notice on March 2, 1981.

According to the latest Order, "Boucher has maintained a cavalier attitude throughout this entire proceeding. He persisted in boxing in the net operators and interfering with their transmissions even after receiving a Notice of Violation. He has consistently claimed that his actions were nothing more than proper retaliation for aggravation by persons participating on the net frequencies." The Order also stated that "Boucher's claim that their split-frequency operation was a remedy for interference is truly cosmetic. Having the broadest amateur privileges available in the United States they [Boucher and Morin] could have easily shifted frequencies . . . . They used no self-restraint on their own operations to avoid interference."

The Commission's Order does not deal with Morin as severely as it does with Boucher because it found no evidence that Morin attempted to persuade others to interfere. According to the Order, Morin is 74 years old and is confined to his home because of the constant care required by his wife's poor health. He was misled and his intentions were misguided, but there is no public benefit to be gained by the revocation of his license.

The Order is not final until 30 days following the receipt of Order by Boucher and Morin, so both radio amateurs have an option of filing a petition for reconsideration with the chief of the Private Radio Bureau or for a review by the Commission. Therefore, the determinations as reported in the Order are subject to modification or reversal. *QST* will report further developments.

TWENTIETH ANNIVERSARY AMATEUR SATELLITE FUND DRIVE

The ARRL Foundation continues to receive outstanding support from members of the amateur community responding to the call for support of the amateur space program. With a scheduled launch of the Phase III-B spacecraft later this year, now is the time to make your contribution to the ARRL Foundation, and for you to play your role in tomorrow's telecommunications world today! Mail your check to the ARRL Foundation Amateur Satellite Program, 225 Main St., Newington, CT 06111. Recent contributors of $100 or more include: George A. Morris, W6ABW; Leo Scott, W3DQI; Joseph Mullen, W1ASI; Richard Wilson, K6LRN; Peter Cracchiola, KA0IQR; and the Louisville Radio Club. — *Richard Palm, K1CE, Assistant Secretary, ARRL Foundation*

Correspondence

Conducted By Bruce R. Kampe,* WA1POI

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

THE MISSING LINKS

☐ It really gets me steaming when I read in the Correspondence portion of *QST* about how all of the problems that exist in the amateur bands are caused by operators who got their start in the citizen's band. All the letters usually start something like this: "I've been a ham for 30 years and I think. . ."

I am referring specifically to the Correspondence from WØZPM in January 1982 *QST*. I get the impression that he thinks because he's been a ham for 30 years he should have 30 times the amount of say-so about matters than the operators who have only been licensed for a year or so. I will agree that CB radio has graduated a few bad apples to the Amateur Radio spectrum. But I don't think it's fair to hang a label on all Amateur Radio operators who get their start in the citizen's band. There have been many instances in which I have listened to groups of old-timers display the same lack of courtesy and good operating practice. This is especially evident in cases where an unfamiliar ham tries to join in a roundtable.

I would be willing to bet that if a form of CB radio had been around "way back then" many of those "30 year men" might have developed their interest in radio the same way.

I still venture back to the citizen's band now and then to talk to old friends. Believe me, the old-time CBers are complaining about their air ways just as hams are.

We live in a technological society. The more advances we make, the more interest we are going to attract — good and bad. If you have a gripe about a bad operator or two, point your finger at them individually. Don't label them as a group of amateurs who happened to start out in the 27-MHz citizen's band. — *Jeffrey A. Smith, KA8NNA, Ada, Ohio.*

☐ In response to a comment in the January *QST* by WØZPM, I would strongly urge Mr. Christensen to reevaluate *his* definition of Amateur Radio. "Amateur," as defined by *The American Heritage Dictionary* is: (1) "One who engages in an activity as a pastime rather than as a profession. (2) One lacking expertise."

Shame on Mr. Christensen, who claims to be an amateur of 30 years. Why should the ranks of Amateur Radio be held by "model operators" only?

The next time you make a consistent error with your new rig on the air which makes you look like an "amateur," I hope someone else won't be so quick as to condemn, but assist and teach you!

P.S.: I am a CBer, a ham and a radio control enthusiast, and I am proud of each license. — *David A. Svatik, N9CMD, Chicago, Illinois*

☐ I was somewhat astounded by Mr. Christensen's letter. It would seem to me that if Mr. Christensen has complaints about poor operators he should work with these people and tell them the error of their ways. That is, if they are committing poor on-the-air practices. Perhaps he is perceiving what he wants to perceive. I have often found myself receptive to constructive criticism. It is much easier to work on a constructive basis than by attempting to stir up unwarranted trouble. Mr. Christensen suggested that every amateur be retested everytime he goes for his/her renewal. The implications of that thought are so far-reaching that I find it difficult to believe that the suggestion was made. The manpower alone and the paper work would fill a library. How about an extra class licensee that does not pass the code? Does he become an Advanced, a General or a Novice? I truly do not believe Mr. Christensen gave his letter that much thought before writing it. — *Tim Patton, N2DBT, Skaneateles, New York*

☐ I am quite new to Amateur Radio, so new that I am not yet licensed, just "working on it."

Two recent occurrences have made me wonder just what goes on in the thinking processes of certain hams. The first happened when I visited my first hamfest. As I was getting out of my car, which has a very noticeable center-of-roof mount CB antenna, I overheard — and was meant to overhear — a very caustic remark to the effect that "Oh God, not another (bleep) CB'er," followed by some lower level mumblings about the ancestry of those who stoop to use CB radio.

And now in the middle column of page 66 of January 82 *QST* I read somewhat the same theme in the letter from Bob Christensen.

I am not going to defend CB. In fact I detest most of it, and may not have much use for it at all once I can move to the amateur ranks. But it undoubtedly has served to get me interested in ham radio, and I'm sure this is true of many others as well. Judging by the bar graph on page 84 of the same issue, you folks in ham radio seem to be going away in droves.

Thus, the two unpleasantries I have experienced will have to be overlooked, because I'm still interested. Of course I should mention that in other personal contacts I've gotten nothing but friendly encouragement from established hams, none of this "go away and leave us old-timers alone" attitude. I hope that I have had the bad fortune to find most of the bad apples in the barrel right away, because I wouldn't like to think that I am, by becoming a ham, forcing myself upon a select group who will give me the cold shoulder. I do not expect that to be the case, but I have had a few doubts at times.

Incidentally, I strongly support the code requirement. Don't *ever* let that get watered down one bit, or you will let Amateur Radio become the zoo that CB has already degenerated to. (Gosh, I almost sound like one of those "old-timers," don't I?) — *David H. Hamley, Bell Vernon, Pennsylvania*

☐ There can't be much doubt that WØZPM's view of Amateur Radio is essentially correct. But while I don't believe the ARRL is at fault, I think it should be more actively concerned about what I perceive is the number one problem of lawlessness on the bands. But why our defensive behavior towards the FCC? Implicit in the FCC's charter is that the Commission is not only here to oversee the licensing procedure, but also to protect our frequencies, and it is our right to demand protection against any element that actually threatens our very existence. Amateurs can't police the bands alone.

The FCC claims it hasn't the funds it needs to function. But in truth there is no legitimate reason other than political why legislation cannot be passed to ensure that monies earmarked for regulatory agencies such as FCC cannot be funneled directly into their hands (rather than handed out from the nation's General Accounting Office) so that the Commission can do its job. A return to the type of exams that existed before November 22, 1967 (the initiation of FCC/ARRL's "Incentive Licensing" program, when exams actually became *less* stringent) would also be in order. I get the feeling, though, that the FCC doesn't care about us, don't you?

As I see it, the FCC has a responsibility to me and all amateurs to preserve Amateur Radio, and we must see to it that the FCC does not shirk its duty. It's as simple as that. *It's time for us to face the fact that we are heading for big trouble, especially from an international standpoint.* The recent happening in Florida, the Attorney General's inaction and the Region 1 protest to the U.S. might serve to illustrate my point. — *Vincent Biancomano, WB2EZG, Staten Island, NY*

[Editors Note: See "ITU Lodges Complaint Against U.S.," "Happenings," October 1981 QST, page 58.]

☐ In January *QST*, KF1Y deplores the gradual decline in the size of our ranks, and the concomitant downward trend of license exams conducted by FCC. The picture is described as "grim," and is attributed in part to the passing of the CB boom.

The emphasis on growth-at-any-cost of the past decade or so has always puzzled me. Somehow, it has always seemed that Amateur Radio and ARRL membership were attractive enough without any aggressive recruiting. Many organizations have also learned that "recruited" members often are not especially strong contributors to whatever cause is involved.

The CB boom is, indeed, over — and that is good. Rarely in this country have we seen a greater display of callous disregard for law and authority. The inability of the FCC to police the CB ranks contributed to the now obvious decline in the quality of Amateur Radio. The crude, profane tactics practiced regularly on CB frequencies inevitably found their way into our amateur bands. It may be argued, by some, that it would have happened anyway. But, as discussed by WØZPM in the same issue of *QST*, who can doubt that the CB influence has been a factor?

Rather than striving for quantity, we should

*Membership Services Assistant, ARRL

be striving for quality. Strength in numbers may make some sense politically, but what of the political strengths of respect and credibility? Have these virtues become suddenly worthless? I think not.

Weep not over the loss of numbers for the sake of numbers. Rather, let us look forward with optimism that perhaps this may contribute to improvement of the breed. CB had lots of very big numbers in its heyday, but look at it now. And look at its trend.

What we need is more WØZPMs, and fewer of the types he describes. — *William R. Gary, K8CSG/8, Houston, Texas*

☐ I am in hearty agreement with the thoughts expressed by Jim Buntain, W6VYM, and Bob Christensen, WØZPM, in the January 1982 *QST* about operators with poor fists. As an old-time brass pounder, (first commercial license in 1920) I had to pass a sending test as well as receiving. But then there were far fewer applicants in those days and the Radio Service of the Department of Commerce examined them in a more-or-less leisurely manner and did not use today's multiple-choice papers.

I am appalled by the QSD (mutilated) sending that I hear. Those people might just as well not bother since their communications are not legible and make no sense. It occurs to me that perhaps nowadays the FCC no longer has the time or the personnel to examine applicants for their competence in sending:

> The code test required of an applicant for an Amateur Radio license, in accordance with the provisions in 97.21 and 97.23 (1975), shall determine the applicant's ability to *transmit by hand key* . . . and to receive by ear.

I don't know when this sending requirement was dropped. It was an unhappy day.

Let's clean up our act, fellows! — *Fred Rosebury, KA1GEN, Natick, Massachusetts*

[Editor's Note: The sending test in Morse code was eliminated on August 18, 1977 for amateur examinations that are administered by the FCC. The Commission felt that persons who are learning the International code build their sending ability at a faster rate than their receiving ability. Experience showed that virtually everyone who passed the code receiving test was able to pass the sending test. At the time this decision was made, there had been a fivefold increase in amateur examinations over the previous three years. The elimination of the sending test was felt to help the field examination staff with the increased workload. The sending test is still a requirement for Novice examinations.]

NOT BK BK BK BK BK BK

☐ If the prosign BK were used correctly, it would be used less than .001 times as much as it is presently used. — *Dean E. Lewis, W7TC, Klamath Falls, Oregon*

KUDOS TO STU: ON TARGET

☐ All the readers of *QST* who have sought technical advice from the League owe a debt of gratitude to the services of Stu LeLand, W1JEC. Stu retired at the end of 1981 and he left a legacy of a job well done.

Stu answered every letter from members asking for information on different electronics devices and circuits. He was diligent and persistent in the pursuit of information which he could pass on to others. To me he represented the epitome of the spirit which moves ham radio.

Stu Leland wrote manufacturers and suppliers to get the necessary information for his fellow amateurs. He never blew his own horn nor sought publicity — he just did one hell of a good job in the years he was at Headquarters.

So "hat's off" to a job well done and I can say we all are better off because Stu set the example of good behavior. 73, Stu, and happy retirement. — *Joe Rice, W4RHZ, Covington, Kentucky*

[Editor's Note: Thank you Mr. Rice, for putting that so well. Stu is a modest *gentleman*, who always seems to give the credit to somebody else. We hope he's enjoying his retirement, but we wish he were still here.]

MIXED MODES

☐ Without FCC action to assign band space for cw and phone on 160 meters there will *never* be voluntary avoidance of the lower 50 kHz by the "old timer" or the "new comer" 160-meter phone operator. Phone stations operate in the so-called DX window, as well as in the 1810 to 1825 kHz region, nearly every night and even during contest periods. These operators show no concern or consideration for other operators trying to utilize the window for its intended purpose. Even if they do observe the window, phone operators try to squeeze as close to the edges of the window as possible. This causes nearly total loss of over half the window anyway because of their splatter. I suggest that the ARRL reconsider the voluntary band plan and instead press for a definite FCC assignment of a cw sub-band. I personally feel that 1800 to 1840 kHz would provide sufficient room for cw operation at the present time and would allow a sufficient buffer for the top edge of the window. — *R. A. "Dick" Church, N4ARO, Oak Ridge, Tennessee*

☐ I have just spent a fairly frustrating couple of hours attempting to have low-power cw QSOs on 160 meters. I was overjoyed with the new band plan, when it was announced in August, and anticipated with glee the eventual use of, perhaps, the bottom 50 kHz or so for cw when the entire 200 kHz of the band is deregulated. The DX window could then be from 1850 to 1870 kHz with everything above this exclusively phone.

The general lack of awareness of the new band plan makes me wonder how many hams read *QST*. I've recently noted stations coming down nearly to 1810 kHz (with consequent splatter down to 1807) and fairly general use by phone stations up to 1825 kHz. Come on, guys! You can use a kilowatt up to 1.9 MHz any time of the day or night, now. Give us semi-low-power cw stations with so-so antennas a little room to find and try to make contact with one another and still leave room for the DX types at the extreme bottom of the band. 25 kHz isn't too much to ask, since that leaves everything above the window for ssb. A lot of cw stations with any kind of filtering can make use of 25 kHz. But it doesn't take too many ssb signals among them to make life difficult for a lot of cw operators. HELP!! — *Jan H. Clute, KFØZ, Mount Vernon, Iowa*

[Editor's Note: See "Members Support 160-Meter Band Plan," January *QST*, page 51.]

"HAM" DEFINED

☐ Many times I have been asked what "ham" means or what it stands for. I honestly never know, so when asked, I only stated what I knew to be true. The word "ham" stands for: H — helping, A — all, M — mankind! — *Brian I. Oertel, WB9TPA, Kacini, Wisconsin*

WANTED: AN HONEST ANSWER

☐ Why do hams promise to QSL, and then fail to do so, having no intention to do so in the first place?

I recently got on QRP cw, with about 1 watt output, and having had such good results, I decided to try for the Worked All States award. As I contacted each new state, I asked for a QSL. Having received a promise, I sent my QSL, again explaining why I needed the amateur's card. I found that about 25 percent of stations contacted ignore the request.

It seems to me it would be preferable to give an honest answer to a request for a QSL in the first place. If an s.a.s.e. is wanted, this should be indicated. — *Theodore Van Loan, K4WQ, Bradenton, Florida*

POSITIVE FOR PUBLIC SERVICE

☐ My hat is off to Gerald Boyd for his fine article, "An Amateur's Guide to Assisting Public Safety Agencies," in January *QST*. Any ARES groups that seem to be having trouble getting public safety agencies to take them seriously should study the five points for creating a positive image. Amateurs have to be good salesmen. They must sell themselves and their services to public safety agencies even though the agencies may not be ready to buy. If their first impression of you is bad, you will have trouble getting past the front door, later on, when you have some assistance to offer.

I hope Boyd's article will become part of the EC (emergency coordinator) workbook. Follow-up articles in *QST* that cover the subject further are still needed. — *Steve Wuelfing, K8BZ, Gladwin, Michigan*

SSTV FREQS. PROPOSED

Now that amateur facsimile and television transmissions are permitted on all amateur phone frequencies between 3.5 and 29.7 MHz, it is time to consider new calling and operating frequencies for these exciting modes to help minimize the potential for interference. The rule change (by FCC action in PR Docket 80-252) has the practical effect of allowing General class and higher licensed operators to use facsimile and slow-scan television on all hf bands. Study has been underway by *A5*, the amateur television magazine, since the fall of 1980 concerning the best place to establish such operating frequencies, while avoiding interference to established phone operation. The following SSTV/FAX combined operating frequencies have been recommended by *A5* magazine:

80 meters — 3.990- 4.000 MHz
40 meters — 7.290- 7.300 MHz
20 meters — 14.340-14.350 MHz
15 meters — 21.440-21.450 MHz
10 meters — 28.990-29.000 MHz

These frequencies are by no means cast in concrete. Again, they have been proposed by *A5* to reduce possible interference to existing phone operation. Your input is hereby solicited. Please let *A5* have your comments about this proposal. Send them to Mike Stone, WBØQCD, *A5* ATV Magazine, P.O. Box H, Lowden, IA 52255.

[Editor's Note: Full details on this rule relaxation appear in "Happenings," this issue. Please send a copy of your comments to ARRL Headquarters so we will be aware of the sentiment in the amateur community concerning this proposed SSTV "gentlemen's agreement."]

Canadian NewsFronts

Conducted By Harry MacLean,* VE3GRO

The Quebec Radio Net

The Quebec Radio Net is a favorite meeting place for amateurs throughout Eastern Canada. Last year, this net celebrated its 10th anniversary. It had met every night of the week, every week of the year, at 1930 EST/EDT on 3775 kHz, since September 1971!

How did it all begin? In June 1971, Ed Gareau, VE2GA, provided some phone patches for a vacationing ham who wanted to keep in touch with a neighbour. Soon, Ed was providing similar service for many amateurs. Every night at 1930 EDT, he called on 3770 kHz, soliciting phone patch and other traffic for the Montreal West Island area. Before long, a dozen or so local amateurs joined in to share the workload and provide a constant level of service. And from there, things just grew.

Quebec Radio Net still handles traffic and arranges many, many phone patches, but its main purpose now is to bring amateurs together. It's a very popular net. Records of

Quebec Radio Net controllers meet at the VE3SH QTH to celebratethe 10th anniversary of the Quebec Radio Net. Drinking ginger ale (we hope) from left to right are: Rick, VE3HVA; Gord, VE3HTJ; Vic, VE3DEP; Ed, VE2BHX (seated); Bill, VE2BZU; Chuck, VE3JDM; Lloyd, VE2AXY; Ed, VE3SH; and Arn, VE2SD. *(VE3SH photo)*

Monday sessions for the past two years show check-ins from 603 different VE3s, 166 different VE2s, and 121 different VE1s. There are also check-ins from VO, VE4, VE5, and in winter months, from VE/W4! To recognize those who check in regularly, handle traffic, offer phone patches, or just bring amateurs together, net organizers have been selecting names of outstanding participants each year. With so many to choose from, it becomes a difficult task. Last year's winners were VE1BRX, VE3CV, VE3HRI and VE3HTG.

Lloyd McLintock, VE2AXY, is net manager and has been for several years. He is assisted by a friendly and hardworking group of controllers. Regular controllers for Quebec Radio Net are: Mondays — Ed Henderson, VE3SH; Tuesdays — Serge Robitaille, VE2BOO; Wednesdays — Ed Garnett, VE2BHX; Thursdays — Vic Cyr, VE3DEP; Fridays — Lloyd McLintock, VE2AXY; Saturdays — Arn Petch, VE2SD; and Sundays — Bill Power, VE2BZU. The net continues to meet every night, 1930-2030 EST/EDT on 3755 kHz. If you can hear it, check in. You'll receive a warm welcome on the Quebec Radio Net.

DOC NEWS

☐ DOC has announced a new reciprocal licensing agreement with Jamaica. A third-party traffic agreement with Jamaica remains in effect.

Our reliable source in Ottawa was too optimistic. At press time in mid-January, DOC had not yet released the 10.1-10.15 MHz band to Canadian amateurs. Nevertheless, there are reports of stations with VE calls operating on this band. *Please do not use the new 10-MHz band until it has been released by DOC. To do so will only discredit our amateur service.* It is now expected that DOC will release the 10.1-10.15 MHz band sometime this month.

☐ DOC has published a number of proposed regulations changes in the *Canada Gazette.* These changes have to do with permitting repeater operation above 29 MHz, slow-scan television, increased bandwidth for regular amateur television, foreign operation on the full 2-meter band, and the removal of power restrictions on 160 meters. Many of these began as submissions from CRRL and other organizations. Several are simply the "rubber stamp" on policy changes already announced by DOC. We'll have more details next month.

☐ DOC's revised *Table of Frequency Allocations* is now available from the Department of Supplies, 45 Sacre-Coeur Blvd., Hull, PQ K1A 0S7, and in selected bookstores across Canada, for $9.95.

CRRL NEWS

☐ CRRL has sent a mailing, complete with a calendar and a stamped return envelope, to 100 members across Canada. Reason? To find out when members receive *QST. QST* is mailed by the 21st of the month before the month indicated on the cover. This should be early enough, but in certain parts of Canada, *QST* is taking over five weeks to reach its destination. The information being gathered will become part of a submission to Canada Post. Hopefully, it will result in faster delivery of *QST.*

☐ Thanks and best wishes to Lloyd Jones, VE5JI. After 13 years of much-appreciated service, Lloyd has stepped down as manager of the ARRL-CRRL Saskatchewan QSL Bureau. Welcome and best wishes to new Bureau Manager Charles Zsoka, VE5AAD.

☐ It's official now! Last year, Andy McLellan, VE1ASJ, and his helpers at the CRRL Central QSL Bureau in Saint John, New Brunswick, processed 468,745 cards. They forwarded them to the 11 League-sponsored QSL bureaus across Canada, who forwarded them to *you.* The CRRL Central Bureau improves your chances of getting the cards you need by making it possible for foreign amateurs to ship Canadian cards in bulk to a single Canadian address. It's a gift of time and money from Canadian League members to all amateurs in Canada.

☐ IARU's WAC, the Worked All Continents Award, established in 1926, is still one of the most popular DX awards. It is no longer necessary for Canadian amateurs to write to the IARU office in Newington for this award. Forms are available from Garry Hammond, 5 McLaren Ave., Listowel, ON N4W 3K1. Garry is also accepting completed forms and QSLs, and is issuing the WAC award on behalf of CRRL, the IARU member-society for Canada.

☐ Bill Skidmore, VE3AUI, reports that DOC is responding well to the efforts of his CRRL-IARU Intruder Watch group. Bill is still looking for additional stations in every part of Canada. What do they listen for? Here are some recent snags: Japanese commercial stations on 3.6 and 3.6225 MHz; Albanian and Chinese broadcast stations on 7.04 and 7.08 MHz; and Vietnamese and Russian military stations on 14.08 and 21.033 MHz. All are operating in violation of international agreements — on our amateur bands. Interested in helping out? Contact Bill at RR 1, Hyde Park, ON N0M 1Z0.

CONGRATULATIONS

Congratulations to Don Welling, VE1WF, who was reelected SCM for Maritimes-Newfoundland Section. Don begins his new term next month. Congratulations to Master Corporal B. J. Amaro, who was recently honored by his superiors for his work with CFARS, the Canadian Forces Affiliated Radio System. CFARS uses military personnel and specially trained amateurs, who operate just above and below the 20-meter band, keeping Canadian servicemen in remote locations in touch with family and friends. Congratulations also to CARTG, the Canadian Amateur Radio Teletype Group, who celebrate their 15th anniversary this year. The group was originally a Centennial project of Sid Burnett, VE3GK. It started with 16 members. Today, CARTG has over 200 members. It publishes a fine monthly newsletter and sponsors the popular CARTG RTTY DX Contest in October.

AND FINALLY

Yes, that DOC van stolen in Winnipeg was recovered, but minus the equipment. If you see some great buys on $15,000 receivers or spectrum analysers at your next ham radio fleamarket, well. . . DOC would probably like to know!

CRRL President Mitch Powell, VE3OT (r), presents the CRRL Amateur of the Year Award to Bert Anderson, VE4AP, at a special dinner held for Bert in Winnipeg. Bert is 73, but one of the most active, technically up-to-date, and helpful amateurs you could find anywhere. *(VE4ADS photo)*

*163 Meridene Crescent West, London, ON N5X 1G3

International News

Conducted By Richard L. Baldwin,* W1RU

ADDITION TO IARU HQ. STAFF — JH1VRQ

Over two years ago we decided that we would like to add Nao Akiyama, JH1VRQ, to the staff of IARU Hq. Since that decision was made, we have been wrestling with the problem of obtaining the necessary visa which would permit Nao to live and work in Newington. Finally, after what seemed like reams of paper work and the helpful advice of many, many people such as "Hank" Meyer, W3ACE, and Vic Clark, W4KFC, the visa was obtained, and Nao is on his way, to join the staff at the end of March 1982.

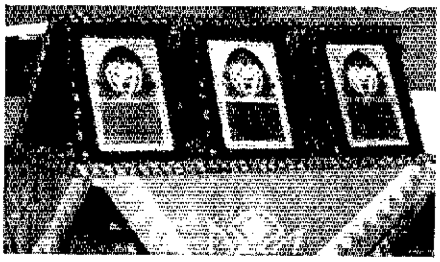
Nao brings us some valuable skills and background. He was a member of the staff of the Japan Amateur Radio League for several years and was their international liaison officer. He has taken part in a number of international meetings, and has traveled extensively. He is an enthusiastic operator and DXer. And he has considerable skills in the languages of English, Spanish and French. His presence on the staff will enable us to further expand our activities on behalf of international Amateur Radio.

SOUTH EAST ASIA NET CONVENTION

SEANET is a group of amateurs, largely in southeast Asia, who gather regularly on the air in a net operation. Their affiliation is strengthened not only by the communications services they provide each other and, for example, cruising yachtsmen, but also because of their fraternity. Each year SEANET sponsors a Southeast Asia DX contest, and each fall they sponsor a SEANET Convention somewhere in the Southeast Asia area. In 1981 the annual SEANET Convention was held on November 28-29 in the Hotel Yogyakarta, in the city of Yogyakarta, in central Java. At that convention awards were presented to the winners in the South East Asia DX Contest 1981, which was held on the weekend of August 15-16. Top score in each category included the following: (In the SeaNet Area) Single-band Single Operator cw — HS5AID; Multi-band Single-operator cw — 9V1TL; Multi-band Multi-operator cw — JA1YYE; Single-band Single-operator phone — DI1CPL; Multi-band Single-operator phone — YB2SV; Multi-band Multi-operator phone — HSØHS. (Outside the SeaNet Area) Single-band single-operator cw — WA4CPR; Multi-band Single operator cw — W3GM; Single-band Multi-operator cw — YZ4T; Single-band Single-operator phone — YU4VBR; Multi-band Single-Operator phone — YZ4HA; Multi-band Multi-operator phone — YU4EWW. The Top Scorer overall was HSØHS, station of the Radio Amateur Society of Thailand. Thanks to YB2CR for this report and the photos.

*Secretary, IARU

At the SEANET Convention in Central Java, 1981 — left to right YB2SV, 9M2MW and YB2CR.



You'd better enter the Southeast Asia DX Contest next year — look at the handsome awards!

Now we know what they mean by "elusive DX."

AMATEUR RADIO EXHIBITION IN NIGERIA

The Second National Science and Technology Fair was held over the weekend of December 5, 1981, at the Polo Field in Enugu, Nigeria. The Nigerian Amateur Radio Society set up Amateur Radio stations on hf and vhf, and had an extensive display of QSL cards and Amateur Radio literature. In addition, NARS had on display a number of the Project Goodwill transceiver kits, so that visitors to the exhibition stand could see that there were alternatives to the more expensive imported transceivers.

A view of the Amateur Radio exhibit at the booth of the Nigerian Amateur Radio Society. One of the IARU Project Goodwill kits is at the right.

NARS wishes to particularly extend its appreciation to the following U.S. clubs and individuals who, through their contributions to ARRL, made these exhibition kits available: The San Mateo Radio Club, the South Milwaukee Amateur Radio Club, the Jackson County Amateur Radio Club, the 3900 Club, the Fox River Radio League, the Five Flag Amateur Radio Association, the Bay Area Amateur Radio Club, the Central Wisconsin Radio Amateurs, the Walla Walla Valley Amateur Radio Club, the Toledo Mobile Radio Association, the Hughes Fullerton Employees Association Amateur Radio Club, the West Allis Radio Amateur Club, WB6VGA, WA9ZDL, WB9SGM and W8VWY. Thanks to 5NØOBA for this report.

SPECIAL COMMEMORATIVE PHILATELIC COVER — NEW ZEALAND

A Special Commemorative Philatelic Cover will be released in conjunction with the 56th Annual Conference of the New Zealand Association of Radio Transmitters to celebrate the 50th anniversary of the Amateur Radio Emergency Corps (AREC). AREC was formed in 1932 by the NZART when it was apparent that some form of emergency communications were necessary, as had been demonstrated by Amateur Radio stations ZL2GE and ZL2BE during the Napier earthquake in February 1931. Collectors wishing to obtain copies of these Commemorative Philatelic Covers, which have a distinctive Amateur Radio motif, may address their request, which must be received prior to April 30, 1982, to NAREC 50, P.O. Box 50, Napier, New Zealand. The fee for each cover addressed and stamped is NZ1.00 or 4 IRCs. For an additional fee of NZ1.30 or 5 IRCs the cover can be sent via surface mail enclosed in an outer envelope, and for NZ1.60 or 6 IRCs the cover can be sent via air mail enclosed in an outer envelope. The covers will be date-stamped at Napier on June 8, 1982.

Washington Mailbox

Conducted By Richard K. Palm,* K1CE

Where Do the Rules Come From?

Most amateurs know that the Federal Communications Commission is the Government agency charged by Congress with the task of regulating the telecommunication services in the U.S. And, most are familiar with its rules. Less familiar, however, is the process by which the Commission makes these rules. Are they simply handed down to us, period? Do we simply drift along with the regulatory current? The answer is a resounding no; amateurs, and any interested parties, have a right, thanks to Congress, to participate in the rulemaking procedure. We can have a profound effect on what rules should be added, dropped or modified. With Amateur Radio the dynamic service it is, it's important that we promote awareness of the Commission's processes as an important step away from stagnation.

This discussion was prepared as a plain-language guide to the amateur rulemaking process by former ARRL General Counsel Bob Booth, W3PS.

The Administrative Procedure Act

The population growth and the social and technological advances in the United States, particularly since World War I, brought about ever-increasing demands for government services. Examples include the development and growth of aviation, radio communication, and medical services and products. Recognizing that it had neither the facilities, time nor expertise to administer and regulate such diverse fields and activities, the Congress of the United States established an ever-increasing number of administrative agencies. Certain duties, powers and enforcement tools were delegated to each agency.

It was not long before the rules, regulations and policies of the agencies acquired the force and effect of laws just as though enacted by Congress. Persons affected by the rules and the Courts expressed ever-increasing concern over the manner by which the rules were adopted, amended and enforced. Finally, in 1946, Congress enacted the Administrative Procedure Act (Title 5, U.S. Code, Sections 551, *et seq.*) setting forth the procedures to be followed by all administrative agencies in adopting and amending their rules. The Act also sets forth the procedures to be followed in adjudicatory hearings.

Insofar as rule making is concerned, the essential provisions of the Act are (1) public notice of the proposal and (2) the right of interested parties to comment. Certain rules, primarily those relating to agency organization and internal operation, are not subject to the notice and comment procedure. Prior notice need not be given if the agency for good cause finds that notice and comments are impractical, unnecessary or contrary to the public interest. Rules may be adopted, amended or repealed by an agency on its own initiative, or may be requested by an interested person by the filing of a petition for rule making.

The Federal Communications Commission, the successor of the Federal Radio Commission of 1927, was established by the Communications Act of 1934 (Title 47, United States Code, Section 151, *et seq.*), and is one of the many administrative agencies subject to the Administrative Procedure Act.

Petitions for Rule Making

FCC rules concerning rule making procedures are relatively simple and straightforward. Any interested person may petition for the adoption, amendment or repeal of a rule or regulation. The petition should be addressed to the Secretary, Federal Communications Commission, Washington, DC 20554, and typed on 8-×-10 or -13 inch, or 8-1/2-×-11, -13 or -14-inch paper, preferably double spaced. The petition should set forth the text or substance of the proposed rule, the rule sought to be amended (or repealed), together with all facts, views, arguments and data deemed to support the action requested. The petition should indicate how the interests of the petitioner will be affected (Sec. 1.401).[1] These requirements as to size of paper and number of copies have not been rigidly enforced, particularly in Amateur Radio matters. Many hand-written requests for new rules and amendments of existing rules in the amateur service have been accepted by the Commission, even when no copies were filed. The sidebar shows the proper caption for a petition and comments.

If preliminary review of a petition indicates that it meets the minimum requirements outlined above, or that a waiver of the requirements is warranted, the Commission will issue a "Public Notice" entitled "Petitions for Rule Making Filed" giving the file number (RM-), the name of the petitioner, the date of filing and a brief summary of the proposal (Sec. 1.403). Such notices are not printed in the *Federal Register*, but those relating to Amateur Radio are often summarized in amateur journals and magazines. Some petitions that plainly do not warrant Commission consideration are not given RM- file numbers and are acted on by the bureau chief under delegated authority. Sec. 1.405 provides that any interested person may file a statement in support of or in opposition to a petition for rule making not later than 30 days from issuance of the "Public Notice."

Notices of Proposed Rule Making

Rule making involving Amateur Radio matters usually falls under the jurisdiction of the Private Radio Bureau. Occasionally, however, jurisdiction may be with another bureau. Petitions for rule making are referred to the appropriate bureau or office. Petitions involving amateur matters usually are processed by the Personal Radio Branch, Rules Division, Private Radio Bureau. If a petition has merit, a draft Notice of Proposed Rule Making may be submitted by the bureau chief to the Commissioners for their consideration. If it is adopted, a docket number will be assigned, and the notice will be released to the public for comments. Depending on the Commission's workload, its priorities and the amount of interest shown by concerned parties, several months or even years may elapse between the filing of a petition and the issuance of a Notice of Proposed Rule Making or a denial.

A "Notice of Proposed Rule Making" sets forth either the terms or substance of a proposed rule or a description of the subjects and issues involved, and the dates for filing comments and replies to comments. The notice must be published in the *Federal Register* and must afford interested persons an opportunity to participate in the proceeding through "submission of written data, views, or arguments" (Sec. 1.411; 1.413). Comments should contain the caption or heading contained on the notice and should be on the same sized paper as required for petitions. The original and five copies must be filed. The notice also will afford interested persons an opportunity to submit comments in reply to the original comments. Again, the original and five copies must be filed. Those wishing each Commissioner to have a personal copy of comments or reply comments should file six additional copies, making an original and 11 copies in all. No other comments may be filed without specific permission of the Commission. Comments not filed by the deadline may not be considered.

As mentioned earlier, the Commission also may propose adoption, amendment or repeal of a rule by issuance of a notice of proposed rule making even though a petition has not been received.

Occasionally, a Notice of Inquiry may be issued or combined with a Notice of Proposed Rule Making. A Notice of Inquiry will set forth the Commission's concern over a particular matter and solicit comments and suggestions as to whether adoption, amendment or repeal of a rule may be desirable. The same notice and comment procedures are followed with notices of inquiry as with notices of proposed rule making.

Next month: The Report and Order, Petitions for Reconsideration, Court Appeals and other actions.

Caption Format To Be Used for Petition or Formal Comments

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

In the Matter of	)	
	)	
Amendment of Section 97.—	)	
(Insert rule number, if an	)	
amendment is	)	RM-
proposed, and the	)	
subject matter of the	)	
Amateur Radio Service.)	)	

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*Assistant Manager, Membership Services, ARRL

[1] References are to sections of the FCC rules.

YL News and Views

Conducted By Jean Peacor,* K1IJV

YLRL's 9th International Convention

YLs from Bermuda, Sweden, Germany, Japan, India and every call area in the United States have already registered for the Young Ladies Radio League (YLRL) Convention. The convention, scheduled for June 18, 19 and 20, 1982, is being sponsored by the Washington Area Young Ladies' Amateur Radio Club (WAYLARC) with assistance from the Northern Virginia Amateur Radio Council. It will be held in the Virginia suburbs of Washington, DC at the Crystal Gateway Marriott Hotel — just south of the Pentagon and at the Crystal City stop on the DC subway.

Activities get under way on Friday morning, June 18, with a tour of the White House, Capitol building and various museums of the Smithsonian Institution. On Friday evening, Jean Chittendon, WA2BGE, will present slides taken on her recent visit to China. Saturday will feature the business portion of the convention, conducted by YLRL's president, Kay Eyman, WAØWOF. There will be a YL Forum, group activities and a number of outstanding speakers. Lenore Jensen, W6NAZ, will be guest speaker at the luncheon. A special tour of the Goddard Space Flight Center at Greenbelt, Maryland, has been planned for OMs and other guests on Saturday from 9:30 A.M. until 3:30 P.M. Saturday evening will feature the YL/OM Banquet. A number of special tours and activities are being offered starting on Sunday together with a recommended schedule for self-guided sightseeing that has been outlined for a full week.

This is YLRL's 9th international convention and will celebrate the club's 43rd anniversary. YLRL membership now totals over 1500 YLs throughout the world. It is not necessary to be a member to attend, however, and it is not too late for your Early Bird Registration.

Early Bird Registrations will be accepted through March 15, 1982. The registration fee is $18. That will include Saturday's YLRL Forum and luncheon. An additional $18 should be sent for OM registration, which includes the Goddard Tour and luncheon on Saturday. Or, for registration only, send $10. Mail to YLRL Convention 1982, 2012 Rockingham St., McLean, VA 22101 (include a self-addressed, stamped envelope). This is a convention you won't want to miss.

YLRL'S MEMBERSHIP CHAIRMEN

Membership chairman of any organization is a job that never stops. They are always on the lookout for anyone sounding interested in joining the club. In the case of YLs in Amateur Radio, hours are spent via the Callbook seeking out the YLs who are newcomers to the ranks. Their work is one of devotion. For its membership purposes, YLRL is divided into two membership divisions — east and west.

Western Membership Chairman

Beth Taylor, W7NJS, of Milwaukie, Oregon has been YLRL western membership chairman for a number of years. Beth has attended every YLRL convention since 1964.

She was first licensed in 1949, and was an interested shortwave listener long before that. Her operating time was limited because of her teaching career until she retired in 1953. It was then that she became active. Beth has contributed a great deal to YLRL, serving as 7th district chairman in 1955, 1956 and 1977, and as president in 1958.

She can't remember how many years she has served as membership chairman. She does know that she has always been interested in letting newly licensed YLs know about YLRL.

Beth has operated from Hawaii many times under the call KH6GDS, which she held from 1965 up until its recent expiration. She's a member of Quarter Century Wireless Association and Quarter Century Wireless Women (QCWW). She was the first to earn QCWW's certificate for working 20 members (see photo).

Eastern Membership Chairman

Minerva Fronhofer, WB2JNL, serves as YLRL 1982 eastern membership chairman for the second consecutive year. She enjoys the opportunity it provides through correspondence of getting to know YLs in many different areas.

Minerva received this column's nomination for "mother of the year" in February 1964 when she first became licensed as a Novice, followed by upgrading to Technician. She was the mother of 10 young children at the time. With the help and expert teaching of her OM, Lennie, KB2OX, she has since upgraded to General followed by Advanced.

Minerva has been an avid member of the Central New England Net for several years. As her children prepared for school each morning, she listened, then joined in with cup of coffee in hand at her first chance. She has served as the net secretary/treasurer and as net manager. She now serves as net control station two or three times each month.

"Lennie's Harem" began with her OM, Lennie, when he'd talk with a group of YLs. This was the start of the New Jersey-New York YL Net (SAYLARC). Minerva helped Phyllis Shanks, W2GLB, in getting the net started, and served as the first net manager. She now serves as net control one Friday each month.

How To Join

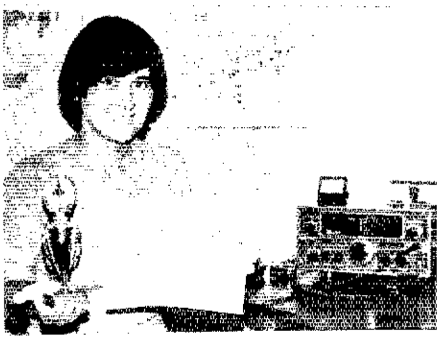
All licensed YLs are eligible for membership in YLRL. Members receive a quarterly newsletter, "YL Harmonics." Dues are $6 per year, payable March 1. Dues for DX YLs are $6 plus $2.50 additional for surface mail, or $6.25 for air mail. Dues for a family member are $1.25. Subscriptions for nonmembers are $6 per year. They should be mailed to Barbara Robinson, WB1ACA, Receiving Treasurer, 28 Upland Rd., Marlboro, MA 01752.

*Country Club Dr., Monson, MA 01057

Christa Elksnat, DJ1TE, holding her first gold cup received for first place in the DX Phone portion of YLRL's DX YL to NA YL in 1981.

Beth Taylor, W7NJS

Minerva Fronhofer, WB2JNL



Gita Lukackova, OK3TMF, with her gold cup received for first place in the CW portion of YLRL's 1981 YL/OM Contest.

Conducted By Stan Horzepa,* WA1LOU

Link With the Future

I have saved more back issues of more periodicals than I care to think about. In one corner of the archives is a stack of past editions of the ARRL Net Directory. These old directories document a trend in our message-handling mode and the National Traffic System (NTS), that is, the abandonment of the hf frequencies in favor of 2-meter repeaters as the meeting place for traffic nets, especially local traffic nets.

This trend is a natural reaction to the growth of repeaters and repeater usage during the last decade. As more and more Amateur Radio activities were being conducted on repeaters, it was only natural that the one of the oldest amateur activities, traffic handling, should find a place in the fm/rpt mode also.

Local Success

Local repeater nets have been very successful. The nature of repeaters is the reason for their success. In the fm/rpt mode, QRM, QRN and QSB are nonexistent in comparison with hf. The variety of repeater users provides outlets for traffic that were never attainable on hf. The number of repeaters makes it possible for a net control station to have traffic relayed on other frequencies with the assurance that the traffic will be passed there as successfully as it would have been passed on the net's repeater. All this makes for smooth and efficient traffic relay. (For a full-blown description of the advantages of repeater traffic handling, read "The Care and Feeding of Repeater Traffic Nets" in May 1979 *QST.)*

Repeater traffic-handling works. Now is the time to go one step beyond (this step is long overdue).

Thus far, the nets I have been discussing are local nets, that is, nets that may on the average cover one, two or three counties because, that is a repeater's typical coverage area. There has not been a great movement of section nets from hf to the advantages of fm/rpt because, except for some sections that are small geographically (for example, Rhode Island, Delaware, Orange, etc.), a section cannot be covered by the average repeater.

Section Links

As long as hams have been building repeaters, the technology has existed to link them. On occasion, repeaters have been linked across the U.S., providing transcontinental repeater communications. So what's stopping us from linking a few strategic repeaters together in order to cover those sections that are bigger than a thimble? Average-sized sections probably could be covered with less than a half dozen machines, and larger sections (geographically), which are generally sparsely populated, may also be covered with a half dozen or so repeaters located in the population centers of those sections.

Of course, I am speaking in generalities. Some sections will be more difficult to cover than others, while some sections will require only one or two machines. For example, here in the Connecticut section, the Connecticut Phone Net (CPN), a section net, is operating on a single 2-meter repeater, which covers a lot of the section successfully. Linking the repeater on which CPN operates with a second repeater could probably provide blanket coverage of Connecticut.

Technologically, we have the ability to link repeaters to cover most of the populated area of any section in the NTS. So what's the hold-up?

Cooperation

To obtain the coverage required for a section traffic net, you need the service of repeaters that are likely operated by different individuals or groups. Cooperation among these different repeater operators is necessary before linking may be achieved. Sometimes such cooperation may be hard to obtain. Repeater rivalries could be a stumbling block if your goal is to link repeaters that are run by competing factions. However, there are a lot of fish in the sea. If one repeater group is not amenable, try another. You might be more successful approaching the smaller, less active repeaters that would be happy to increase their usage and usefulness.

Bob Halprin, K1XA, public service guru at ARRL headquarters, feels that by means of our repeaters and upcoming satellites, the whole NTS may be able to function strictly (and more efficiently) on vhf and uhf in the near future. The repeaters are here, so let's start building the NTS of the future now.

REPEATER DX IS. . .

A number of repeaters encourage the exchange of hf DX information. You may be tuning across 10 meters looking for that rare one and suddenly, the squelch breaks on your 2-meter transceiver.

"WB3GPR/VU7 is now operating on 21.195. This is K1EFI, clear."

Quickly, you QSY to 15 meters, QSO with Al and, Bingo!, snag a new one for DXCC.

Some folks may wonder if K1EFI's transmission is legal. Can a ham make an announcement on a repeater or on any frequency without making his transmission directly to another ham?

The pertinent parts of the FCC regulations (section 97.91) state that "the following kinds of one-way communications, addressed to amateur stations, are authorized and will not be construed as broadcasting. . . Information bulletins consisting solely of subject matter having direct interest to the Amateur Radio Service as such. . ."

The rule is clear. One-way transmissions of bulletins containing information pertinent to hams are permitted, and the last time I checked, chasing DX was subject matter having direct interest to the Amateur Radio Service (as such).

TWO-METER REPEATER SUB-BAND PLAN

At their September 1980 meeting, the ARRL Board of Directors adopted 20-kHz channel spacing on the odd-numbered frequencies in the 144.5- to 145.5-MHz repeater sub-band. The accompanying table lists the repeater frequency pairs that are allocated by the ARRL sub-band plan. The Board also adopted a maximum modulation deviation of 5 kHz for the sub-band to minimize adjacent-channel interference.

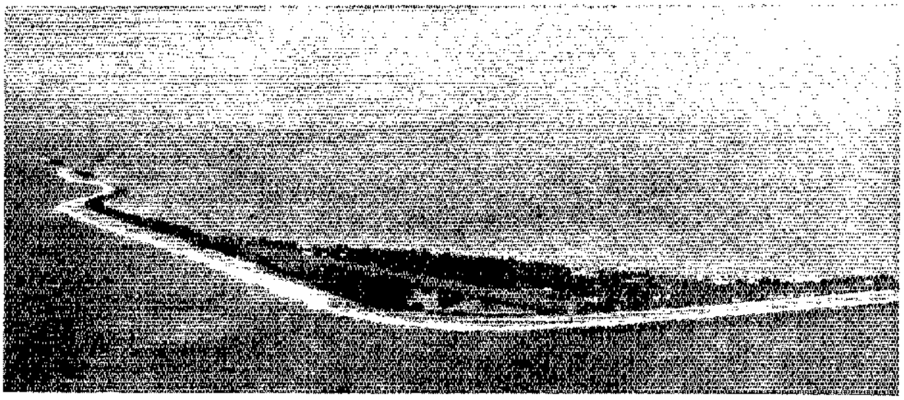
ARRL Sub-Band Plan

Input	*Output*
144.51	145.11
144.53	145.13
144.55	145.15
144.57	145.17
144.59	145.19
144.61	145.21
144.63	145.23
144.65	145.25
144.67	145.27
144.69	145.29
144.71	145.31
144.73	145.33
144.75	145.35
144.77	145.37
144.79	145.39
144.81	145.41
144.83	145.43
144.85	145.45
144.87	145.47
144.89	145.49

*72 Stiles St., Waterbury, CT 06706

Conducted By Ellen White,* W1YL/4

Austrian Pacific DXpedition — 1981



Modern day DXpeditioning is, by its very nature, considerably different from that of the '50s. Yet, the bottom line remaining is the quality of the operation itself. Classy operating, in the very best tradition of Amateur Radio, was exemplified in last fall's Pacific swing by Ed, OE1ETA, and Wolf, OE2VEL. Here's jet-age DXpeditioning at its best.

On August 29, 1981, a small car crammed full of gear left Salzburg, Austria, for Munich Airport. Twenty-seven hours later, OE1ETA with his XYL Brigitte and OE2VEL disembarked at Honolulu International Airport.

Getting the "feel" of the bands from a Pacific perspective (and helping Europeans with rare Zone 31 on the low bands) was made possible with the help of KH6OR and KH6XX. An amplifier arrived (thanks to WA8MOA) but the promised Yagi and vertical never did arrive. Additional wire (KH6OR) was acquired and the OEs continued on to Pago Pago, American Samoa, arriving just before midnight. It came as no surprise to find them working on antennas just after 2 in the morning! The hotel detective and local police required some convincing that the operation was legal. That hurdle was overcome, however, thanks to the local telecommunications officer. They spent five beautiful days in that tropical paradise. (KH8 proved to be very popular, particularly on cw, and OE1ETA managed more than 200 QSOs/hour on that mode!) Conditions were poor on the low bands, netting just 100 two-ways with W and JA on 40, and only 30 contacts on 80 meters.

The next stop, just 15 minutes away when you're traveling on a new 737, was Faleolo Airport, about 40 kilometers west of Apia, the capital of Western Samoa. Plans had been made to continue on to Niue as rapidly as was possible, so the crew just erected a quarter-wave waterpipe vertical for 20 meters on the hotel roof. That 5W1DD and 5W1DO operation netted 1300 contacts with just one rig, *sans* amplifier (because of the high line voltage, some 270 volts!). Things must have been hopping in Samoa at that time what with another DXpedition in Apia signing 5W1DG/DK (operated by VK9NS/NL).

Two days later the scene changed to Hanaan International Airport, Niue, with their arrival on the first plane into Niue in a month. The operating site was Hinemata Motel, a guesthouse with only three rooms, a small garden and a sheer, 30-meter drop to the sea! Permission was obtained to put up an antenna, but the owner of the facility got more than he bargained for — he couldn't enter the garden for fear of hanging himself on the antenna wires! The "farm" consisted of a full-size multiband dipole for 80 to 10 meters, a dipole for 40, a 3-element full-size wire Yagi for 20, and a 120-meter-long V for 160-10 meters. Adding two transceivers to that, as well as an amplifier, and you'll understand both why the luggage weighed what it did and why their signals from ZK2EL/ZK2TA were so terrific.

After a week (five days of which saw rain) the scene shifted back to Apia for an Air Nauru flight to the richest country in the world, the Republic of Nauru. Telecommunications Officer C21JD made it possible for the OEs to use the club call, C21NI. Another coincidence developed the following day when a knock on the door revealed Ian, VK4NIC (of 3X fame) awaiting his connecting flight to Majuro. With a motorbike you can go around the island in a half hour. It consists of coral and volcanic rock, covered by phosphates which are dug out. By 1995 the island will be an abandoned desert. Swimming is particularly hazardous because of the strong currents, high waves and sharp coral. Only a transit visa was possible so the tour had to move along after four days (and 6000 two-ways!).

Next on the itinerary was Tarawa, in Western Kiribati. The atoll consists of some 46 islands, palm trees and beaches but with limited amounts of room for the numbers of people living there. For four days T3ØBF and T3ØBG entertained the faithful to the tune of 5000 contacts.

It was time to go too soon, and a five-hour flight from Micronesia brought them back to Polynesia, to Funafuti (see photo, above), Tuvalu, their final destination. The atoll consists of a few islands, long and narrow. There is only one place (on Fongafale Island) large enough for an airstrip. It is normally used for football, and the sound of a siren alerts both players and observers to clear the field for a landing. Ed and Wolf note that the island is very clean, compared with Tarawa and Nauru.

The "proof" of a successful DXpedition, 3 of 10 boxes full of direct letters, awaiting cards from the printer; security provided by an attack cat.

Ed and Wolf at Funafuti International Airport, Tuvalu.

Wolf, T3ØBF, on the air

Dieter, OE2DYL, operations QSL manager

*19620 SW 234 St., Homestead, FL 33031

Summary, Austrian Pacific DXpedition

Calls Used	*Duration*	*EU*	*W/VE*	*JA*	*Other*	*Totals*	
OE1TA/KH6 OE2VEL/KH6	few hours					742	
OE1ETA/KH8 OE2VEL/KH8	5 days	652	2633	1254	446	4985	101 countries 5BWAC
5W1DD 5W1DO	2 days	219	584	384	79	1266	
ZK2EL ZK2TA	8 days	3059	3839	2969	677	10,544	130 countries 5BWAC
C21NI	4 days	1182	2045	2404	326	5957	101 countries
T3ØBF T3ØBG	4 days	1093	1834	1654	416	5003	91 countries 5BWAC
T2ETA T2VEL	3 days	1076	1701	1001	331	4109	87 countries 5BWAC
Totals	27 days	7631	12,836	9816	2323	32,606	

One night's operation was lost because of lack of room at the hotel. The remaining three days of hamming did not prove satisfactory because they had a very small room; the antennas were too close together, and the room lacked even an operating table. The same co-DXpedition coincidence popped up again in the form of T2GSH/ZL1BFV, ex-YJ8GH. (He arrived the day before the Austrians but plans on staying on Tuvalu for two years. Gordon *is* interested in DX but is having troubles with his old rig. A tip to the wise: His address is Gordon Huckin, T2GSH, c/o Post Office, Funafuti, Tuvalu.) A blazing end to the Tuvalu saga took place the last night of the T2ETA/T2VEL operation when the balun went up in smoke.

A further coincidence awaited Wolf and Ed in Hawaii, enroute home, where they met OE6BVG who operated from Macau as CR9AN, from Hawaii as OE6BVG/KH6 and from Raratonga as ZK1BR.

In spite of the considerable expenses of the trip (more than $10,000 US), they enjoyed the trip immensely and are already looking forward to future exploits. For those wanting more detailed information, DXpedition aid, slides, movies or videotapes, write Wolf Klier, OE2VEL, Jahnstr. 15, 5020 Salzburg, Austria. QSL via Dieter Konrad, OE2DYL, Besserabierstr. 39, 5020 Salzburg, Austria.

CAR NEWS

Here's an update of what's happening in the Central African Republic, courtesy of TL8WH. TL8RC and TL8GE remain active. TL8JM should have left the country within the past few weeks. TL8WH has departed but will be doing a three-year tour at the American Embassy in TR8. TL8CN has returned to France.

GB2BC

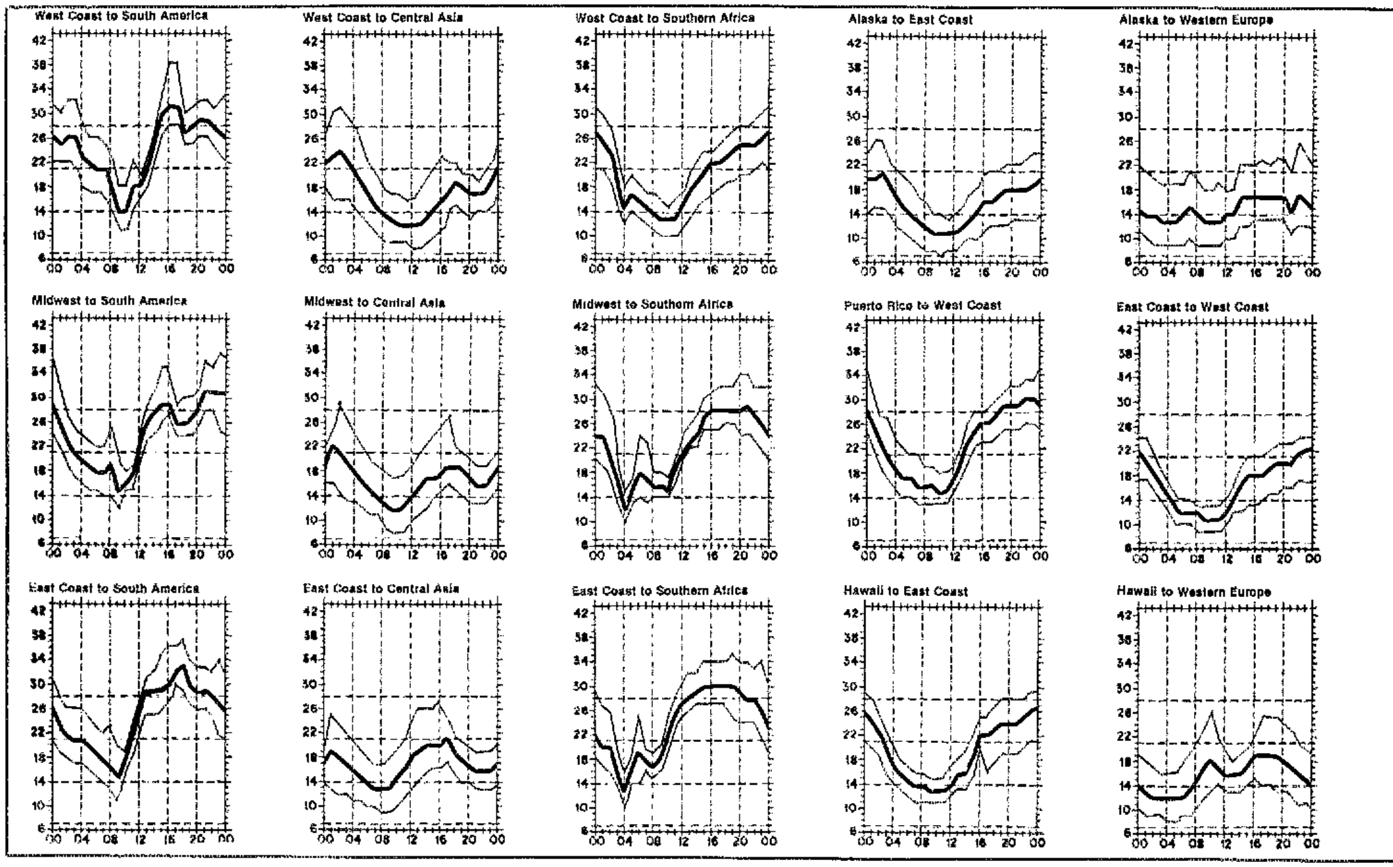
During 1872, a proclamation by the British Columbia Government established the office of BC's agent general to England. Later housed at one of the most prestigious addresses in London (1 Regent St., S.W.), BC House was to become one of the most respected trade delegations in England. On this, its 110th anniversary, the Surrey (British Columbia) Amateur Radio Club in conjunction with the Sutton and Cheam Radio Society (of Surrey, England) will be operating special-event radio station GB2BC. The operation will take place from BC House, London, from March 26 to April 1, operating as close as possible to 24 hours daily on all hf bands (and will participate in the late-March ARRL DX Test). QSL via VE7SAR, Box 542, Surrey, BC, Canada V3T 5B7.

WORLD'S FAIR

The Delta Division Convention will host a DXCC Forum (and will provide DXCC card checking by W3AZD, WAZ verification by K4SE, long-range planning by W4KFC) and special buses to the World's Fair for nonham family members. Not too soon to plan for the May 23 event in Knoxville, Tennessee. For information, contact N4BAQ, 5833 Clinton Hwy., Suite 203, Knoxville, TN 37912.

ANTARCTIC/SOUTH ATLANTIC DXPEDITION

As reported by W1AW DX Bulletins, LU2AH was well into his chilly venture at the beginning of the year. Ron, by invitation of the Argentine Navy, embarked on a 60-day southern swing sponsored by the Argentine Radio Club. He boarded the Argentine Navy's



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 newest ship, the *Bahia Paraiso*, on December 21 and plans called for stops on the Antarctic Peninsula, South Shetlands, South Orkneys and South Sandwich Islands. ICOM furnished dual IC-720As and linears (hoping to foil Murphy's Law!). Operation was planned on all 5 hf bands, plus the new 24-MHz allocation permitted by LU authorities. A special award will be granted by the Argentine Radio Club for any three different LU-Z contacts (furnish list, dates, band and 10 IRCs).

QSL via LU2A, C.C. 100 SUC. 28, 1428 Buenos Aires, Argentina.

CALENDAR NOTES

March 6-7, the ARRL DX Test (phone) — *the* gran-daddy of all DX Competitions — don't miss it! Do your planning now for the big DX Convention in Visalia, California (halfway between S.F. and L.A.), sponsored this year by the Southern California DX Club, on April 16-18. A week later the notable Dayton Hamvention is scheduled, April 23-25.

This month starts the second year of editorship of the DX column by your reporter. When time permits drop me a note with your views on subject matter; in particular ideas for topics *you* would like covered during the coming year.

QSL Corner

Administered By Joan Becker, KA1IFO

ARRL-Membership Overseas QSL Service

Send outgoing cards to this address: American Radio Relay League, 225 Main St., Newington, CT USA 06111.

This is an "outgoing" service that allows ARRL members to send DX QSL cards to foreign countries at a minimum of cost and effort. While QSLing direct to foreign amateurs is faster, it is also more tedious. Time spent searching for addresses in the *Callbook*, addressing and stuffing envelopes, and mailing could be better spent operating DX. And, the cost of IRCs, airmail postage and envelopes can be prohibitive.

An unlimited number of QSLs may be sent for distribution 12 times per year. The fee is just $1 per pound or portion thereof (155 QSL cards average a pound).

The ARRL-Membership Overseas QSL Service operates *only* in an "outgoing" capacity. To receive QSLs from DX stations, see "The ARRL DX QSL Bureau System," in December 1981 *QST*, page 84, or send an s.a.s.e. to ARRL QSL Bureau, 225 Main St., Newington, CT 06111.

U.S. amateurs may send SWL reports to foreign short-wave listeners. Unlicensed (associate) members may send SWL cards to foreign amateurs. QSL managers: write for details.

Requirements

1) Presort your DX QSLs alphabetically by call sign prefix (A3, AP, C6, CE, F, FG, G, GI, GM, JA, 3A2, etc.).

2) Enclose the address label from the brown wrapper of your current copy of *QST*. This information shows that you are a current ARRL member. Family members may also use the service by enclosing their QSLs with those of the primary member. Include the appropriate fee with each individual's cards and indicate "family membership."

Sightless members who do not receive *QST* should indicate that the QSLs are from a "sightless member."

ARRL affiliated club stations may utilize the service when submitting club QSLs by indicating the club name. Club secretaries should check affiliation papers to ensure that membership is current.

3) Enclose payment in the form of a check, money order or cash. Sending large amounts of cash through the mail is not suggested. Please do not send stamps.

QSL INFORMATION

Here is some QSL information for those of you who would like to QSL direct to the station location. It is passed along as we receive it and therefore may not be accurate.

The call sign in parentheses is the QSL manager.

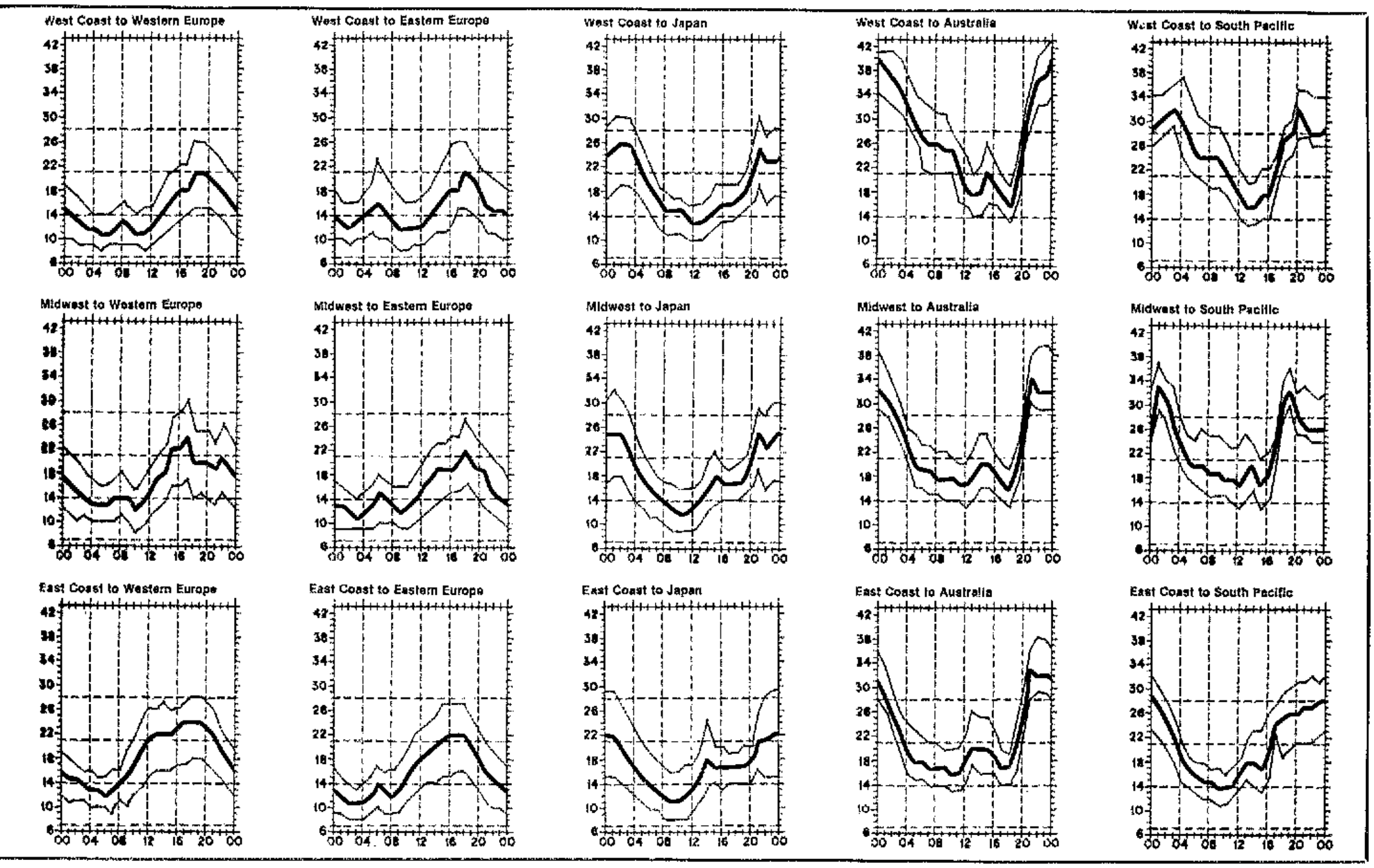
CN8CY (G3GJO)
CT2YG P.O. 5, Lagoa 9560, St. Miguel, Azores
C5AEG (N6BFM)
EA6FS (EA6GP)
ET3PG (DJ9ZB)
FM7BX (KA8ANO)
FO0KP (W6SZN)
HI3AMP P.O. 100, Salcedo, Dom. Rep.
HK5CKH P.O. 18003, Cali, Colombia
HT1CTJ (HK3LT)
HI8XT (JA1XIQ)
J28DM P.O. 2414, Djibouti
J28DP (F2GA)
SM2DWH/C9A (SM0KV)
SV1NA/5 P.O. 40, New Ionia, Athens, Greece
S81WJJ P.O. 821, Yumtato, Rep. of Transkei
TG9NX (WA4RZL)
TA1AB P.O. 10, Orestias, Greece
TJ1AA P.O. 73, Pasarrosse, 40600, France
TZ0PP (F9KP)
VP2MM (AB1U)
VP2VHT (WA3YJA)
VP2VD (VP2VBK)
VP2VI (W1GNC)
VP8ANT P.O. 146, Cambridge, England
VP8QI (G4CHD)
VS5DD P.O. 1200, Brunei
VS5PM P.O. 969, Brunei
V3MS (W0CP)
ZC4KC (G4ICC)
ZF2RK (WD9IIC)
ZP5JR (K3BYV)
ZS2DK P.O. 10050, Port Elizabeth, Rep. of S. A.
ZS5SP (WD4IHV)
ZP5MJV P.O. 916, Acension

QSL MANAGER VOLUNTEERS

W6GYM KA6FNW

Please Note:
9Q5HU operating RTTY, is a pirate station.

December 1981 "QSL Corner," page 84, contains information and addresses for the Incoming Bureaus. For information on bureau operations (Incoming and Outgoing) send a self-addressed, stamped envelope to ARRL QSL Bureau, 225 Main St., Newington, CT 06111.



lowest curve (optimum traffic frequency, or fot). See January 1977 *QST*, page 58, September 1977 *QST*, page 35 and January 1979 *QST*, page 11, for a complete explanation. The horizontal axis shows Coordinated Universal Time (UTC); the vertical axis, frequency in MHz. Data are provided by the Institute for Telecommunication Sciences, Boulder, Colorado. These predictions, for March 15 to April 15, 1982, assume a sunspot number of 114, which corresponds to a 2800-MHz solar flux of 161.

DX Century Club Awards

Administered by Don Search, W3AZD

The ARRL DXCC is awarded to amateurs who submit written confirmations for contacts with 100 or more countries on the official ARRL DXCC List. You may also submit cards to endorse your award in 25-country increments through 250, 10-country increments through 300, and in 5-country increments above 300. The totals shown below are exact credits given to DXCC members from November 1 through November 30, 1981. An s.a.s.e. will bring you the full rules for participation in the DXCC, the DXCC list and application forms.

New Members

Mixed

CT4YN/179, DA1RR/121, DA1WA/110, DF1JM/225, DF4RU/108, DF6ZX/106, DK7PE/236, DK9SA/109, DL1KAI/138, G4AXD/105, GI4IBD/117, HB9AQS/105, HBØXAA/100

I2PJA/313, I2VGU/317, I2ZZZ/320, JA1AEW/108, JA1KXT/109, JG1QGT/204, JH1EFA/114, JA8EAT/313, KH6BD/105, NL7C/101, OK3RJB/102, OZ1CEX/112, SM7IZL/186

SMØABR/111, SP5BT/320, SP5EAQ/290, SP5EWY/310, VE3IUR/107, VK5ARR/132, YU1OHI/122, YU2CKH/291, YU3AW/291, YU3TCU/137, YU6ZAN/160, ZS2DK/155, 4Z4AB/150

9V1UQ/114, AA1V/255, KA1CBD/102, KA1IN/202, N1BCV/100, N1BFS/140, N1BIZ/104, W1NZO/106, WB1CRI/103, K2DSU/100, K2TWI/137, KA2DZQ/100, KA2HJS/101

K2HVM/140, KB2DY/100, KB2VO/104, KJ2B/109, N2KT/186, W2GQF/281, W2NKD/122, WB2LHY/105, AK3F/103, KA3AAO/102, N3ALL/100, W3AKD/146, W3WW/106

K4BQ/108, K4FXP/253, K4KZE/102, KA4NEC/146, NO4N/107, NS4W/109, W4MAF/156, W4PG/113, WA4RAH/107, WB4NCI/107, WB4FKM/101, WB4NJC/100, WD4FYB/105

W5VEO/102, K6YGX/104, KA6CJL/103, KB6UI/109, KS6O/157, N6AUU/109, N6CYL/105, W6RQV/107, WA6YFD/105, W7OMN/106, WB7WBA/125, KA8IIC/100, KC8CK/104

KD8V/123, W8CF/151, W8TQE/104, WB8RNY/153, WB8UPN/121, WD8MVK/111, WD8OFB/154, K9FM/228, K9KB/299, KF9U/101, KF9W/116, N9ACG/101

N9AXR/103, N9GB/103, W9MW/129, WA9MFP/109, WB9ZHS/113, KØGPD/101, KAØINF/100, KCØFJ/109, NØAUT/104, NØGL/100, WBØWRL/102, WDØDFW/104

Radiotelephone

CP1IL/143, CP6IM/103, DF1JM/189, DF5NK/120, DF8TK/102, EA5AKY/115, EA7FL/103, EA7JG/105, G3ISG/110, HB9AQS/101, HB9RG/129, HI3BEA/137

I2PGA/311, I2VGU/315, I5RCR/125, I8QAF/101, JA8NLI/107, JH1IED/110, JH1QFA/109, JA2GHW/227, OH2YP/100, ON7TN/107, ON7ZA/110, OZ1DYC/103

OZ6QX/103, OZ3ZK/102, OZ9RL/113, PT7SC/106, SM3DXC/253, SMØJOQ/132, SP5BT/316, SP5EAQ/290, VE3DIZ/106, VE3DOU/221, VE3IZH/104, VO1CW/110

XE1TIS/102, YC1BSA/104, YU3TCU/113, 4Z4AB/120, AA1V/252, K1EFI/223, K1EM/236, K1FEV/107, KA1CXC/144, KA1IN/201, N1ALR/135, N1BFS/116

WA1BZS/181, K2HVM/104, KB2GW/104, N2ATY/102, N2BAT/104, N2KT/186, W2GQF/276, W2YXO/102, K3ZPG/107, W3NRU/113, WB3EMR/102, K4VBS/120

KA4GDQ/105, KA4NEC/140, KB4OR/107, N4ACT/106, N4CJU/103, N4DRC/102, N4HX/TT8/104, KB5AH/103, KB5CM/108, KB5KA/104, N5AFV/106

N5APB/104, N5CFP/109, K6ANP/127, K6YGX/103, KA6ISX/105, KS6O/157, KT6T/141, N6AUU/109, N6CYL/102, WA6DSB/115, KA7DLC/102

K8IHX/104, KB8AE/109, KB8MF/100, KB8QY/101, KD8V/123, KF8D/108, W8SDE/149, W8VSA/103, WD8MVK/110, K9FM/215, KA9AAB/109

KB9OA/102, KD9E/108, KF9W/113, N9AXV/107, N9BDM/150, WD9GQV/177, WB9ZHS/105, ACØS/105, NØCXE/101, WBØMNW/100, WDØAXF/111

CW

DF1JM/110, DF2PI/109, DL1SN/106, DL3EO/105, DL6PI/120

JA1KXT/101, JA8EAT/281, JA8FKO/264, JA8RII/110, PR7CM/110

SM3DXC/194, SM5FUG/107, SM7IZL/134, SP5EWY/274, VE3CWE/121

XE1XF/100, 7X4MD/103, K1EFI/105, K1VJH/102, WA1BZS/170

WB1HIH/100, K2IAU/110, KJ2B/103, W2GUP/102, WA2CNF/103

WB3LBH/103, KB3MM/115, KB3TN/142, W3AKD/129, W3EYF/221

WB3DNA/101, WD4DLE/109, W5AL/207, W5LVD/240, WB5DDI/153

WD5JYU/108, K6ANP/125, W7YS/145, W8FN/109, N9RB/123

W9KQD/206, W9MW/119, WD9BBI/115, KØJFV/106, KIØC/171

5BDXCC

IV3AVZ, W1EWD, PY2FCF, JA5ANP, K2TV, AF5H, 7X4MD, W7CG

Endorsements

Mixed

CT1SH/214, CEØAE/286, DF5DP/157, DJ6BN/272, DJ6DU/252, DK5QK/288, DK7XX/204, DL1KS/316, DL4FL/250, DL7AA/361, DL7JY/252, DL7JY/W6/154, EA6DE/253, F3CB/266, G3AEZ/206, G3IOR/345, G3SJH/313, GI3ZCK/151, HB9IK/332, JA1EF/271, JA1SJV/293

JF1KKV/280, JF1VST/177, JA2CXH/274, JA2DJH/310, JH2PYX/169, JH6HYC/238, JR6EFE/280, JA7COE/157, KL7JC/150, KP4DGT/178, OK1DVK/200, OK1KRS/229, OK3EA/320, PY2JSF/176, SLØAS/223, SM3DXC/296, SM5AQB/330, SM5BBC/327, SM5BFC/286, SM5FUG/154, SM7GCP/180

SMØHEP/219, VE3CUI/125, VE3CWF/250, VE3KK/201, VE3LGQ/330, VE6WQ/304, VE7WL/290, VK2DFE/296, YU2AKL/300, YU4VTU/308, YV5BX/345, ZE1BJ/146, K1EFI/265, K1FN/217, K1ITS/146, K1VJH/289, K1WJB/224, KA1CXC/149, KA1KD/216, N1AMB/184, K1GW/148

W1BFT/274, W1CUH/150, W1ETV/260, W1GVZ/275, WA1YTW/258, WB1BVQ/202, WB1FRZ/210, K2IJ/289, K2ON/262, KA2APZ/152, KA2CFH/149, KJ2Q/157, N2JV/282, W2CC/314, W2HKE/250, W2IFK/269, W2LOG/280, W2QJT/247, W2SUE/196, W2VAV/204, W2VJN/335

K3OXS/134, KA3BVI/204, KF3C/154, W3AIC/152, W3DDG/200, W3LDD/200, WB3JZN/175, AD4F/163, K4UEE/315, KA4Y/262, KB4LX/225, KB4UO/200, N4AH/290, N4AXT/261, N4DRG/124, N4NG/183, N4PY/201, NE4F/170, W4GIO/182, W4PRX/268, WA4VDN/237

WA4VMZ/273, WA4WYN/302, WA4JRS/205, WB4AGT/228, WB4FTU/261, WB4PRU/283, WD4FAB/126, WD4FFX/126, K5KX/320, N5MX/127, N5OK/310, W5EIJ/200, W5RJC/284, W5VGX/207, WA5HNK/143, WD5DRS/229, WD5GJB/253, AB6M/133, AJ6M/250, K6ELX/289, K6KCM/200

K6RK/312, K6TXA/280, KB6HT/294, KB6JK/264, KB6ZL/226, N6BFQ/277, N6KM/133, N6NF/262, N6OJ/299, N6PV/228, N6ZV/305, NA6F/156, W6MUO/158, W6OK/284, W6OMM/304, W6PU/250, W6RDS/183, W6ZID/239, WA6JDB/137, WB6MBF/229, WB6ZUC/300

K7CE/173, KI7I/125, W7JYX/339, W7KVV/250, W7PK/315, W7RVQ/184, WA7OBH/250, AC8Y/154, KA8DL/130, W8BCL/212, W8CHV/280, W8LCU/143, W8QBY/135, WB8VPA/280, KN8COQ/255, AB9V/232, AG9E/173, K9MZJ/218, K9WG/242, K9WWW/172

KB9PY/151, KC9A/183, KC9R/203, KE9A/270, KG9J/265, W9CA/250, W9OPD/218, W9NUD/229, WB9LFD/262, WD9BBI/177, ACØA/281, WØDP/244, ACØS/199, KAØFPK/149, KØJFV/276, WØAIH/355, WØBF/204, WØJIE/175, WØKZV/276, WBØUFL/282

Radiotelephone

AH6BZ/208, DF5DP/155, DL7AA/340, EA5BCX/157, EA6DE/253, EA7BMZ/236, F6AOI/325, F6BGV/138, G3SJH/313, G3UML/344, HB9AST/202, I1SBU/200, I2AKI/200, I3EJ/160, I5TDJ/340, JA1EF/239, JA1MCU/319, JF1VST/174

JA2CXH/267, JH2PYX/169, JR6EFE/275, KP4DGT/178, NP4CC/226, LA1LI/320, LA3WV/207, LU4MEE/260, LU8CW/305, OA4OS/325, OK1DVK/150, OZ1WL/175, OZ2QL/283, OZ6KM/152, PY2JSF/175, PY5GA/315, SM5AQB/312, SM5BFC/282

SM7GCP/178, SMØHEP/215, VE3CWE/182, VE7WL/278, VE6WQ/294, 7X4MD/256, 9G1JU/280, K1GW/124, KA1KD/213, N1AMB/184, W1AOL/286, WA1DPX/152, WA1LOU/200, WA1YTW/253, WB1BVQ/202, K2BK/314, K2SHE/308, KB2HZ/251

N2DN/157, W2CC/313, W2IOO/309, W2LOG/280, W2RGU/308, W2SUE/185, W2UT/200, WA2CHT/149, WA2MTR/202, WA2SRM/249, WA2TNN/140, W3YHR/273, WB3BAP/201, AK4E/267, K4KCS/225, KA4Y/185, KD4CB/290, KV4F/289

N4AXT/250, N4BQB/201, N4CRU/261, N4DQF/190, N4DRG/124, N4JA/280, N4NG/175, W4CYJ/226, W4PDL/344, W4WMQ/249, WA4VMZ/232, WB4FTU/256, K5LVZ/147, KB5PJ/149, N5BES/202, W5GZI/159, W5RJC/255

W5VGX/158, WB5TXP/198, WB5RMF/152, K6AO/307, K6ASI/245, K6RK/287, K6RMM/307, K6TXA/217, KB6DJ/238, KB6HT/289, KB6JK/264, KM6L/253, N6ACU/248, N6BFQ/276, N6NF/235, N6OJ/270, N6PV/204

N6ZV/250, W6CN/282, W6FET/321, W6JQT/125, W6MFC/280, W6OK/281, W6PGK/217, W6QWJ/152, WB6KRI/154, WB6NBR/128, AD7S/156, K7CE/173, KB7DA/217, W7DSZ/280, W7EZ/325, W7JYX/339, N7AET/146

WA7OBH/250, WB7RGN/240, WB7SGU/140, WB7SGV/134, K8MG/269, KA8FEL/156, KB8RT/156, KN8COQ/240, W8GUS/277, W8NDJ/203, WA8MPW/249, WB8RNY/151, WB8VPA/280, WD8MRF/151, K9KB/295, KB9PY/136, KB9QZ/213

KF9J/285, KG9J/263, N9AUV/263, N9BA/290, W9CA/203, W9NUD/202, W9RKP/290, WB9LFD/260, ACØA/281, KØEPE/325, KØHSC/224, KØJFV/247, KØRDJ/205, KBØA/176, WØJKM/199, WAØPDA/136, WBØUFL/281

CW

DK5XF/151, DK7XX/200, DL7AA/270, DL9YC/176, HA8UB/200, JA1EF/223

JA1MCU/287, JF1KKV/251, JG1QGT/203, JA6VA/210, JH6HYC/238, JA8AYN/230

OH6EW/142, OK1KRS/200, OK3EA/210, SLØAS/222, VE1BLX/201, VE2FOU/170

VE3BX/270, VE3II/187, VE6WQ/207, VE7CNE/226, K1ITS/128, K1UO/265

WB1FRZ/205, K2IJ/267, KA2GCS/132, W3EVW/279, KA4Y/134, N4PY/177

NE4F/151, WA4VMZ/247, WA4WYN/268, WA4YZF/137, W5VGX/119, K6JG/282

K6RK/163, K6TS/131, KB6HT/142, KR6Q/154, KS6O/207, N6NF/216

W6ISQ/262, W7KVV/204, AB9V/227, K9GX/126, K9ZO/197, KG9J/153

W9CA/134, ACØS/147, KAØE/226, NØOA/128, WØYBV/149

DXCC NOTES

Annual List Correction: Mixed, WØELA/363

50 Years Ago

March 1932

☐ The lead article and cover photo features "A Low-Power 1715-kc. C.W. Transmitter" by George Grammer, W1DF. The simple '45 Hartley is recommended by the author as a good start for anyone wishing to give the 160-meter band a try, since the solar cycle now favors the lower frequencies.

☐ Technical Editor James Lamb discusses "Changing Over to the New 'Phone Bands." Amateurs with less than a year's experience will not be eligible to qualify for operation on 75 and 20 meters, but they have 1875-2000 kc. and the 4 Mc. at 56-60. The qualified operators who will be working 75 and 20 are reminded they should test only with dummy antennas until the new assignments go into effect on April 1; after that they can check *on* frequency with fellow hams.

☐ "Eliminating Interference Caused by Electrical Equipment" is based on a paper by Prof. Absalon Larsen of the Royal Technical College in Copenhagen. This C.C.I.R. report showed typical sources (d.c. motors, switches, etc.) and suggested filters for elimination of the noise at the source. Key clicks are mentioned.

☐ George S. Parsons reports on "Silvering Electrodes on Quartz Crystals," work he did at the University of California (Berkeley). Plating the crystal and then installing it in the holder worked well, but by holding the plated crystal by pressure between two wires the crystal oscillated even more freely and yielded more power output. Instructions for plating are included.

☐ The second part of the classic Dellenbough and Quimby series, "The First Filter Choke — Its Effect on Regulation and Smoothing," treats the well-designed power-supply filter following mercury-vapor rectifiers. The effects and importance of the input and smoothing chokes are shown, along with the introduction of terms like "critical" and "threshold" inductance. (Mercury-vapor rectifiers have a 4:1 peak/average current limitation; silicon rectifiers run very much higher, and that's one reason you don't see many filter chokes these days.)

☐ Lou Hatry follows up Ross Hull's earlier article on audio filters with "More About Audio Selectivity." Hatry disagrees with some of Hull's conclusions, and several lengthy Editor's footnotes are included. (Interesting reading, and honest journalism.)

☐ Louis Leuck, W9ANZ, believes that "Putting Life in the QSL Card" is the way to improve one's returns percentage. His solution (no pun intended) is to sensitize chemically a portion of the QSL card and add a picture of the operator or station. Chemical formulas are given for this pre-DXpedition approach.

☐ "An Effective Power-Type Frequency Multiplier" by H. S. Keen, W2CTK, presents a regenerative pentode circuit that utilizes feedback via the screen grid. The author concludes that the '47 audio pentode is an excellent choice for the crystal oscillator stage and best for the regenerative multiplier.

☐ In the *Experimenter's Section*, Schmelzer, D4AAR, and Dave Atkins, W6VX, independently submit the push-push frequency-doubling circuit, which is also shown in the Keen article.

☐ An erudite *Stray*, quoted verbatim: "We learn from *The Tech* (Massachusetts Institute of Technology) that the Radio Society has improved its transmitter by the addition of crystal control, which 'makes it operate more closely to the frequency at which it transmits.' Marvellous things, these crystals."

25 Years Ago

March 1957

☐ In the lead article, Dean Morgan, W2NNT, discusses "Tropospheric Scatter Techniques for the Amateur" on frequencies of 144 Mc. and higher. The comprehensive account includes a nomogram for estimating performance of a scatter circuit.

☐ L. Richard, ON4UF, describes his method of building "Parallel Dipoles of 300-Ohm Ribbon" fed with a single 75-ohm line. The TV lead-in material is cut to make two dipoles.

☐ Cal Hadlock, W1CTW, writes about "Design Considerations of 50-Mc. Converters" and tells how a converter designed for lowest noise figure worked very well when no locals were transmitting. His solution to the overload problem is to reduce the gain and the number of stages, and to back off a little on the low noise-figure requirement.

☐ A *Technical Topic* by George Grammer, W1DF, gives the advantages and complexities in adapting "Suppressed-Carrier A.M." to general ham use. While the transmitter design is simple, the receiver is rather complex, and the transmitted bandwidth is double that of an s.s.b. signal.

☐ Laurence Stein Jr., W1BIY, shows how to build "A Dual Keyer for Differential Keying." Closing the key closes fast one relay ahead of a second relay, and opening the key opens the second relay before the first. By keying the oscillator with the first relay and an amplifier with the second, oscillator chirp is avoided (if the oscillator and buffer are worth their salt).

☐ "A Modified 'Standard of Comparison' Mobile Receiver" by R. J. Gunderman, W8INO, relates the author's success in modifying a published mobile receiver design to meet his own requirements. This involved repackaging for a more acceptable form factor and modifying the circuitry to increase the dynamic range.

☐ The first of three articles by George Grammer on "Simplified Design of Impedance-Matching Networks" treats basic principles and the L network. The straightforward treatment should help anyone to understand these circuits.

☐ Lew McCoy, W1ICP, considers "The Evils of Multiband Antenna Systems — And the Cure." He knocks down the harmonics the antenna will accept by using simple half-wave filters of coil-and-capacitor construction.

☐ "Keeping your Station Log" is three accounts of different approaches to the subject by Ed Handy, W1BDI, Peter Morrow, W1VG, and Joe Moskey, W1JMY. Good ARRL man Handy uses the ARRL log, while individualists Morrow and Moskey print their own (different) designs.

☐ "'Proxos' — A Labor-Saving Spotting Switch," by Laird Campbell, W1CUT, and W1DX, reflects the lengths the lazy authors will go to in minimizing their expenditure of physical effort. The clever device can be readily applied to any existing transmitter. As the operator's hand *approaches* the v.f.o. dial to change frequency, the spotting switch is automatically turned on; it goes off when the hand leaves the vicinity. (The worth of this outstanding contribution is apparent when one realizes how widespread its use has become. One could say that today "Proxos" is a household word.) — *Byron Goodman, W1DX*

Strays

EARN AN OSCAR 8 PHOTO

☐ AMSAT-OSCAR 8's Fourth Anniversary on March 5, 1982 will be commemorated with a black-and-white glossy photograph of OSCAR 8 to those who send information that confirms a two-way QSO via OSCAR 8. QSLs are not required. The participation period will be the entire month of March. Send a 5 × 7-in. envelope with sufficient return postage. The OSCAR 8 QSL card will be sent for telemetry reports only. Send your requests to OSCAR 8 Fourth Anniversary, Club and Training Dept., 225 Main St., Newington, CT 06111. — *Bernie Glassmeyer, W9KDR*

ADDRESS NEEDED

☐ I need the QSL address for KZ5JUN for DXCC. QSO date was Feb. 8, 1979. Operator was Jan from Fort Amador, Canal Zone. Contact Charlie, WD4JIR, Rte. 1, Box 295 AA, Clinton, NC 28328.

QST congratulates . . .

☐ Dr. William J. Crielly Jr., HP1XHI, stationed at Howard AFB, Panama, who was recently named "Outstanding Dental Officer of the Year" by the U.S. Air Force.

☐ Kenneth M. Miller, K6IR, president and chief executive officer of the Penril Corp., of Rockville, Maryland, who has been named a member of the Governor's Committee on High Technology.

☐ Howard Kelley, K4DSN, who has been promoted to vice president and general manager of WTLV-TV, Jacksonville, Florida.

The W2ZI Historical Wireless Museum in Trenton, New Jersey, is the one-man project of Ed Raser, W2ZI, who has somehow found time to gather and research more than 400 items in this museum. The collection focuses on apparatus from the 1899 period, when Marconi first came to America, to around 1925, when the spark era ended. A large wireless library is part of the museum, which is open to the public by appointment only. Contact Ed Raser, W2ZI, for details. *(photo courtesy W2ZI)*

Hamfest Calendar

Conducted By Marjorie C. Tenney,* WB1FSN

[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.]

Connecticut: The Hartford County ARA will hold its annual auction on March 11, at 7:30 P.M., at the Veterans Memorial, Sunset Ridge Dr., East Hartford.

†Florida: The 1982 North Florida Swapfest sponsored by the Playground ARC will be held at the Fort Walton Beach Shrine Fairgrounds, State Road 189, Fort Walton Beach, on Saturday March 20, from 8 A.M. to 4 P.M. and Sunday, March 21, from 8 A.M. to 3 P.M. Advance admission is $2, at the door $3, family members free. Forums and contests, including a homebrew contest. Craft tables and ladies free bingo. Also, QCWA, MARS, TEN-TEN and ARRL. Fun for everyone, large indoor swap area, free parking. Talk-in on W4LRC/R, 19/79, call W4ZBB. Info and reservations: PARC, c/o Joe Giangrosso, WD4JZG, P.O. Box 3075, Fort Walton Beach, FL 32548, tel. 904-863-2829.

†Georgia: The Columbus ARC hamfest will be held on Saturday, March 27, from 9 A.M. to 5 P.M. (EST) and Sunday, March 28, from 9 A.M. to 3:30 P.M., at the Columbus Municipal Auditorium. Ticket donation 13 for $10, 6 for $5 and 1 for $1. ARES forum, flea market, bingo for family, free coffee and hot chocolate. Free parking for self-contained RVs only. Prizes. Talk-in on N4BJZ/R 146.01/61. Information and table reservations from Jeane Hunting, K4RHU, 2701 Peabody Ave., Columbus, GA 31904, tel. 404-322-7001.

Illinois: Second annual Spring Hamfest will be held by Civil Air Patrol at Lake County Fair Grounds, U.S. 45 and Illinois 120, Grayslake. Donation $2, tables $3. For reservations and info, send s.a.s.e. to Capt. Rehm, W9NXR, 637 Emerald St., Mundelein, IL 60060. *Note new date — Saturday, March 20.*

Indiana: The Randolph ARA 3rd annual hamfest is Sunday, March 14, from 8 A.M. to 5 P.M. Set up on Saturday from 6 to 8 P.M. and Sunday from 6 to 8 A.M. Tickets $2, $3 at the door. Table space (by reservation only) $5 with table, $2.50 without. For advance reservations and information, contact RARA, P.O. Box 203, Winchester, IN 47394 or W9VSX, tel. 317-584-9361.

†Iowa: The 6th annual Hamboree sponsored by the 3900 Club and Sooland Repeater Association, will be held Friday, March 19 and Saturday, March 20, at the Marina Inn in South Sioux City, Nebraska. Doors open at noon on Friday and at 9 A.M. Saturday. Exhibitors, flea market, technical forums, cw contest (one for Novices), ARRL, QSL Bureau, Handi-Hams, dinner banquet. Tables (3 × 8) $3 for both days; contact Al Smith, WØPEX, 3529 Douglas St., Sioux City, IA 51104. For advance tickets and motel reservations, contact Jerry Smith, WØDUN, Box 14, Akron, IA 51101. For further information, contact Dick Pitner, WØFZO, 2931 Pierce St., Sioux City, IA 51104 or Glen Holder, KØTFT, RR 1, Hinton, IA 51024.

†Kentucky: The Lincoln Trail ARC hamfest will be held on April 3, from 8 to 5 in Elizabethtown. Donation is $3 advance, $4 at door. ARRL forum, Dave Vest, KZ4G, SCM of KY: ARES Forum, N4EEL, Paul Eiden, Jr. Food and refreshments, tables and chairs. Talk-in on 38/98 and 52. Further information from Dave Welch, WA4IXA, 101 Danna Ave., Radcliff, KY 40160, tel. 502-351-2340.

†Louisiana: Lafayette Hamfest 82 sponsored by the Acadiana ARA will be held at Evangeline Downs Race Track Club House, Lafayette, on Saturday, March 13, from 9 to 5 and Sunday, March 14, from 9 A.M. to 1:30 P.M. Commercial displays, forums, flea market, ladies activities. Talk-in on 22/82 and 21/81. For information, contact Richard Ipson, N5BYM, Rte. 1, Box 378, Carencro, LA 70520, tel. 896-4492.

†Maryland: The Baltimore Radio Amateur Television Society (BRATS) presents the famous BRATS Maryland Hamfest, at the Howard County Fairgrounds, Rte. 144 at Rte. 32, adjacent to I-70, about 15 miles west of Baltimore. Talk-in on 63/03, 16/76 and 52. Indoor tables with ac power, $15; without ac, $10. Indoor tailgating $5 per space; outdoor tailgating $3 per space. Overnight RV hookup available. For information and reservations, write to BRATS, P.O. Box 5915, Baltimore, MD 21208.

Massachusetts: The Framingham ARA will hold its 6th annual spring flea market on Sunday, April 4, at the Framingham police station drill shed. This is the largest indoor ham flea market in New England. Doors open at 10 A.M. (sellers' set-up at 8:30). Admission is $2, sellers $8/table prior to March 27, $10/table after. Talk-in on 75/15 and 52. Radio equipment, computer gear, food, bargains galore! Contact Ron Egalka, K1YHM, 3 Driscoll Dr., Framingham, MA 01701, tel. 617-877-4520.

Michigan: The Southeastern Michigan ARA (SEMARA) will hold its 24th annual hamfest swap and shop on April 4 from 8 A.M. to 3 P.M., at the Grosse Pointe North High School, Vernier Road between Mack and Lakeshore, Grosse Pointe. Admission is $1 in advance, $2 at the door. Prizes and food. Talk-in on 75/15. For further information please send s.a.s.e. to SEMARA Swap, P.O. Box 646, St. Clair Shores, MI 48083 or call Ray Ninness, WD8KXN, tel. 313-777-0119.

Michigan: The 21st annual Michigan Crossroads hamfest, sponsored by the Southern Michigan ARS and the Calhoun County Repeater Association, will be held March 20 at the Marshall High School, Marshall. Doors open at 7 A.M. for exhibitors and at 8 A.M. for buyers and lookers. Plenty of free parking and carry-in help. Full food service available. Table space at 50¢/ft, reserved until 9 A.M. For more information write SMARS, P.O. Box 934, Battle Creek, MI 49016 or call Earl Goodrich, tel. 616-781-3554.

Minnesota: The Rochester ARC and the Rochester Repeater Society will sponsor the Rochester Area Hamfest on Saturday, April 3 at John Adams Junior High School, 1525 N.W. 31 St., Rochester. Doors will open at 8:30 A.M. Large indoor flea market for radio and electronic items, prizes, refreshments. Talk-in on 22/82. For further information, contact RARC, c/o WBØYEE, 2253 Nordic Ct. N.W., Rochester, MN 55901.

†Missouri: A.R.C.H. '82, St. Louis, March 27 and 28, Chase Park-Plaza Hotel, official ARRL-sanctioned hamfest. Amateur Radio and computer hobbyists: All indoors, including giant flea market, major national exhibitors and dealers, workshops and forums. Saturday evening banquet, ladies activities, prizes. Special hotel accommodations. Advance tickets $3. For further information, contact Gateway Amateur Radio Assn., P.O. Box 8432, St. Louis, MO 63132, tel. 314-361-4965. Talk-in on 34/94.

Missouri: The Jefferson Barracks ARC will hold its annual auction and hamfest on March 12 at a new location, the Carendelet Sunday Morning Athletic Club in South St. Louis. Doors open at 6 P.M., auction at 7:30 P.M. For further info, contact JBARC, c/o R. R. Lang, KAØIUY, 9400 Dana Dr., Affton, MO 93123.

Nevada: SAROC annual prestige convention for radio amateurs is scheduled April 1-4 at the luxurious Aladdin, one of Las Vegas's newer hotels. Registration is $19 per person; technical sessions, exhibitor display Friday and Saturday. Aladdin SAROC special room rate $36 per night, plus room tax, single or double occupancy, available to exhibitors and SAROC paid registered guests. Send SAROC registration to P.O. Box 14217, Las Vegas, NV 89114.

New Hampshire: The Interstate Repeater Society, Inc. will hold their annual hamfest and flea market on Saturday, March 13, at the Merrimack Hilton Hotel in Merrimack, from 9 A.M. to 4 P.M. Tables will be available at $10, admission $1. Commercial vendors, prizes, dinner dance will feature live music and entertainment. Talk-in on 25/85 and 52. Further information from Ken Soares, N1BAD, P.O. Box 94, Nashua, NH 03061 or on 25/85.

New Jersey: The Irvington RAC hamfest is Sunday, March 21, from 9 to 4 at the PAL Bldg., 285 Union Ave., Irvington. Take the Garden State Pkwy. to exit 143 North or 143-B Southbound. Talk-in on 34/94 and 52. Refreshments. Admission $1, tables $3. For information call Ed, WA2MYZ, tel. 201-687-3240 or write IRAC at PAL address.

New Jersey: Ham Radio Flea Market sponsored by Chestnut Ridge RC will be held Saturday, March 20, at the Education Building, Saddle River Reformed Church, East Saddle River Rd. and Weiss Rd., Upper Saddle River. Tables $10 for first, $5 each additional table, tailgating $5. No admission fee. Food and soda. Contact: Jack Meagher, W2EHD, tel. 201-768-8360 or Neil Abitabilo, WA2EZN, tel. 201-767-3575.

New Jersey: The Delaware Valley RA will hold its annual flea market Sunday, March 28, 8 A.M. to 4 P.M. at the New Jersey National Guard 112th Field Artillery Armory, Efferts Crossing Rd., Lawrence Township. Advance registration $2.50, $3 at the door. Indoor and outdoor flea market area, prizes, refreshments, FCC examinations. Sellers bring own tables. Talk-in on 07/67 and 52. For further information write: DVRA, P.O. Box 7024, West Trenton, NJ 08628.

North Carolina: The Raleigh ARS will hold its 10th annual hamfest at the Crabtree Valley Shopping Mall parking area on April 18 from 8 A.M. to 4 P.M. The preceding evening there will be a hospitality room and party from 7 to 10 P.M. at West Community Room at Crabtree Mall. Admission $4. Prizes, vendor booths, swap tables, MARS, food. Talk-in on 04/64 and 28/88. For further information contact Ken Boggs, KB4RV, 8704 Cliff Top Ct., Raleigh, NC 27612, tel. 919-782-8646.

†Ohio: The Lake County ARA will present their 4th annual Lake County Hamfest, Sunday, March 28, at Madison High School, Madison. Doors open for exhibitors at 6 A.M., for the public at 8 A.M., at the large indoor location. Doors close at 4 P.M. Admission in advance $2.50, $3.50 at the door. Table and display space is $5 for 6-foot table, $6.50 for 8-foot table; advance reservations guaranteed until 10 A.M. Talk-in on 81/21 and 52. Information and reservations available by sending s.a.s.e. to Lake County Hamfest Committee, 1326 East 349th St., Eastlake, OH 44094, tel. 216-953-9784.

Ohio: The Teays ARC hamfest will be held on Sunday, March 21, at the Pickaway County Fairgrounds, from 8 A.M. to 4 P.M. Advance admission is $2, at the door $3. Tables (8 ft) are $4 in advance, $5 at the door. A flea market for new and used equipment. Many prizes. Talk-in on 78/18 and 52 simplex. For further information, advance registration and tables, contact Dan Grant, W8UCF, 22150 Hulse Rd., Circleville, OH 43113, tel. 614-474-6305.

Ohio: The Canton ARC will hold their annual auction on March 20 at the Nimishillen Grange Hall, Easton St. N.E. Doors open at 4 P.M. Prizes, talk-in on 12/72. For more information, send s.a.s.e. to Rick Rolli, WD8IKA, 1515 40th St. N.W., Canton, OH 44709, tel. 216-492-2369 after 5 P.M.

†Ohio: The Toledo Mobile RA, Inc. presents its 27th annual auction and hamfest, Sunday, March 21, at the Lucas County Recreation Center, on Key St., Maumee. Hours are 8 A.M. to 5 P.M. Free auction starts at 10 A.M. Tickets are $2 in advance, $3 at the door. Flea market tables available and displays are limited to electronics and ham gear *only*. Commercial exhibits, refreshments, prizes, special ladies program. Talk-in on 52. Area repeaters are on 01/61, 19/79, 34/94, 87/27 and 975/375. Hope to see you there. For more info, write J. Honisko, KB8YD, 1733 Parkway Drive N., Maumee, OH 43537.

Pennsylvania: The 5th annual hamfest of the Conemaugh Valley ARC will be held on March 28 at the Sandy bottom Sportsman's Club in Seward, which is approximately 10 miles northwest of Johnstown along Rte. 56. Hours are 8 A.M. to 4 P.M. Plenty of prizes and food. Talk-in on 34/94. For further information contact CVARC, 2829 Bedford St., Johnstown, PA 15904.

†Tennessee: The Oak Ridge ARC invites you to attend the 4th annual Oak Ridge Hamfest at the Civic Center in Oak Ridge on April 3-4. Doors open 9 to 5. Large indoor dealer display, forums, awards and concessions. Enjoy a free cup of coffee while you eyeball old friends in our QSO Room, or take advantage of the Tennessee springtime while browsing through the ample outdoor flea market. Talk-in on 28/88 (72/12 backup) and 52. Admission $3, accompanied children free. For more information send s.a.s.e. to: ORARC,

†ARRL Hamfest

*Convention/Travel Coordinator, ARRL

Hamfest, P.O. Box 291, Oak Ridge, TN 37830 (Attn: Jim McNair, N4EXG).

Texas: The MSC ARC, W5AC, Texas A&M University, College Station, will hold its annual hamfest on March 27, at the Zachary Engineering Center on the Texas A&M campus. Technical seminars by faculty and distinguished Amateur Radio operators are scheduled between 9 A.M. and 3 P.M. Tables may be loaded and tuned starting at 7 A.M. Xmtr hunt in afternoon, prizes, and tours of W5AC shack will be conducted. Contact: H. N. Howell, Jr., Dept. of Entomology, TAMU, College Station, TX 77843.

Texas: Midland ARC is having its annual swapfest beginning March 13 at 8 A.M. to 6 P.M. and continuing on Sunday at 8 A.M. to 3 P.M., at the Midland County Exhibit Building, east of Midland on Hwy. 80 on the north side. Prizes. Pre-registration is $5, $6 at the door, tables are $3 per table. Talk-in on 16/76 and 01/61. For further information and reservations, please write to Midland Amateur Radio Club, Box 4401, Midland, TX 79704.

Wisconsin: The Tri-County ARC will hold its annual hamfest on March 21, from 8 A.M. to 3 P.M., at the Jefferson County Fairgrounds, Jefferson. Tickets are $2.50 in advance and $3 at the door. Tables are $2.50 advance and $3.50 at the door. Talk-in on 52 and 22/82. Parking, food and prizes. For information, advance tickets and tables, send s.a.s.e. to: Horace Hilker, K9LJM, P.O. Box 204, 261 E. High St., Milton, WI 53563.

Coming Conventions

March 20-21
Roanoke Division, Charlotte, North Carolina

March 27-28
Nebraska State, Kearney

April 3-4
Arkansas State, Little Rock

April 3-4
Missouri State, Kansas City

April 17-18
Mississippi State, Jackson

May 14-15
Atlantic Division/New York State Rochester

May 15-16
Alabama State, Birmingham

May 22-23
Delta Division, Knoxville, Tennessee

June 4-6
Southwestern Division, San Diego, California

June 5-6
Oregon State, Seaside

June 12-13
Southeastern Division, Atlanta, Georgia

June 19-20
Kansas State, Salina

ARRL NATIONAL CONVENTIONS

July 23-25, 1982
Cedar Rapids, Iowa

October 7-9, 1983
Houston, Texas

ROANOKE DIVISION CONVENTION
March 20-21, 1982, Charlotte, North Carolina

The first hamfest of the year in the Mid-Atlantic states and one of the largest in the southeast will be the ARRL Roanoke Division Convention at the Charlotte Hamfest and Computerfair on March 20-21, 1982, at the Charlotte Civic Center. Charlotte's location, near the center of the two Carolinas and at the intersection of I-77 and I-85, makes it readily accessible to all of the surrounding area.

All major Amateur Radio manufacturers and dealers are expected to exhibit, as well as computer manufacturers, dealers and software houses. In addition to the commercial exhibits there also will be a large indoor flea market area. The facilities of the Civic Center are such that the exhibits and the flea market are accommodated on a single floor.

The Mecklenburg Amateur Radio Society is aware of the increasing use of computers, particularly among hams, for personal business and hobbies, and this year for the first time is including computers in the makeup of the event. This would be a good chance to check on whether a computer is in your future and to compare the various lines.

The 1982 Charlotte Hamfest and Computerfair will have a full convention format with forums, meetings, demonstrations as well as activities for the ladies.

Charlotte has a new "hands on" science museum, Discovery Place, in walking distance of the downtown Civic Center, which should prove popular with both children and spouses. Open Saturday and Sunday.

The list of prizes, while not available at press time, should be impressive. Pre-registration tickets at $4 admit one to the hamfest for one or both days. The same tickets at the door are $5.

For a brochure with details and registration information, send an s.a.s.e. to Mecklenburg Amateur Radio Society, 2425 Park Rd., Charlotte, NC 28203.

NEBRASKA STATE CONVENTION
March 27-28, Kearney

The 1982 Nebraska State Convention will be held in Kearney on March 27-28. This is the first State Convention to be held in recent years and the sixth year in a row that the Midway Amateur Club has hosted a Spring Hamfest. The two-day affair will again be held at the spacious and beautiful Holiday Inn-Holidome (right off I-80) with over 40,000 square feet of ham and family activities under one roof.

An all-star event has been lined up with outstanding symposiums, ranging from amateur television to designing your own antenna; a great "Ladies Day"; nationally known exhibitors; a fine flea market; and a very popular Ladies Bazaar. Speakers will include Paul Pagel, N1FB, from *QST* Product Review to Dr. William Osborne, KJØT, from the University of Nebraska and COMSAT. Because of the growing popularity of the flea market and the ladies bazaar, they have been expanded to two days and moved into the Holidome along with the commercial exhibitors.

Other annual popular activities will include the Fourth Annual Code Contest with a prize and certificate for the winner, the Flying Hams Breakfast, State Army MARS meeting, and ARRL Forum with Paul Grauer, WØFIR, Midwest Division Director. A miniature golf tournament for the kids and a Farmers Breakfast have been added to this year's list of events. The annual family banquet on Saturday evening will be highlighted by outstanding entertainment and nationally known after-dinner speaker Dr. Beverly Meade. The dinner will again be all you want Western buffet style.

The Holiday Inn-Holidome provides for a super family fun vacation weekend, and owing to its central location, Kearney is one of the most popular convention centers in Nebraska. Continued support from our ham friends across the Plains will make this the very best Convention ever. For an eight-page brochure and further information, please contact Dorothy Jacobsen, WDØGTS, Nebraska State Convention, Box 1231, Kearney, NE 68847.

ARKANSAS STATE CONVENTION
April 3-4, 1982, Little Rock

The ARRL Arkansas State Convention and All Arkansas Hamfest, sponsored by The Central Arkansas Radio Emergency Net, Inc. (CAREN), will be held April 3 and 4, at the North Little Rock Community Center on Pershing Blvd. near the intersection of I-30 and I-40. Three motels within walking distance. Banquet Saturday night at the Ramada Inn, with guest speaker Clyde Hurlbert, W5CH, newly elected Delta Division Director. Hourly drawings, flea market, new dealers, MARS coffee, DX program. Close to McCain Mall for shopping, fun for the whole family. Hours: 9 to 5 Saturday, 9 to 2 Sunday. Free admission. Talk-in on 146.34/94 and 147.90/30. You do not have to be present to win the main two awards of a low-band rig and a 2-meter rig. For further details, contact Dale Temple, 1620 Tarrytown, Little Rock, AR 72207.

MISSOURI STATE CONVENTION
April 3-4, 1982, Kansas City

The PHD Amateur Radio Association, Inc. of Liberty, Missouri, will sponsor the 1982 Missouri State ARRL Convention (13th Annual Northwest Missouri Hamfest) on Saturday and Sunday, April 3-4, in the Trade Mart Building at the Downtown Kansas City, Missouri Airport.

There will be a complete program of forums: ARRL, DX, XYL; 65 commercial booths and 150 swap tables, all inside the 45,000 square-foot, one-level air-conditioned building. Unlimited free parking adjoins the site. RVs welcome, no hookups. Missouri-Kansas CW and Amateur of the Year awards. Homebrew contest. Many prizes. Doors open 10-5:30 both days. Commercial exhibitors may set up 7-9 P.M. on Friday or 7-10 A.M. Saturday. Swappers 9 A.M. Saturday.

There will be a Saturday night banquet at the world-famous Gold Buffet. Guest speakers will be Ellen White, W1YL/4, DX editor of *QST*, Marjorie Tenney, WB1FSN, ARRL convention coordinator, Paul Grauer, WØFIR, Midwest Division Director, and others.

Registration $4; banquet tickets $10.25; swap tables $10 for both days (includes one registration per table). Those desiring banquet tickets and swap tables are urged to order in advance. All pre-registrations will be held at door. Talk-in on 146.34/94. For information write to PHD Amateur Radio Association, Inc., P.O. Box 11, Liberty, MO 64068-0011, or phone 816-781-7313 or 816-452-9321.

Special Events

Conducted By Mark Wilson,* AA2Z

Opp, Alabama: KA4LRL will operate from the 23rd annual Rattlesnake Rodeo from 1200Z *March 6* until 0400Z *March 7*. Frequencies: 3.965 7.240 14.290 21.375 28.600 MHz. Certificate available from Dale Boothe, KA4LRL, 3430 Greenwood Ave., Anniston, AL 36201.

Fulton, Missouri: Callaway AR League will operate WØDD from 1500-2200Z *March 6 and 7* from the Winston Churchill Memorial to commemorate the Iron Curtain speech of 1946. A special QSL is available for a large s.a.s.e. to P.O. Box 241, Fulton, MO 65251.

Trail, British Columbia: Beaver Valley ARC members will operate from 0001Z *March 5* until 2400Z *March 8* during the British Columbia Winter Games. Certificate for proof of contact with any area amateur and s.a.e. with return postage or IRCs to: Box 413, Fruitvale, BC VØG 1LØ, Canada.

Missoula, Montana: Hellgate ARC will operate KC7HP on *March 13 and 14* from the summit of Lolo Pass on the Nez Perce Indian trail used by Lewis and Clark on their journey to the Pacific. Frequencies: General-class portions of 20-15-10 meters. Certificate for large s.a.s.e to Fred Olson, 705 W. Sussex, Missoula, MT 59801.

Stanford, California: Stanford Linear Accelerator Center ARC will operate WA6UNP from 0000Z *March 20* until 0000Z *March 21* in commemoration of the seventh anniversary of the discovery of the Psi particle. Frequencies: phone — 3.905 7.260 14.290 21.360 28.650 MHz. Certificate for large s.a.s.e. to SLAC ARC, Bin 20, Box 4349, Stanford, CA 94305.

Houston, Texas: Johnson Space Center ARC operates W5RRR during Space Shuttle missions, providing special QSL cards and retransmitting live air-to-ground communications between the Orbiter and Mission Control in Houston. The next mission is tentatively scheduled for *March 22*. Frequencies: phone — 3.940 7.265 14.280 21.365 28.600 MHz. QSL for s.a.s.e. to JSC Ham Club, RFD 1, NASA, Houston, TX 77058.

Ventura, California: Poinsetta ARC will operate WA6BMH from 2000Z *March 27* until 2000Z *March 28* to commemorate the bicentennial of the San Buenaventura Mission. Frequencies: phone — 3.945 7.245 14.285 21.365 28.545; cw — 45 kHz up from lower band edge; Novice — 45 kHz up from lower band edge. Certificate available from PARC, Box 716, Ventura, CA 93002.

Timonium, Maryland: Catonsville Community College ARS will operate W3FT from 1200-2100Z *March 28* during the Baltimore ARC 1982 Hamboree and Computerfest. Frequencies: phone — 7.275 14.290 21.365 28.550; cw — 7.110 21.120 28.120. Certificate for QSL showing QSO number and large s.a.s.e to KA3GSN, 6 Osborne Ave., Catonsville, MD 21228.

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 March to make the May issue.

*Assistant Communications Manager, ARRL

In Training

Conducted By Steve Pink,* KF1Y

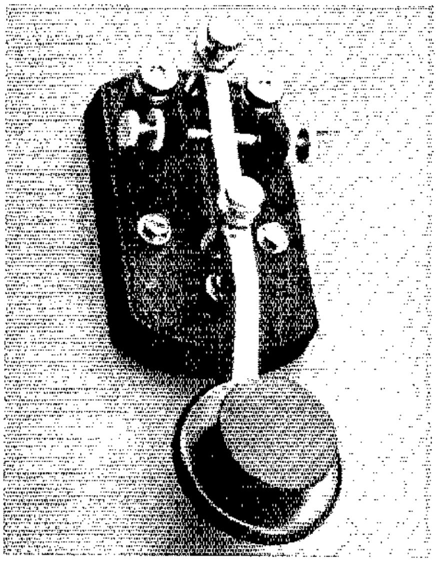
MORSE CODE REVISITED

Teaching Morse Code has been the subject of this column before, but this time we would like to direct the discussion to philosophical fundamentals. Two questions need to be asked: "What is the best method of learning to copy code at a particular speed?" and "What is the most effective program for passing the FCC code exam?" We can look at these questions separately.

Code Speed

The approach taken by W1AW and the League's training program has been to generate code characters at the rate of 16 wpm and to achieve the slower speeds by lengthening the space between characters and words. The philosophy behind this method is that learning the code characters initially at a high speed enables one to advance more quickly to higher rates of copy. Thus the difference in learning to copy code at 5, 7-1/2 and 10 wpm, by this method, is learning more quickly to recognize the patterns of "dits" and "dahs" that make up a character. An advantage of this system is that sending the characters at high speed makes it impossible, from the beginning, to count dots and dashes and forces the student to learn the code by sound only. The transition from counting dots and dashes to recognizing patterns of sound is crucial to getting beyond copying approximately 10 wpm.

But there is a disadvantage to using this system consistently. The FCC's 13-wpm code exam is based on the standard method of code generation where a "dit" has a relative time duration value of one, a "dah" three, an element space one, a character space three and a word space seven. Accordingly, W1AW and ARRL code practice material switch at their 13-wpm level to the standard method in order to prepare the student for the FCC exam. The problem arises when the student is forced to make this switch after learning the code generated according to the League's method described earlier. One only needs to listen to the two consecutively to hear the difference. Copy, for example, side 3 (10 wpm) of the *ARRL Code Kit* for a few minutes and then switch to side 4 (13 wpm). Some hams find the 13-wpm code difficult or awkward to copy after listening to the 10 wpm, and some of these people can copy 25 wpm or more!



There are some very good educational reasons why we teach code from the beginning at the 16-wpm character level. There is also one very important reason why we switch to the standard method at the 13-wpm level. Is there any way, then, to eliminate the awkwardness in the jump from 10 to 13 wpm? One suggestion is to change methods gradually from the 5-wpm to the 13-wpm level so that the jump from 10 to 13 is not so startling. This would mean that the code characters for the 5-wpm code practice would be generated at 16 wpm with large spaces between characters, but then the proportion between character and character space would be diminished in steps at the 7-1/2- and 10-wpm level, approaching the proportion of the standard method. Implementing suggestions like this takes some doing, and it would be nice to hear from ARRL instructors on this issue. Does the League's method of code generation satisfy you or would some changes help you to teach your classes better? We need feedback from you to answer these questions.

Practicing for the Exam

Our second question expresses a concern over the way to study for the FCC code exam. Does more effective preparation come from practicing random code groups or from copying actual text, such as sample QSOs? The texts for the code exams given by the FCC these days are simulated QSOs, and the test consists of 10 questions asking for fill-in-the-blank answers. You must answer 7 out of 10 correctly (and this means correctly to the letter and for punctuation marks) to pass the test. This procedure suggests that practice for the test should be in the QSO format. Practically, though, there is a problem with this format. Code practice can contain only a small number of QSOs and experience shows that these texts are often memorized before the code-speed level has been achieved.

Thus, much of the code-practice material available contains random character groups. Some people say that copying random groups is more difficult than copying straight text so that if you can copy the random characters at a certain level than you can copy the text. But does copying only random characters prepare you for the peculiarities of a QSO? Here again, it seems, there are advantages and disadvantages to both methods. Perhaps a combination of the two methods is the best approach to take in a code-practice tape. On this issue, too, we need your comments and suggestions. The ARRL training program is there to serve you, the instructor. Let us know, in your experience, the best way to answer these questions. Drop a line to the Training Branch; your comments will be very much appreciated.

*Training Program Manager, ARRL

Club Corner

Conducted By Sally O'Dell,* KB1O

TO REPEAT OR NOT TO REPEAT

Is your club considering putting a repeater on the air? Several thousand repeaters are in operation across North America. (Most of them are listed in the new ARRL *Repeater Directory*, which will be available in April). It's a good idea to plan before you leap — for both the clubs attempting this for the first time as well as the "old timers." What's involved in putting a good repeater system on the air?

What band do you want to use? Why, 2 meters, of course! Really? Let's take a look at the facts. Using the *standard* (?) 2-meter band plan as a guide, about 60 frequency pairs are available. The new *Repeater Directory* will list approximately 5000 repeaters for this band! That makes for a lot of rf.

The 2-meter band sits just below the commercial "high band" (148-170 MHz), which is one of the most congested (polluted?) of the commercial 2-way radio bands. Chances are your repeater will be located near several stations operating in the "high band." The hetrodyning of these signals with the 2-meter energy in the area may give your repeater a bad case of "intermod."

The 2-meter band plan is falling apart at the seams. Several years ago before the 144.5- to 145.5-MHz subband came along, repeater channels were spaced 30 kHz apart, e.g., 146.01, 146.04, 146.07. The need for additional repeaters forced the adoption of the split channels, such as 146.025, 146.055 and 146.085. Some areas adopted regular input/output sequencing (low-in/high-out for 146 MHz), while other areas inverted the split channels (high-in/low-out for 146 MHz). Since there was a large safety zone between areas, few problems were noticed early on. Now the safety zone has melted away, because the rural areas are filling up the available channels. Where the "uprights" meet the "inverted," there is chaos.

So, if you are certain that you want to put a 2-meter repeater on the air, rest assured that in addition to the normal problems associated with repeaters, you are almost certain to encounter other difficulties related to overcrowding and a breakdown of the coordination system. Is there a reasonable alternative to 2 meters? You bet!

The best alternative to the growing mess on 2 meters is the 220-MHz band. The band plan for 220 has 50 pairs, which is close in number to the 60 or so of 2 meters. There are only about 600 repeaters on 220 compared with the 5000 on 2 meters! Nothing near 220 is capable of creating the intermod garbage that comes from "high band." The 220 band plan works, and, to the best of my knowledge, is being universally followed with *no* oddball splits. Best of all, the coverage area is about the same as that with a 2-meter repeater.

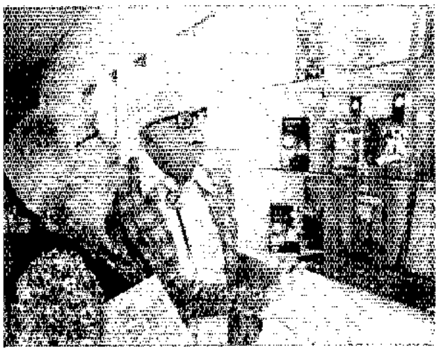
Now that you've decided that 220 is the logical choice for your repeater (please don't tell me that you still want to put up a 2-meter repeater; I can't deal with rejection), what are the big cost items when establishing and maintaining a system? The initial investment includes the receiver and transmitter strips, the control circuits, the antennas, the hardline cable and, usually, a duplexer. These are essential; any bells or whistles will cost extra. Autopatch is probably the most common accessory for a repeater — and it can be one of the most expensive. The hardware, although not necessarily inexpensive, may be the least costly part of the 'patch. You will have a monthly telephone bill. If the repeater is located at a remote site with other radio equipment, the telephone company may charge you the business rate for any lines terminated there. That usually means higher rates. Logging and monitoring requirements are more stringent for repeaters with autopatch than those without.

There are less obvious costs associated with repeaters. Like any other equipment, repeaters break down and have to be repaired. Repairing them requires parts, time and test equipment. Antennas are occasionally hit by lightning — they usually aren't much good afterward. Eventually, everything wears out and must be replaced. Will the club be saving a little each year for that rainy day?

What kind of a repeater do you want? Do you want something that provides good, but limited, local coverage? Or do you want to be in the monster (wide coverage) repeater category? Clubs that have monster repeaters certainly are well known — to the flakes, weirdos, jammers and other assorted malcontents. Hint: Any way you look at it, there are less problems with limited-coverage repeaters.

Having read this and thought about it for a while, is your club still considering putting a repeater on the air? Repeaters are great fun, useful in times of emergency and challenging (at least, to the technical crew), but there is a price to pay. Is your club ready to pay the price? — *Peter O'Dell, KB1N, VRAC Hq. Liaison*

*Club Program Manager, ARRL



As the Pecos Valley ARC of Roswell, New Mexico, has discovered, donating a set of League publications to the local library is a most worthwhile effort. Club President KA5DUE (right) and Secretary-Treasurer WB5PSM admire the library display. *(photo courtesy Roswell Daily Record)*

Strays

ATTENTION EMASS AMATEURS

☐ The Framingham ARA is offering a scholarship opportunity for licensed amateurs in the Eastern Massachusetts section. Contact FARA Chairperson George Blakeslee, N1GB, Box 15, Sudbury, MA 01776.

When 9N1MM comes to visit, people listen! Father Marshall Moran, who has made 15,000 contacts from Nepal over the past 15 years, chats with W8ROS and WA8YPY at a recent meeting of the Motor City RC in Detroit. *(photo courtesy KB8R7)*

CHRISTMAS COMES TWICE TO WA7NNH

☐ When Jack Brower, WA7NNH, of Boise, Idaho, sat down to work some DX last fall, he didn't expect to snare two rare stations on the same day — T32AB and VK9XW. What's noteworthy about it is that both stations are located on Christmas island — one in the Indian Ocean, and one in the Pacific!

CONTACT A ZS HAM

☐ A South African ham with many friends in North America, now off the air because of a loss of hearing, would like to hear from his radio friends by letter. He's Don Grundlingh, ZS6BEP, Kiepersol 110, Fratesweg, Rietfontein 0084, TVL, South Africa.

QSLING TIP

☐ My DX QSOs are logged in a different color ink than those used for recording domestic QSOs. This scheme makes eventual QSL logging much easier. — *Victor A. Woodling, W9JNH*

HE'S NOT A "CEer"

☐ When John Christopher, of Santa Ana, California, received a new amateur license with the call KC6CE, he didn't think anything was out of the ordinary. It wasn't until after some friends happened to notice that KC6CE already appears in the *Callbook* under a different name that he suspected a problem. The FCC tells him that his new call should have been printed as KC6CB. All who have contacted John, KC6CE, should change their log notations to KC6CB.

QST congratulates . . .

☐ Mark Friedman, WB2FNX, who won first place in the regional, and second place in the national, competition for computer projects designed to assist persons with disabilities. The competition was sponsored by the Applied Physics Laboratory at John Hopkins University. Friedman is assistant professor and research engineer at Carnegie-Mellon University at Pittsburgh.

☐ Dean Davis, W5BGE, who received a plaque from the West Gulf Division and ARRL honoring him for many years of service on traffic nets.

I would like to get in touch with . . .

☐ amateurs who work for the DuPont Company, for a company-wide listing of hams. Bob Averitt, DuPont Experimental Station, Bldg. 357 (through company mail), or at 170 Brookside Blvd., Newark, DE 19713.

☐ Pittsburgh-area amateurs who operated on the informal "1900" net during the spring and summer of 1941. Les Hill, W2QHS (ex-W8VGL), 11 Fairfield Dr., Tinton Falls, NJ 07724.

☐ repeater groups who are interested in temporarily linking their machine with ours, allowing QSOs between your members and ours. Casper ARC, c/o Joe Dickinson, KB7XF, 1212 S. Boxelder Ave., Casper, WY 82601.

☐ U.S. amateurs who would like to host us for a couple of days, in return for us doing the same for them in Australia. We plan to visit the U.S. around mid-year. David S. Thompson, VK2BDT, "Marama," Box 350, Goulburn 2580, Australia.

Silent Keys

It is with deep regret that we record the passing of these amateurs:

W1ACZ, Burnett V. Vickers, Orleans, MA
W1ALK, Perley H. Mudgett, E. Walpole, MA
W1AXH, R. Foster James, No. Chatham, MA
W1BJ, Archie L. Deane, Sedgwick, ME
W1BSG, Ransom H. Willard, Natick, MA
K1HRE, Allan O. Collier, Keene, NH
W1MKE, Herbert M. Huntley, Trumbull, CT
K1SLW, Albert G. Snow, Jr., So. Burlington, VT
W2AXB, Ralph S. Wallen, Sr., Surf City, NJ
WA2CGV/KB2YL, Charles M. Ring, West Hurley, NY
N2CM, Charles A. Martin, Hightstown, NJ
ex-K2DJ, Clyde J. Houldson, Mt. Carmel, IL
W2DLF, Wilmer S. Thompson, Libertyville, NJ
W2ETI, Philip M. Hamlin, Toms River, NJ
WA2QMF, Harold S. Warner, Coxsackie, NY
WA2QZR, Helen C. Uryniak, New Hartford, NY
WB2WAV, John English, Phoenix, NY
K2YMM, Haywood Parker, Jr., Pittsford, NY
K3AHB, Lt. Col. Clifford T. Andrews, Aberdeen, MD
WB3ALT, Dr. Lewis M. Yunginger, Lancaster, PA
KA3FIP, Stanley D. Clark, Meadville, PA
WA3GXE, Anthony J. Vitacco, Levittown, PA
W3HFG, W. Stanley Winter, York, PA
W3HMG/ex-K8HVH, Frederick L. Scheuering, Export, PA
WB3JRI, Capt. Arthur Enderlin, Bethesda, MD
W3KNU, Walter B. Grautoff, Silver Spring, MD
W3VRE, Clark V. Hile, Pleasant Gap, PA
W3ZFU, Ann M. Carson, Honey Brook, PA
WA4APA, Urquit S. Aaron, Savannah, GA
WB4ARR, Gilbert R. Covington, Hermitage, TN
WA4EKH, James W. Carter, Stockbridge, GA
K4EL/W2ED, Graham V. Lowe, Sebastian, FL
W4FYQ, Clarence A. Breazeale, Lenoir City, TN
W4GA, Lester G. Rodefeld, College Park, GA
K4HHL, James D. "Dink" Stone, Ridgeway, SC
K4JSF, Casper L. Wenzler, Memphis, TN
W4JYS, Howard H. House, Fort Wright, KY
*WA4KEM, Malcolm M. Hemphill, Griffin, GA
KA4KJO, Leslie P. Farmer, Louisburg, NC
WB4KPQ, Edward A. Quick, Hendersonville, NC
WD4LDC, Dee Rogers R. Foil, Montgomery AL
WD4MCD, James F. Pearsall, Richmond, VA
WA4MYQ, Stewart S. Ingool, Greensboro, NC
WB4NRF, William Humphries, Riviera Beach, FL
W4ORE, Merrill W. Preston, Jonesboro, GA
W4OUX, Frank Faynor, Boca Raton, FL
K4PE, Malthus F. Pugh, Hepazibah, GA
K4QPB, Carl R. Leslie, Delray Beach, FL
W4RL, Richard C. Peck, Herndon, VA
KA4SWO, Brewer B. Jones, Columbus, GA
W4SWR, Jesse B. Watson, Wilmington, NC
WA4UQE, Alfred W. Hester, Atlanta, GA
W4VWQ, William T. Brown, Vine Grove, KY
N4YO, William A. Clark, Atlanta, GA
W5ATJ, Howard W. Dow, Hammon, OK
W5EN, John L. Boulton, Lilburn, GA
W5PA, J. Douglas Martin, Jr., Cedaredge, CO
W5RIM, Charles Galloway, Jackson, MS
W5WVH, Rex W. Ely, Tyler, TX
WH6ADF, Joseph F. Robert, Pinellas Park, FL
WB6CAR, John Brice, Glendale, CA
WB6CNQ, Carl J. Perkins, Hemet, CA
W6DAY, Joseph Tami, Jr., Rowland Heights, CA
W6FTA, Edard E. "Barney" Burke, Jr., Fresno, CA
W6FYW, Irvin O. Hege, Paso Robles, CA
W6PER, Raymond McConnell, Ontario, CA
W6PIX, Harry F. DeVries, Porterville, CA
N6QT/VE2GT, David J. Deeks, Hayward, CA
W6RAQ, William F. Frankart, Santa Ana, CA
W6TAR, Gage E. Johnson, Sun City, AZ
W7AET, L. R. Evenson, Seattle, WA
N7BX, Daniel Sleasman, Pacific Beach, WA
W7MCK, Morgan Z. Evans, Glendale, AZ
WB7NGC, Herman J. Anders, Cheyenne, WY
W7OAN, Lawrence I. Hatfield, Pasco, WA
K7QC, Robert R. Richolt, Issaquah, WA
AF7Y, J. Watson Justice, Sun City, AZ
K7ZVA, Robert L. Jenks, Tacoma, WA
W8CJW, Robert C. Lawrie, Wakefield, MI
W8CON, Harold W. Shoquist, Iron Mountain, MI
W8HIM, Jack S. King, Fennville, MI
WA8NBQ, Howard R. Leland, Ravenna, OH
W8PFP, John T. Powell, Fairborn, OH
WB8QWT, Louis F. Phillippi, Pleasant Ridge, MI
K8RKM, Carl W. Salminen, Birch Run, MI
W8SOE, Allen H. Kammer, Anchorville, MI
W8TXT, Stanley W. Dickhaut, Huron, OH
W8YCN, Floyd F. Jackman, Montrose, MI
WB8ZFY, Robert N. Burley, Huntington, WV
K8ZOH, Ronald Robinson, Niles, MI
WA8ZWX, Eugene F. McAuliffe, Westland, MI
WA9DHQ, William P. Foster, Attica, IN
KA9GDG, Edward C. Sparling, Springfield, IL
W9KXK, Paul R. Niles, Waupaca, WI
W9NQJ, Alex Lochmandy, South Bend, IN
WB9QEB, Joseph D. Hoyt, Indianapolis, IN
W9QR, William M. Enslen, Fort Wayne, IN
WA9SRZ, Thomas N. Haug, Des Plaines, IL
K9TAJ, William W. Parker, Wisconsin Rapids, WI
K9YZJ, Robert E. Keeling, Veedersburg, IN
W9ZSC, Raymond O. Worthington, New Lisbon, IN
WØBAJ, Earl W. Mauzey, Cassville, MO
KØCVX, Winton M. Logan, Zumbrota, MN
WDØGWT, Fred L. Bretch, Clearview City, KS
KØMUF, Elwin L. Coolman, Lincoln, NE
WØQNJ, Elmer J. Wilson, Healy, KS
KØRSD, Alvin E. Hoskinson, Turon, KS
WBØVPZ, Elmer V. Seburg, Minneapolis, MN
WBØZXA, Frederick H. Allen, Eagle Grove, IA
KH6EA, George W. Chinn, Honolulu, HI
VE3LSH, Sidney Giles, London, ON
VE3XD, James W. McCleary, Willowdale, ON
VE6WZ, John W. Row, Barons, AB
VE7ZY, Albert N. Porter, Ganges, BC
VE7BZZ, Rex Cameron, Kamloops, BC
F2FA, Firmin-H Asselin, Senates, France
G2CAS/ON4ZD, John Douglas, North Yorks, England
VK2ADE, Frank N. Leverrier, Castle Cove, Australia
VK2ZLP, Darrell L. Price, Mosman, Australia
ZL1OF, Douglas Reid, Pukekohe, New Zealand

*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 deceased. Thus, those who report a Silent Key will not necessarily receive an acknowledgment from Hq.

Note: All Silent Key reports sent to Hq. must include the name, address and call sign of the *reporter* as well as the name, address and call of the Silent Key in order to be listed in the column. Please allow several months for the listing to appear in QST.

Strays

This stamp, one of a series of commemoratives on scouting, was issued by the Ascension Island Post Office in February. It depicts a ham operating the annual Ascension Island Boy Scout Jamboree station, ZD8JAM. This may be the first time that a ham radio call sign has appeared on a postage stamp. Tnx ZD8TC.

MORSE (THE THIRD) STILL GOING STRONG

☐ Former West Gulf Director Roy Albright, N5RA, was idly scanning through his new *Callbook* and came across the entry, Samuel F. B. Morse, III, W6FZZ. Roy mentioned the interesting reference to us, and we followed up on it. We got a nice note from W6FZZ and we'd like to share some of it with you:

"I was born on July 26, 1902. My father, George W. Morse, was born May 9, 1851. By word of mouth my father indicated that his father was Samuel Francis Barracks Morse and that his father was Prof. Samuel Finley Breese Morse, a famous portrait painter and the inventor of the Morse telegraph. I am quite satisfied that my father's statements are truthful, accurate and dependably valid. I am also a telegrapher and frequently boast that I am much more proficient than my great granddaddy was! At age 17, I was the youngest telegrapher employed by the Associated Press, on a wire of 60 receivers. The wire required an average of 35 wpm for eight hours. There was a 30-minute lunch break, and two 10-minute rests and two five-minute rests. I was not the best but I can tell some tall stories about the real operators I worked with that were true but sometimes hard to believe!"

QST congratulates . . .

☐ Bob McGarvey, WB2EVF, who received a plaque from the Metuchen (New Jersey) ARC for his public relations work on behalf of Amateur Radio. McGarvey's column, "Calling CQ," has been a regular feature for a number of years in the *Sunday Home News* newspaper.

Members of the Barstow (California) ARC entered this handsome float in the annual Halloween Mardi Gras parade. *(photo courtesy WA6RDR)*

I would like to get in touch with . . .

☐ hams in top-notch condition who would like to bicycle 3000 miles, coast to coast, in late spring. Also, thanks to the many hams who helped me out on my trip from Brandon, Manitoba, to San Antonio, Texas. Randie Whelan, VE3LEK, 161 Queen's Dr., Weston, ON.

☐ anyone who has a schematic or other technical information about the Hammarlund/Outercom FM5O, a business transceiver. Leonard Martin, WD5DNQ, P.O. Box 18665, Baton Rouge, LA 70893.

The New Frontier

The World Above 1 Gig

Conducted By Bob Atkins,* KA1GT

Small Scale EME

Over the Christmas period I spent some time in England at the QTH of the RSGB Microwave columnist Charlie Suckling, G3WDG, and his wife Petra, G4KGC. Of particular interest is a 1296 EME system they have built, based around a 13-ft-diameter parabolic dish. As you will realize, this is a small antenna by EME standards, but their system is capable of obtaining EME echoes any time the antenna can see the moon.

The transmit side of their system consists of a low power (1-W) solid-state transverter driving a single-tube 2C39 amplifier. This in turn drives a two-tube 2C39 amplifier to an output power of about 130 to 140 W. For high-power work, a six-tube 2C39 ring amplifier is available, capable of 500 W of rf out.

The receive preamplifier is based on a Plessey GAT6 GaAs FET and has a noise figure of about 0.6 to 0.7 dB. Equivalent results have been obtained using a Mitsubishi MGF 1400 (the NE72089, mentioned elsewhere in this column should also be capable of similar performance).

As mentioned before, consistent EME echoes can be obtained with this system running full power out. The significance of this is that any other equivalent receiving system could also hear these echoes, so that 13-ft dish to 13-ft dish EME QSOs are quite possible (even quite easy?) With present-day equipment. The dish at G3WDG/G4KGC was home constructed, the major part of it having been built in one weekend. A dish of this size could easily be mounted on a tripod for temporary operation. EME QSOs have been made at much lower power levels with the better-equipped stations. G4KGC worked PAØSSB using only about 80-W of power at the dish feed. This power level is easily obtained from a two-tube 2C39 amplifier, which is not a tremendously difficult home construction project.

Charlie and Petra have shown that you can work EME even if you have restricted antenna space (or a limited budget, or neighbors of limited antenna tolerance!) If you have the ability to build a bigger dish then you should undoubtedly do so; it will make life easier for you and the station you are trying to work. But if you don't, then 13 ft will do the job. The rest of the equipment used is certainly capable of home construction by many amateurs with experience on 1296 MHz. In fact a good number of tropo stations probably have all they need to work EME right now, except for the antenna!

10 GHz BASICS

I have recently received a number of letters asking for some very basic information about 10-GHz operation and equipment. Those familiar with vhf/uhf operation will realize that on these bands the higher you go in frequency the more difficult (and/or expensive) the equipment is to build and operate, and the more care is required in construction and use. Following this line of reasoning it would be logical to assume that operation on the high-frequency microwave bands, such as 10 GHz, would be much more difficult than operation on the uhf bands. Wrong! Most of the operation on 10 GHz is of a different nature than operation on the lower bands. Wideband frequency modulation of free-running oscillators is the most common mode of operation. Generation of such rf at 10 GHz is in fact much easier than building a 2-meter transmitter. Gunn oscillators are the most common method of generating 10 GHz rf. These consist of a Gunn diode mounted in a small waveguide cavity with a dc voltage (about 10 volts) across it. That is all there is to it. A diode and a 10-volt dc supply will give you 10 to 20 mW of power out at 10 GHz. Frequency modulation can be achieved by varying the voltage supplied to the diode by a few 10s of millivolts. You could not hope for a much simpler transmitter than that.

On receive, the same Gunn oscillator used for transmit can be used as the local oscillator of the receiver. A simple mixer can be made by mounting a diode (e.g. 1N23) across a piece of waveguide. One end of this piece of waveguide is then attached to an antenna, and the other end to the Gunn oscillator. The signal produced by an incoming signal across the diode can be fed to a standard broadcast-band fm radio, which then acts as the entire i-f strip, demodulator and audio amplifier. You can, of course, get more complex systems than this, but it's hard to get much simpler.

The Microwave Associates "Gunnplexer" consists of an integrated module containing a Gunn oscillator, receiver mixer diode and a varactor tuning diode. Such an assembly can also be made by the home constructor who can measure accurately and drill a few holes, and who is prepared to build a little test gear. It really isn't very hard to do.

Another common assumption, based on experience gained on the lower bands, is that the higher you go in frequency the shorter communications range becomes; hence, you won't be able to work very far on 10 GHz. This is not so; it depends on how you operate. On 28 MHz you can work 12,000 miles using a random piece of wire and operating from a hole in the ground (well almost!). On 2 meters you need a decent antenna and preferably a high tower. On 10 GHz fixed-station operation is not the way to get good DX results. It requires a different operating philosophy. On the lower bands, better DX is obtained by using better and more sophisticated equipment. On 10 GHz better DX is obtained by careful planning and choosing portable operating sites. Even the simplest equipment is capable of working almost any line-of-sight path in the world. Using 1-foot-diameter dish antennas, two Gunnplexers using wideband fm (200 kHz i-f bandwidth) with 20 mW of power out should work over a line-of-sight path of over 250 miles. Using a propagation mode known as tropospheric ducting, even greater DX is possible with the same equipment. This occurs when a sharp temperature gradient occurs just above the earth's (or more usually the sea's) surface. Microwave signals can propagate in the "duct" formed between this temperature gradient and the earth's surface with very little loss. The current world DX record (about 540 miles) was obtained using this mode of propagation and Gunnplexer type of equipment.

This has been a very brief introduction to 10-GHz operation. Interested readers should consult the following references for more information:

The Gunnplexer Cookbook, by Bob Richardson, published by the Ham Radio Publishing Group.

The RSGB vhf/uhf Manual, published by the RSGB and available from the ARRL.

Solid State Microwave rf Generators, by Jim Fisk, *Ham Radio*, April 1977, p. 10.

"Getting Started on the 10 GHz Band" by Dain Evans, *VHF Communications*, Spring 1977, p. 19.

1296 MHz DIRECTORY

Al Ward, WB5LUA, is preparing a new edition of his 1296 MHz activity directory. He is also in a position to make regular updates, since he now has the directory stored as a computer file. If you are listed in the current directory but have changed your QTH or equipment, let him know. If you are not listed and you are active on 1296 MHz, again let him know with details of QTH and equipment.

Al's address is Al Ward, Rte. 7, Box 32, McKinney, TX 75069. Copies of the directory are free to CSVHF members; others might wish to enclose a large s.a.e. with requests for a copy.

Also listed in the directory are stations who are active on, or constructing for, 2304 MHz, so if you fall into either category send your information to Al.

GaAs FET NEWS

NEC are now producing a GaAs FET, type number NE72089, which is reported by WB5LUA to give very good performance on 1296 MHz. Al has measured noise figures of 0.5 to 0.6 dB for preamps using this transistor. Price (as of January 1982) is $15 each plus $5 postage and packing in 1-9 quantities. These transistors are available from California Eastern Laboratories Inc., 3005 Democracy Way, Santa Clara, CA 95050.

At this time I have no circuit details for preamps using this device. When I receive more information, it will appear in this column.

1296 MHz TROPO NEWS

I have a report of WA5TBE in Corpus Christi, Texas working W4ODW in Knightsville (near Pensacola) Florida on 1296 MHz. This is an over-water path of about 700 miles. I have no other information on this contact at present.

CORRECTIONS

Readers thinking of building the 10-GHz frequency marker described here in November 1981 should check "Feedback" Jan. 1982 *QST* p. 47, for corrected dimension information.

*c/o ARRL Hq., 225 Main St., Newington, CT 06111

The World Above 50 MHz

Conducted By William A. Tynan,* W3XO

A New VHF/UHF Awards Program

More activity! That's the oft-repeated plea. How do we get more activity on our favorite bands? Many have suggested that awards, recognizing operating accomplishments on the vhf bands, would be one way of getting more people on more often. The Central States VHF Society, believing this to be true, agreed at their annual conference held last August to sponsor a group of three different awards applicable to work on 144 MHz and above. Two of these awards provide for continuing accomplishments, so they are not merely one-shot propositions and hence should provide sustained activity.

The three awards, which are destined to become sought after by aspiring vhfers, are: VHF/UHF Century Club (VUCC) requires proof of contact with 100 different stations on a single band above 144 MHz. Endorsements are available for working additional stations in increments of 25. A different type of endorsement can also be obtained for working all 100 stations in a single calendar year via one propagation mode, which must be either Es, EME, m.s. or aurora. This endorsement should be quite a challenge.

The 1K Coverage Award (1KCA) is given for running up a total of 1000 points during any two-month period. Points vary according to band, with 2 meters yielding 2, 1-1/4 and 23 cm — 5, 70 cm — 4, etc. These are multiplied by a number representing the distance. This number is determined by counting the one-degree by one-degree grid squares, the same as are employed in the ARRL UHF contest between your station and the station worked. By including a distance factor for each contact, this award rewards both activity and station capability, something that many have urged.

The Worked Hundred Grid (WHG) Award. As in the 1KCA, the same type of one-degree by one-degree squares used in the UHF Contest form the basis for this award. In this case, one must show evidence of working stations in 100 squares on a particular band above 144 MHz. Two types of endorsements are available. One involves working additional squares in multiples of 25, while the other requires that 100 squares be worked during one calendar year.

All of these awards are available to anyone whether or not a member of the Central States VHF Society. No QSLs need be submitted, but all applications must be verified by a member of the Society. Since there are members in all sections of the country, as well as many parts of Canada, this should not present a significant problem. A full set of rules and an application form may be obtained by sending an s.a.s.e with postage for 2 ounces to Bob Taylor, WB5LBT, 10715 Waverland, Baton Rouge, LA 70815. Bob will also include a list of CSVHF members, so you can locate someone to verify your entry.

The Central States VHF Society has provided us a chance to earn some truly meaningful wallpaper and, in doing so, enhance activity and enjoyment of our bands. Let's accept the challenge and go after these awards.

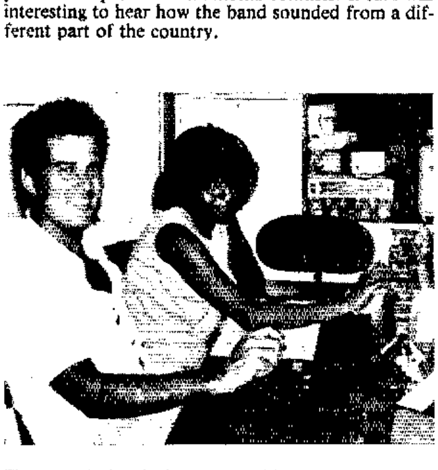
SOMETHING NEW IN VHF CONTESTS

The Ramapo Mountain Amateur Radio Club in northern New Jersey has sponsored spring vhf contests for the past few years, but this year they are trying something a little different in the way of rules. Not only are one-degree by one-degree grid squares being used (in place of ARRL sections) but the distance of each contact is being rewarded by counting the number of squares between stations. In another departure from previous contests sponsored by this group, fm operation is no longer prohibited. The feeling is that the distance multiplier applied to each QSO will outweigh any advantage that might be gained in working large numbers of stations on fm. How well this scheme works out, as well as how popular this year's event is across the country in comparison to previous years will surely be watched by the ad-hoc committee that is advising League Headquarters relative to possible rule changes for ARRL vhf contests.

See "Contest Corral," page 88, for full rules, and send an s.a.s.e. to RMARC, P.O. Box 364, Oakland, NJ 07436 for log forms. The contest will be held the weekend of March 27 and 28. It should be interesting. W3XO will certainly be in there trying!

ON THE BANDS

6 Meters — It is said that "All good things must end." By mid-December, that cliche seemed to apply to F2 propagation on 6 meters. However, the band had a few more surprises in store before 1981 went into the history books. As if to provide some sort of consolation prize, Es arrived to produce a better-than-average winter season. The very extensive and detailed notes submitted by WA5IYX illustrates this point very well. Pat's summary shows that, from his QTH of San Antonio, there were 22 Es openings on 12 different days during December for a total of 1310 minutes of propagation via the E Layer. And as 1982 arrived, the conditions continued. New Year's Day brought a widespread opening that included double hop. This conductor became aware of what was going on when I heard local Houston Channel 2 TV station (I was visiting Houston over the holidays) announce that reception problems that viewers might be experiencing were not the fault of their sets or the station, but rather, interference from TV stations in other parts of the country. The first signal I heard upon pulling out the whip on the little Yaesu FT-690R was W1AJR in Rhode Island. After going out to the car, where I had the benefit of a better antenna (a 5/8 wavelength, 2-meter, magnet-mount whip), I proceeded to work stations from New York State to New Mexico with the mighty 2-1/2 watts. Reports were generally S-6 but a few ranged as high as S-9. Two days later, on the afternoon of the 3rd, another opening to Ohio and points west produced additional contacts. It sure was interesting to hear how the band sounded from a different part of the country.



The people behind some well-known 6-meter calls: 8P6KX/9Y4JW John and 9Y4LL/8P6MH Elsa. *(photo courtesy of K2QIE and WB2WSV)*

Another highlight of my visit to Houston was running into W6JKV/5 on 6 meters and getting a chance to meet him. Jim, as most will recall, was the voice behind C5AEH, which provided a new country for some 900 stations and the final continent for many of them. He said he has plans for visits to more rare places in the near future. He is convinced that, with high power and good antennas at both ends, DX paths can be worked more often than most of us think possible. His record from The Gambia certainly lends credence to that contention. Keep listening to 28.885 for late information on his plans as well as those of others who might be providing some exotic 6-meter DX.

Es wasn't all that 6 meters had to offer as 1981 gave way to 1982. WB2PMP/4 in south Florida reports that the last day of the year brought a very rare opening from his part of the country to ZD8TC. Dave says that a number of stations in the area worked Ted around 1300Z that day. This was the first time that they had heard signals over this path in three years of trying. WB2PMP particularly notes the fine operating and tenacity on the part of ZD8TC, without which such fleeting openings would go unnoticed. This conductor can echo that, after being one of those lucky enough to work Ted on what appears to be an Es-to-TE link-up in mid-December.

Almost everyone who has been active on 6 meters over the past few months will agree that the fall of 1981 has been much better than expected, both in terms of the number of DX countries workable and in the frequency and strength of the openings. The reason we were all so surprised is that the experts say Cycle 21 peaked in December 1979 with a smoothed sunspot count of 164.5. It has always been generally believed that there is a correlation between sunspot count and the 10.3-cm flux that we are accustomed to hearing announced on WWV at 18 minutes after each hour. But WA5IYX computes the daily average 10.3-cm flux for the year 1981 as 202.6. This compares with 144.5 for 1978, 193.0 for 1979 and 199.9 for 1980. The highest peak reached in this cycle, 383, did occur in 1979; however, the top reading for 1981 was 305.

VE1YX sends along a very detailed daily summary of 6-meter conditions from Nova Scotia beginning October 11, when the FY7THF beacon was heard, running through January 5, when he completed several crossband contacts with the UK. Bob's com-

*Send reports to Bill Tynan, W3XO, P.O. Box 117, Burtonsville, MD 20866, or call 301-384-6736 and record your message.

pilation indicates that the days around the New Year were quite good. He also reports a contact with ZD8TC, this one on December 28, for a new country. Transcontinental F2 was observed on several days, the latest being January 4. Bob requests that I publish his address for those who get confused by all of his call changes. It is Robert Billings, R.R. 1, Bridgewater, NS B4V 2V9, Canada.

As if 50 MHz operation is not enough of a challenge, some, like the PAØs, ZLs and VKs, are forced to the stratospheric parts of the band by their governments. But KL7JAI apparently likes to do things the hard way just for the fun of it. Since completing WAS in the part of the band inhabited by most of us, Ken began concentrating his operating at 51 and 52 MHz. By mid-December he had worked 20 states on 51 and eight on 52. WA1ZUB seems to be in the same category. Jim reports using fm to work a number of West Coast stations during the fall openings.

Also in the hard-to-do department, many U.S. 6-meter operators have been attempting to work all Japanese Prefectures. For many of us on the East Coast, QSOing one JA would be enough of a thrill but for the westerners, WAJA is, at least, possible. One of those who has completed this notable achievement is WA6BYA Santa Cruz. On the same day that he picked up the last JA Prefecture, December 13, Bob worked TF3T to complete WAC and topped off the day with a contact with HL2JD. Who said 13 is unlucky? A letter from JA1VOK furnishes some information on VU2AID, who, as reported last month, worked VE1ASJ and VE1YX in November. His name is Dasan and he runs an FT-620 and a 5-element Yagi. In addition to Andy and Bob, the Bombay station QSOed some 300 JAs during the few days he was authorized to operate on 6 meters. JA1VOK says there is a chance that additional 6-meter work may be permitted in India sometime this spring. Hatsuo also reports that 5B4AZ worked about 80 Japanese stations during the first half of November. From perusal of the logs, he also notes that Nick provided Cyprus contact to 45 U.S. stations, plus VEs 1YX, 2DFO, 3DSS and 3FIB on October 31 and November 1.

Tapes have been known to get people into trouble, but not N5KW. On sending a QSL to N7YL, manager for T32AB, Pam received a "sorry not in log" reply. But she and Connie had taped all 6-meter DX QSOs so they found the right spot on the tape and played the contact over the phone to N7YL. The QSL arrived two days later.

A number of awards are available for 6-meter operation but little concise information on them has been available until now. WD8OXK has tried to rectify that by preparing a compilation of such awards. Anyone wishing a copy may send an s.a.s.e to Jeffrey K. White, P.O. Box 767, Athens, OH 45701.

Two silent keys of note in the world above 50 MHz have come to my attention. I particularly regret to pass along word of the passing of a very well known 6-meter personality. She was Helen Harris, W1HOY, widow of Sam, W1BU, conductor of this column from October 1960 to March 1967. Helen was of great help to Sam in his stewardship of "The World Above 50 Mc," as it was known then. In recent years, she was very active as W1HOY/KP4. This sad news comes via the *Northeast VHF News*. The other is Nathaniel Bishop, ex-W1EYM, who is credited, along with W6DNS, with making the first transcontinental 5-meter contact on July 22, 1938. Thanks to K7GGJ for this information.

Another piece of bad news was brought to my attention by G4JCC. Well-known crossbander G5KW has been seriously injured in a fall from his loft while putting up a 6-meter dipole. Ken was away from his normal operating location for the holidays and wanted to keep track of band conditions. I am sure he would welcome cards and letters of encouragement from all of his friends. Address is Ken Ellis, 29 Stanbrook Rd., Northfleet, Graves End, Kent, England.

2 Meters — The Es that ushered in the New Year on 6 meters also provided some rare winter skip for this band as well. Few details are available as of this writing, but this conductor noted a good opening from the Houston area, where I spent the holidays, to Ohio, Michigan and Indiana. I know that a number of 5s picked up some new states as a result of this surprise opening. Unfortunately, I was not able to complete any contacts with my 10-watt mobile set-up. WB5CTK Austin, Texas fared better. Jim, after being tipped off by N8AXA that something was happening, called a CQ on 144.2 and ended up in a pile-up of 8s and 2s. Unfortunately, he got only two states out of it, Ohio and New York. Not bad for January! Those familiar with 6-meter doings may recognize WB5CTK as the kind individual who provided the IC-551 that put TF3SG/TF3T on the air.

KP4EOR reports that 2-meter conditions have been very good during the fall of 1981. The openings began on September 16 when he worked LUs 8DJE, 6DZG and 7DJZ with S-7 to S-9 signals between 0004Z and 0039Z. He believes that, if anything, signals were better than in previous years as, this time around, he was running only 80 watts rather than the KW used formerly. Nevertheless, he has received reports from Argentina of S-9 to plus 20 dB. On the evening of November 6, he reduced power to one-half watt and still received an S-5 report. Tests with Ascension Island station ZD8TC, who has improved his set-up with better feed line and a preamp, are continuing but no contacts have resulted as yet. ZD8TC is reported to have heard the ZB5VHF 2-meter beacon on December 2.

KP4EOR also notes with interest the report in this column for December 1981 regarding work between a Louisiana 2-meter repeater and a station in Bolivia. David says that on the date in question, September 23, he made contacts with LU stations at approximately the same time. He urges southern U.S. stations to set up schedules with South Americans using an hf frequency such as 28.885, or on 50.110. He suggests that they concentrate on 144.150 and 144.3, as these are the two frequencies used most by South American ssb and cw 2-meter operators.

From Montana, W7HAH reports on his success on EME. Shep comments that fall conditions were "great," enabling him to land such exotic catches as UA3TCL, Y22ME, OZ1EME and a number of other Europeans. He is at 46 states waiting for Hawaii, Kentucky, Tennessee and West Virginia to appear so he can complete WAS. That last one should not be too much longer in coming, if WD8QDA has anything to say about it. Steve is putting the finishing touches on an 8877 final and four-Yagi array, and should be about ready to go by the time this appears. His QTH is Box 235, RD 1, Chester, WV 26034.

Another Montana resident, WA1JXN/7 says that he is back on after a few months absence to put up a bigger array. Lance now uses 12 19-element Boomers phased with 3/4 inch hardline. He reports that the new antenna is working well and cites his success on the evening of January 10 as evidence. Helped by very low geomagnetic activity (k index was zero), he worked YU7PXB, OK1MBS, UB5JIN, YU2RGO, LA1TN, DF7DJ, SM4GVF and KP4EOR. KP4EOR says that he has worked K1WHS, as well as WA1JXN, off the moon using four, 8-element Yagis. He expects to have four 19-element Boomers up by the time this appears in print and eventually expects to add elevation control.

Not too many reports have been received on successes in the Geminides but W2RS is an exception. Ray made the grade with K5BMG Louisiana and WA4NVM Tennessee to bring his state total to 33. K1FJM/4 in south Florida did not find the shower particularly good but did manage to complete with WA4PCS Kentucky, K8CAY West Virginia and W3ZZ Maryland.

The Higher Bands — The mail increasingly brings news of 1-1/4 meter moonbounce activity. On December 15 the band supported the first U.S. all-distaff EME QSO. Not unexpectedly, on one end was that perennial 220-MHz booster, Lee Fish, K5FF, while the other was handled by Pam, N7CDO, the spouse of K7NII. It was Pam's first moonbounce contact on any band, and it won't be the last if the bug has bitten her as it has so many others.

M.s. is also coming in for its share of attention on 1-1/4 meters. WA4CQG Auburn, Alabama has been using that mode to boost his state total. During the Quadratids, Dale picked up Minnesota as a result of a January 3 contact with WØVB. Another successful sked yielded VE3EMS after only 15 minutes. Mississippi should now be easier to work, thanks to a new amplifier at N4JS/5. John says that it delivers about 300 watts. He also has two 7289s producing 80 watts on 23 cm. This feeds a pair of 28-element loop Yagis. Incidentally, the amplifier, which John says works well, is from a 1973 article in *73* Magazine and uses a cat-food can for a cavity!

Montana should be available on 1-1/4 meters soon as W7HAH plans to get on the band with some power. Shep also has similar plans for 70 cm and already has an IC-451. He makes a plea for moving the ARRL EME Contest to the fall. Others having opinions on this are urged to write to AA2Z at Headquarters. Another with hopes of 1-1/4 meter operation is VE3DSS. Dana has an old Telrex 16-element Yagi but lacks the data sheet. He believes it may be tuned to 222 MHz. Can anyone help him with information on this antenna?

WA4MVI has been providing his new state of South Carolina to a number of 70-cm EMErs since getting his system going. In so doing, Jim has run his own state total to 21. Another active 70-cm moonbouncer, W5UKQ, has also just completed a move. John is now installed in Wakefield, Louisiana, and has his array of 16 RIW 19s up at 75 feet and performing well. He has worked a number of stations on EME from the new QTH and has run his state total to 24. He is looking forward to using the system on tropo as well. QST

Strays

Among the many clubs who brought Santa Claus to kids in hospitals this past Christmas were Metroplex (top) and Newington Amateur Radio League (bottom). Burt, K2KLN, is shown with one of the children at Babies Hospital, Columbia Presbyterian Medical Center, in Manhattan. Santa was Mike, WA2JKG. NARL members visited Newington Children's Hospital, where 12 kids asked Santa for special favors via 2 meters. This annual event, covering several Connecticut hospitals, is sponsored by the Pioneer Valley Radio Association.

OKLAHOMA VHF GROUP TO MEET

□ All amateurs who were at any time members of the Oklahoma Central 6 Meter Club (later known as the OK Central VHF Club) are invited to a 25th reunion the last weekend in July in Oklahoma City. Contact T. W. Stevens, W5VCJ, P.O. Box 976, Edmond, OK 73083.

W1YL/4's license plate asks the question and DXAC member Jim Rafferty, N6RJ, handily comes up with some answers vis-a-vis his imposing ZF2FL CQWW phone effort enroute home via Miami International. (Your DX column editor is happy to report she no longer has trouble remembering her license plate combination!)

April Open CD Party

"Spring Sweepstakes." That's how many active contesters describe the April Open CD Parties. Activity levels are very high and the exchange short, so high-rate hours are common. The top scorers averaged over 60 QSOs per hour on cw and 90 QSOs per hour on phone last year, making for an exciting contest.

The rules are relatively simple, and with only 10 hours of operating permitted, it won't take up your whole weekend. This is a very good opportunity to snag those missing states for your WAS or 5BWAS, as activity is usually good on all bands. You might even work the rare ones on five or six bands!

Take a few minutes to write for CD Party forms so you'll have them when the CD Party begins. If you'd like to help out as a volunteer, write to: the Membership Services Department for information on the Intruder Watch or Public Information Assistant program; the Board of Directors for Advisory Committee (Contests, DX, Emergency Communications, VHF-UHF, Public Relations and VHF-Repeater) information; the Technical Department for information on the Technical Advisor program; the Communications Department for information on the Official Observer, Official Relay Station, Official VHF station, Official Emergency Station and Official Bulletin Station appointments, or contact your Section Communications Manager (page 8 of this issue) for information on the various Emergency Coordinator and National Traffic System appointments.

Don't forget to mail your entry for the CD Party early. Logs must be *received* by May 10 at League Hq. Everyone sending in an entry will receive copies of the issue of *QCD* (quarterly publication of the Communications Department) containing the results. Good luck!

CD Party Facts and Figures

Phone		*Cw*	
Starts:	1800Z April 3	Starts:	1800Z April 17
Ends:	0600Z April 4	Ends:	0600Z April 18

Eligibles: Member, Life Member, Charter Life Member, President, Vice President, Past President, Past Vice President, Director, Past Director, Assistant Director, Vice Director, General Counsel, Associate Counsel, Treasurer, QSL Manager, Section Communications Manager, Assistant Section Communications Manager, NTS Officials, Technical Advisor, Advisory Committees, Intruder Watch, Public Information Assistant, SEC, EC, DEC, STM, NM, HQ, OO, OBS, ORS, OES, OVS.

Rules: Logs must be submitted in UTC, not local time. Operate a maximum of 10 hours; timeouts must be at least 30 minutes long. Exchange "status" and ARRL section. Dupe sheets must be included with logs of 200 QSOs or more. You may work each station once per band. Number new sections in the log as worked. Phone and cw contests are separate. Entries must be received at ARRL headquarters no later than May 10, 1982.

Scoring: Multiply valid QSOs by number of different ARRL sections worked plus VE8/VY1 (max. 74).

Suggested frequencies: Phone: 1865, 3870-3910, 7200-7245, 14,265-14,295, 21,340-21,360 and 28,600-28,630. Cw: Up from 1835, 3535, 3715, 7035, 7115, 14,035, 21,035, 21,115, 28,035 and 28,115. Try 10 on the hour 1800-2100 UTC; 160 at 0430 and 0530 UTC. Check the Novice bands frequently. Don't forget 6 and 2 meters.

Rules, Fifth ARRL International EME Competition

Hope you're taking advantage of this springtime weather to iron the bugs out of your EME system, do some antenna adjustments, add a mast-mounted pre-amp, or whatever you still have to do to get ready for the 1982 EME Competition. A look at the results of last year's contest (see September 1981 *QST*) will show you that more and more people are getting on EME and entering the contest. Although 144 and 432 MHz are still the most popular moonbounce bands, 220 and 1296 MHz are up and coming. And for those of you with four-antenna stations, there *is* hope. Many small stations completed EME contacts last year — contacts made possible in part by the incredible hardware at a few of the super-stations. Whether you're an experienced operator or new at the game, there's opportunity aplenty to make EME contacts during the two scheduled weekends of the EME Competition. And, finally, be sure to send in your logs even if you complete only one QSO. The only way we can judge interest is by the number of entries received. Good luck!

Rules

1) **Object:** Two-way communications via the earth-moon-earth path on any authorized amateur frequency above 50 MHz.

2) **Contest Period:** Two full weekends, April 3-4 and May 1-2, full 48-hour period UTC each weekend.

3) **Categories:**

A) Single Operator: One person performs all operating, equipment adjustment and antenna alignment.

B) Multioperator: Two or more persons participate; includes neighboring amateurs within one call area, but with EME facilities for different bands on different team members' premises, as long as no two are more than 50 km (30 miles) apart. Multioperator neighborhood groups cannot use the same call signs at each location; all calls will be listed in the results.

C) Commercial equipment: Stations using equipment that is not amateur (such as a dish antenna for lab equipment owned by an institution or government agency) will have their scores listed separately.

4) **Exchange:** For a valid contact to occur, each station must send and receive both call signs and a signal report in any mutually understood format, plus a complete acknowledgement of the calls and report. Partial or incomplete QSOs should be indicated in your log, but not for contest credit.

5) **Scoring:**

A) QSO Points: Count 100 points for each complete EME contact.

B) Multiplier: Each U.S. and Canadian call area, plus each DXCC country (not U.S./Canada) worked via EME on each band.

C) Final score: Multiply QSO points by sum of multipliers worked on each band for your final score.

6) **Miscellaneous:**

A) Fixed or portable operation is permitted. Stations operating outside traditional call areas *must* indicate so, identifying the call area of the operating site.

B) Contacts may be on cw or ssb. Only one signal per band is permitted.

C) A transmitter, receiver or antenna used to contact one or more stations under one call sign may not be used subsequently under any other call sign during the contest, except for family stations where more than one call has been issued, and then only if the second call sign is used by a different operator.

D) There is no specified minimum terrestrial distance for contacts, but all communications must be copied over the moonbounce path, regardless of how strong (or weak) a nearby station's terrestrial signal may be.

7) **Reporting:** Entries must be postmarked no later than 30 days after the contest and must include complete log data. Entries received after mid-July may not make *QST* listings. Your summary sheet should indicate the total number of QSOs on each band, multipliers per band and final score. If possible, include details of your station set-up and a photo.

8) **Awards:** The high-scoring single and multioperator stations in each U.S. and Canadian call area and each DXCC country will receive a certificate. In addition, each station that successfully completes at least one moonbounce contact during the contest period will receive a certificate commemorating that achievement.

9) **Disqualification:** See January *QST*, page 92.

Operating News

Conducted By John F. Lindholm,* W1XX

"Hey, Buddy, Your Brake Lights Are Out!"

In the July 1980 issue of QST, OM Herzer, DL7DO, asked the question: "Will the RS(T) System Last Until Judgement Day?" Herr Herzer's question generated a fair amount of correspondence, both pro and con. The matter is not dead, however.

In September of 1981, The ARRL Board of Directors voted "to reassess the usefulness of the present RST system of cw signal reporting, with specific attention to be given the possibility of discontinuing the ineffectual tone report in the interest of conservation of transmission time and frequencies." Since publication of those minutes, several correspondents have taken exception to the "ineffectual tone report" part of the motion. An active contester in Georgia contends that the T7 or T8 report is "often the first and perhaps only indication of trouble in the transmitter." This is substantiated by Official Observers who continue to send out reports for cw tone of less than perfect quality. Another respondent, N6PE, has pointed out that the problem of the T being ineffectual is one of *education*, not necessity. How many of us know how to grade tone? He suggests incorporating a tape cassette into our training program to demonstrate what signals of different tone quality sound like. Thus a report of 577 will not be thought of as bad news, but more like telling a friend: "Hey, Buddy, your brake lights are out!"

Further, there does not seem to be universal agreement that solid state-of-the-art rigs are necessarily without their technical faults under certain less-than-optimum operating conditions. Some messed-up signals are heard, for example, when flaky antennas are connected to the transmit end of a solid-state radio looking for 50 ohms. Fortunately, the automatic shutdown mode usually takes over before damage is done either to transistor finals or operator reputation. And the savvy DXer will usually bet a pair of nickels he can pinpoint the DXCC country of the "chopity-chow-pit chow-chow-pi-chow" even before he hears the call sign.

On the other hand, of what real value is the contest exchange of 5NNNNNTENN (that's the guy in Tennessee running 999 watts giving a signal report of 599 in the Worked All Podunk Hollow Contest)? Also we've all heard (and are probably guilty of): "You're 59, OM, but please repeat your name, your QTH and my signal report." Further, who really knows the difference between a T6 and T7 report? Or even an S5 and an S6 signal-strength report? And, of course, the double-digit reports seem to prevail while working the weak ones, such as (in descending order): "speed limit," "rifle shot" or, heaven forbid, "snake eyes." Where will it all end?

Although universally used, the RST system is not the only signal reporting system in existence. From the familiar Q-code, other services use QSA (1-5) for signal strength. Shortwave-broadcast enthusiasts use the SINPO code, denoting *s*ignal strength, *in*terference, *n*oise, *p*ropagation and *o*verall merit, all on a scale of 1 to 5.

Attempts have been made in the past to adopt standards for measuring signal strength. As we all too well know, the S meter on the Ether Sniffer HI800 is different from the S meter on the Spectrum Raker FB-2000. Taking into account such large deviations between characteristics of S meters on current amateur equipment, the International Amateur Radio Union (IARU) Region 1 conference in Hungary (1978) adopted the following standards:

(a) One S unit corresponds to a level difference of 6 dB.

(b) Below 30 MHz a meter deviation of S9 corresponds to an available power of a cw signal generator connected to the receiver input terminals of −73 dBm. Above 30 MHz, this power shall be −93 dBm.

(c) The metering system shall be based on quasi-peak detection with an attack time constant of 10 ms ±2.0 ms and a decay time constant of at least 500 ms.

Unfortunately, this is not easy to translate into actual engineering and development at the factory. Because of the vast difference in overall gain that most receivers exhibit, it is difficult (although not impossible) to obtain close calibration of the S meter. Some are intentionally designed to have higher gain on 10 and 15 meters than from 160 through 20 meters. This changes the agc characteristics across the bands, and hence the uniformity of the S meter readings. It is not likely that multi-band ham receivers will ever yield uniform meter readings across the several amateur bands they cover. Such a feature would no doubt be reflected in the price the consumer pays for the product.

A subjective attempt to modify the present system is being proposed by the Radio Society of Great Britain for consideration by the IARU Region 3 conference in Manila in April of this year. The RSGB proposal would abolish the tone report because "nowadays nearly all transmissions are T9 due to the use of commercial equipment." Tradition would be preserved in the strength report, however, but shortened to the odd numbers only, defined as follows:

S1 barely perceptible
S3 weak
S5 fair
S7 strong
S9 extremely strong

The rationale for this simplication is that the human ear is not capable of accurately discerning nine subdivisions and the present definitions such as S5, "fairly good" and S5, "moderately strong," are too vague.

Overlooked in the can-the-tone bandwagon are the realities of award chasing. An estimated 10 to 20% of cards submitted for single-mode awards, such as cw DXCC and WAS, neglect to indicate mode. In such instances, a 579 is taken to confirm a cw contact. Deletion of the tone report could impose some hardship on seekers of such awards. Is this sufficient reason to retain what some see as a continuation of antiquity?

Since the present RST system is used daily by radio amateurs throughout the galaxy, any modification is bound to meet opposition. Since this is not merely a domestic question, but rather one that affects worldwide amateur communications, adoption of a new scheme by all three IARU regions would seem necessary to invoke change. This would have to be followed by a long period of education before any degree of acceptance could be expected. Perhaps the question is: Is the effort worth it?

You are the best judge of that. And we'd like to hear from you on this. In the meantime, continue to check your brake lights and don't hesitate to advise those you work who have their wires crossed.

W1AW NOTE

The complete W1AW winter operating schedule appears in October *QST*, page 98. A W1AW schedule also is available on request from ARRL Headquarters. Please enclose an s.a.s.e. See the "Contest Corral" section of *QST* for times and dates of W1AW Code Proficiency Runs.

SCM ELECTION RESULTS

The following were elected for a two-year term of office beginning April 1, 1982:

Uncontested

E. New York	Paul S. Vydarney, WB2VUK
North Carolina	Ian C. Black, WD4CNR
Maritime/NFLD	Don Welling, VE1WF
San Diego	Arthur R. Smith, W6INI

SCM APPOINTMENT

In the Louisiana Section, John Meyer, N5JM, has been appointed to complete the term (until March 31, 1982) of Jim Giammanco, N5IB (resigned).

MEET YOUR SCM

On October 1, 1981, after a long and meritorious record of public service, Joseph N. Winter, WA7RWK, took over the office of Section Communications Manager for Washington state. Joe, who lives in Tacoma, is a retired civil engineer. It seems that there is a famous mountain in Joe's backyard called Mount St. Helens! As section emergency coor-

Joe Winter, WA7RWK, Washington state SCM

*Communications Manager, ARRL

Amateur Radio Satellite Schedule

Date (UTC)	AMSAT-OSCAR 8 Ref. Orbit	AMSAT-OSCAR 8 Time (UTC)	AMSAT-OSCAR 8 Long W.	Soviet RADIO 5 Time (UTC)	Soviet RADIO 5 Long W.	Soviet RADIO 6 Time (UTC)	Soviet RADIO 6 Long W.	Soviet RADIO 7 Time (UTC)	Soviet RADIO 7 Long W.	Soviet RADIO 8 Time (UTC)	Soviet RADIO 8 Long W.
1 March	20,319A	0027	85	0158	309	0129	302	0039	289	0105	295
2 March	20,333A + J	0030	86	0153	309	0113	300	0029	289	0102	296
3 March	20,347X	0034	87	0147	309	0058	297	0020	288	0100	297
4 March	20,361A	0038	88	0142	309	0043	295	0010	287	0057	298
5 March	20,375A + J	0041	90	0137	309	0027	293	0000	286	0054	298
6 March	20,389J	0045	91	0137	310	0012	290	0150	315	0051	299
7 March	20,403J	0049	92	0126	310	0155	318	0140	314	0048	300
8 March	20,417A	0053	93	0121	310	0140	315	0131	313	0045	301
9 March	20,431A + J	0056	94	0115	310	0124	313	0121	312	0043	302
10 March	20,444X	0100	95	0110	310	0109	311	0111	311	0040	303
11 March	20,458A	0104	96	0105	310	0054	308	0102	311	0037	303
12 March	20,472A + J	0107	98	0059	311	0038	306	0052	310	0034	304
13 March	20,486J	0111	99	0054	311	0023	304	0042	309	0031	305
14 March	20,500J	0115	100	0049	311	0007	301	0033	308	0029	306
15 March	20,514A	0119	101	0043	311	0151	329	0023	307	0026	307
16 March	20,528A + J	0123	102	0038	311	0135	327	0013	306	0023	307
17 March	20,542X	0127	103	0033	312	0120	324	0004	305	0020	308
18 March	20,556A	0130	105	0027	312	0105	322	0153	334	0017	309
19 March	20,510A + J	0134	106	0022	312	0049	320	0144	333	0014	310
20 March	20,584J	0137	107	0017	312	0034	317	0134	332	0012	311
21 March	20,598J	0142	108	0011	312	0018	315	0124	331	0009	312
22 March	20,612A	0002	83	0006	313	0003	313	0115	331	0006	312
23 March	20,626A + J	0006	85	0001	313	0146	314	0105	330	0003	313
24 March	20,640X	0009	86	0155	313	0131	338	0055	329	0000	314
25 March	20,654A	0013	87	0149	343	0106	335	0046	328	0157	345
26 March	20,668A + J	0017	88	0144	343	0100	333	0036	327	0154	346
27 March	20,682J	0021	89	0139	343	0045	331	0027	326	0152	347
28 March	20,696J	0025	90	0133	344	0029	328	0017	325	0149	347
29 March	20,710A	0028	92	0128	344	0014	326	0007	324	0146	348
30 March	20,724A + J	0032	93	0123	344	0157	354	0157	353	0143	349
31 March	20,738X	0036	94	0107	344	0142	351	0147	353	0140	350
1 April	20,752A	0039	95	0112	344	0127	349	0138	352	0138	351
2 April	20,766A + J	0043	96	0107	345	0111	347	0128	351	0135	351
3 April	20,780J	0046	97	0101	345	0056	344	0118	350	0132	352
4 April	20,794J	0051	99	0050	345	0041	342	0109	349	0129	353
5 April	20,808A	0054	100	0051	345	0025	340	0059	348	0126	354
6 April	20,822A + J	0058	101	0045	345	0010	337	0049	347	0123	355
7 April	20,835X	0102	102	0040	346	0153	5	0040	346	0121	356

Orbit predictions for OSCAR 8 by 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 3550 kHz. Saturday — International at 2200 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. For a three-month printout of each orbit of satellites that are carried in the Project OSCAR calendar, send an s.a.s.e. and any donation to Project OSCAR, P.O. Box 1136, Los Altos, CA 94022. 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.

Exact orbit numbers have not been determined for the Radio satellites.

Satellite	*Period (min.)*	*Increment (deg.)*	*Inclination (deg.)*	*Height (km)*
OSCAR 8	103.1836	25.7959	98.79	919
RADIO 5	119.4986	30.0159	82.95	1682
RADIO 6	118.6616	29.8063	82.95	1632
RADIO 7	119.1403	29.9259	82.94	1654
RADIO 8	119.7090	30.0683	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

	Uplink	*Downlink*	*Beacon*
OSCAR 8			
Mode A	145.850-145.950 MHz	29.400- 29.500 MHz	29.402 MHz
Mode J	145.900-146.000 MHz	435.200-435.100 MHz	435.095 MHz
RADIO 5	145.910-145.950 MHz	29.410- 29.450 MHz	29.330/450 MHz
RADIO 6	145.910-145.950 MHz	29.410- 29.450 MHz	29.410/450 MHz
RADIO 7	145.960-146.000 MHz	29.460- 29.500 MHz	29.340/500 MHz
RADIO 8	145.960-146.000 MHz	29.460- 29.500 MHz	29.460/500 MHz
RADIO 5 ROBOT	145.826 MHz	29.331 MHz	
RADIO 7 ROBOT	145.835 MHz	29.341 MHz	

RADIO 3 and RADIO 4 are for experiments only to be announced by USSR.

OSCAR 9
Hf Beacons — 7,050, 14,002, 21,002 and 29,510 kHz. On-off keying with Morse telemetry. Interspersed with a carrier or continuous carrier.
Vhf Beacon — 145.825 MHz nbfm ± 5 kHz. ASCII, Baudot, voice, afsk and Morse.
Uhf Beacon — 435.025 MHz nbfm ± 5 kHz. ASCII, Baudot, voice, afsk and Morse.
S-Band Beacon — 2401.0-MHz nbfm ± 10 kHz. ASCII, Baudot, voice, afsk and Morse.
X-Band Beacon — 10.470-GHz steady carrier. S- and X-band beacons use fhcp.

Mode J Club: Become a member of the Mode J Club. Complete eight Mode-J contacts. QSL cards are not required. Just list the call sign of each station worked, date, orbit number and station equipment used. Send this information along with $3 in U.S. funds, a one-time charge to cover the certificate and newsletter costs, to Mode J Club, c/o Larry Roberts, W9MXC, 3300 Fernwood, Alton, IL 62002.

OSCAR 8 QSL: To receive an OSCAR 8 QSL card, send a copy of the telemetry from the 29.402- or 435.095-MHz beacons. Please send your report, along with 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 all-new OSCARLOCATOR package is now available: $7 U.S., $8 elsewhere.

dinator, Joe helped coordinate Washington ECs for search-and-rescue operations. Besides the usual Pierce County ARES drills, Joe has won public service awards for the central Washington floods and Mount Ranier rescue in 1977. Joe is a past president of the Radio Club of Tacoma and has served as both chairman and cochairman of the Tacoma Hamfair — which is a very nice affair, by the way, when it doesn't rain! Good luck, Joe, in your many duties as SCM for the state of Washington. — *John F. Lindholm, W1XX*

Strays

Speaking of the Wouff Hong (January 1982 *QST*, page 9), here's a live one! This natural "hong" was shot by Ed Rogers, KØGKB, at Rocky Mountain National Park in Colorado. (*photo courtesy KØGKB*)

MY SILENT DXPEDITION

☐ Not long ago, I decided to visit Ireland to explore the country and do some Amateur Radio operating. I decided not to bring along any of my own gear because of space limitations, but I was sure that I could find a club station or friendly ham to let me get on the air for a while.

After getting help from the ARRL, I got my application in the mail right away to the Irish authorities. They, however, returned my application for additional information — I had forgotten to tell them that I wasn't bringing my own gear. But I had allowed plenty of time, so I wasn't expecting anything to go wrong. Only two weeks from my departure date I received the eagerly awaited envelope from Ireland. I opened it and found nothing: It was empty. Simple error or the work of leprechauns — I'm not sure. I had a lovely visit to Ireland, though I wasn't on the air. When I returned home, I found another letter from the Irish Department of Posts and Telegraphs — containing my temporary license. Oh well, maybe next time! — *Tom Hart, AD1B, Westwood, Massachusetts*

I would like to get in touch with . . .

☐ someone who has the schematic for the Measurements Corp. Model 65 standard signal generator. M. Eisenberg, K3DG, 1224 McKinley, Philadelphia, PA 19111.

☐ owners of Atari Microcomputer System to form a net and exchange information and programs. Jack McKirgan II, WD8BNG, 4749 SR 207 NE, Washington CH, OH 43160.

Public Service

Conducted By Robert J. Halprin,* K1XA

Survey Results at Last!

Here are the long-awaited (?) results of the Public Service column readership survey, which appeared under the title of "The Feeling Thermometer" in the July 1981 issue of *QST*. A total of 143 questionnaires were returned. Perhaps your conductor was suffering from delusions of grandeur, but the total was somewhat disappointing. Obviously there were many more readers who wanted to participate but never got around to it. Furthermore, you don't have to be a genius to realize that the summer months aren't a terrific time to conduct a survey.

We should have ran the survey in *this* issue, and then printed the results in March, rather than vice versa. After all, the winter is the optimum time for surveying, when "The Feeling Thermometer" drops below the freezing mark. This causes most people to stay at home reading *QST*, while cozying up to the woodstove. Please, no jokes about putting the journal *in* the woodstove! In the midst of balmy weather, we're all too busy midnight rambling to be bothered with questionnaires. Nevertheless, we do thank the 143 hardy souls who completed and mailed the survey; even that sample may provide statistically valid information, although this is an area in which we are not yet expert.

By the way, there was no need to carve up your July issue; a photocopy of the survey, or the use of a plain sheet of paper, was totally proper and acceptable. We certainly hope this won't be a news bulletin to you, but most libraries and post offices have facilities for making individual copies at nominal fees, assuming you weren't able to liberate copies on your office equipment. Rest assured that we will embark on another survey (with complete instructions) sometime down the log, but it will definitely be at a time when Jack Frost is nipping at your questionnaire.

Before getting into the ponderous percentages and so forth, we should describe the results of the three questions that were of an open-ended variety (making a statistical breakdown difficult). Specifically, question three asked, "What topics would you like to see covered more often in the Public Service column?" Question four asked, "What topics would you like to see less often in the Public Service column?" And question five inquired, "What improvements can you suggest for the Public Service column?" Coming through loud and clear in reply to question three was the feeling that the readers seek more of the how to do it, nitty-gritty info about public-service operating, particularly aimed at the beginner. With regard to question four, the signals were dead full quieting on one major point: The charts, tables and call sign lists are a significant turn-off to the readers. Suggested improvements, therefore, (question five), ran along the lines of eliminating or consolidating all the stats, with more emphasis on getting the individual involved in traffic/emergency

*Assistant Communications Manager, ARRL

1. In your honest opinion, as compared to the other columns in *QST*, the Public Service column is:

much better: 6% (9)
better: 23% (33)
about the same: 57% (82)
worse: 8% (12)
much worse: 1% (1)
no response: 4% (6)

2. Please rate your interest in the various components of the Public Service column:

	1	2	3	4	5	6
the lead editorial	39% (56)	39% (56)	12% (17)	2% (3)	2% (3)	6% (8)
Public Service Diary	28% (40)	47% (67)	10% (15)	7% (10)	3% (5)	4% (6)
Communications Service of the Month	26% (37)	41% (58)	13% (19)	6% (9)	7% (10)	7% (10)
ARES Reports	21% (30)	34% (48)	15% (22)	11% (16)	15% (21)	4% (6)
BPL	10% (14)	26% (37)	22% (31)	12% (18)	26% (37)	4% (6)
Repeater Log	10% (15)	25% (36)	20% (28)	15% (21)	24% (34)	6% (9)
PSHR	13% (9)	22% (31)	24% (34)	17% (24)	20% (28)	5% (7)
SEC Reports	10% (14)	25% (36)	20% (29)	16% (23)	20% (29)	8% (12)
NTS Reports	17% (24)	24% (35)	20% (28)	12% (17)	22% (31)	5% (8)
Independent Nets	7% (10)	17% (25)	27% (39)	13% (18)	29% (41)	7% (10)
Other (specify)	2% (3) 1 survey results 1 ARES activities 1 TCC reports	1% (1) 1 TCC reports	1% (2) 2 not specified	0	3% (5) 4 not specified 1 statistics	

1 — Very interesting
2 — Interesting
3 — No opinion
4 — Not interesting
5 — Never read
6 — No rating

6. Are you familiar with the new *ARRL Operating Manual?*

Yes: 66% (95) *No:* 34% (48)

7. If yes, how would you rate this publication?

excellent: 51% (48)
good: 44% (42)
fair: 3% (3)
poor: 1% (1)
no response: 1% (1)

8. Are you familiar with the names of the countries that have signed third-party traffic agreements with the U.S. or Canada?

Yes: 73% (104) *No:* 27% (39)

9. During the past 12 months, on the average, how many hours per week have you spent using any of the following modes?

116 respondents reported ssb activity at 7.5 hours per week average
114 respondents reported cw activity at 7 hours per week average
113 respondents reported fm activity at 7 hours per week average
(only 16 people reported RTTY activity, and just 5 reported ASCII activity)

10. Can your home station operate without commercial power?

Yes: 67% (96) *No:* 33% (47)

11. Give a brief description of your station:

hf (80-10) rigs — 92% (131)
2-meter fm capability — 66% (94)
hf wire antennas — 62% (88)
hf quads/Yagis — 45% (65)
hf amplifiers — 34% (49)
hf verticals — 19% (27)

12. Do you hold an ARRL appointment from your section communications manager?

Yes: 45% (64) *No:* 55% (79)

13. If yes, please specify appointment(s): (many respondents held more than one appointment).

ORS	*EC*	*OES*	*OO*	*NM*	*OBS*	*DEC*	*OVS*	*SEC*	*ASCM*	*STM*	*appointment not indicated*
58% (37)	30% (19)	16% (10)	14% (9)	14% (9)	13% (8)	6% (4)	6% (4)	5% (3)	1% (1)	1% (1)	1% (1)

14. In what field(s) of public service communications, if any, are you active:

ARES: 58% (83)
Local Public Safety Events: 57% (81)
NTS: 49% (70)
RACES: 27% (39)
Independent Traffic Nets: 27% (39)
MARS: 15% (22)
Low-Band Monitoring Services: 13% (18)
International Phone Patching: 10% (15)
Other: SKYWARN and weather watches 8% (8)
CAP 1% (2)
Unspecified 1% (1)
No response: 8% (12)

15. What is your class of license?
Novice: 1% (1)
Technician: 2% (4)
General: 21% (30)
Advanced: 35% (50)
Extra: 40% (57)
No response: 1% (1)

16. How long have you been licensed?
less than 2 years: 4% (6)
2-5 years: 19% (27)
6-10 years: 12% (17)
11 or more: 64% (92)
No Response: 1% (1)

17. In what other Amateur Radio on-the-air activities, if any, do you participate?
Ragchewing: 76% (109)
DXing: 62% (88)
Contesting: 46% (66)
Awards Chasing: 27% (38)
Others: 20% (28)
Satellite Operating: 8% (11)
None: 2% (3)

18. Where do you live? (actual number of responses, not percentages)
DX: Brazil—1.
VE: ON—1.
W1: CT—6, MA—5, ME—1, NH—1, RI—1, VT—1.
W2: NJ—7, NY—11.
W3: MD—3, PA—4.
W4: AL—1, FL—12, GA—1, KY—2, NC—1, SC—1, TN—1, VA—9, PR—1.
W5: NM—1, TX—5.
W6: CA—19.
W7: AZ—2, ID—1, WA—3, WY—1, AK—1.
W8: MI—6, OH—6.
W9: IL—4, IN—3, WI—4.
WØ: CO—4, IA—1, KS—2, MN—2, MO—4, NE—1, SD—1.

operations, playing up the human-interest angle, and generally getting back to basics.

Because of space limitations, the breakdown of the remaining 15 questions is presented here with no editorial comment; this will permit the reader to draw his/her own conclusions independently. Note that the number in parenthesis is the actual number of responses in that category.

Again, thank you, one and all, for your most helpful suggestions.

REPEATER LOG

According to reports received between December 21 and January 21, the following repeaters were involved in the delineated public service events.

	Weather Emergency	Criminal Activity	Medical Emergency	Vehicular Emergency	Fire	Search and Rescue	Public Safety Events	Drills/Alerts	Power Failures	Total
WC1RAC	1						1	4		6
W1XJ							1	4		5
WR2ADJ				5						5
KC2CY	1			7				1		9
N2MD								1		1
K2QIJ				1				5		6
W2VL		1	1	23				1		26
N3AIA	1		5	7	1					14
N3BFL				1					1	2
W3EEK	2			2				4	1	9
K3JSZ				2				13		15
K3TR		1	2	3	1					7
W3UER				2			1			3
AK4B								1		1
W4KCQ	1									1
NN4N					3					3
WB4QES	2	1		46	1				2	52
W5GIX				5						5
W5RVT				1						1
KH6AH						1				1
W6ASH							1			1
WA6EUZ				3						3
W6IYY	1			6			1	4		12
W6RHC				1					1	2
WA6WTT	3	1		9				1		14
WC7AAT			1	2						3
WR7ABX				2						2
WR7ACF				2						2
K7CC		1		5						6
K7CTS				3						3
KC7FA				2				3		5
WA8ULB				2						2
WR8AES							1	4		5
WR9ADQ							1			1
WRØACD	1									1
WRØAEV	1						1			2
WØAFG	57									57
WBØCMC		1	1	3				3	2	10
WØFIO							1			1
WØMME				2						2
Total	71	6	10	147	6	1	9	49	7	306

NATIONAL TRAFFIC SYSTEM

Everything was coming up roses for NTS in the traffic-bouquet month of December. A glance at the statistics below will reveal marvelous traffic, rate and representation tallies. K2KIR, EAN/c4 manager, reports the third best December and second best year in the net's history! W8PMJ reports that 8RN/c4 had its best month ever! W9FC says that 9RN/c4 handled the most Christmas traffic since he's been around. WB4PNY indicates that EAN/c2 handled 300 more messages this time. WB7WOW has returned from his overseas assignment and has re-assumed full responsibility for RN7/c2. Thanks to WB7OEX who served as acting manager in the interim. VE1WF advises that ECN also had a busy December; special thanks to VE3CYR and VE3KK for their help. W2RQ reports that 1981 was a very good year for 2RN/c2; only nine sessions were missed in the entire year! The Bill Shaw, WB2VEJ, Memorial Award for the outstanding trafficker in the Second Region was presented to W2XD. The new assistant manager on 2RN/c4 is WA2SPL. Your conductor worked A4XJO, who is none other than former EAN net control WB4SGV. ECN certificates were awarded to VE1WF VE1LCR VE1XF VE2FKI VE2PJ VE2EDO VE2FFE VE3AWE VE3CYR VE3DVE VE3GOL VE3GFN VE3BZB VE3KK VE3HTL VE3HGJ VE3JRT. 2RN/c4 certificates awarded to KK2Y WB2IQJ WB2VVS KA2KVZ N2AKZ (first annual), W2ZOJ (second annual), K2HD (fourth annual). TEN/c2 certificates to KØDKM WBØTED NØCOU KBØCH VE5ADZ. CAN/c4 certificates to AKØS ACØE KØBM KC4AV.

December Reports

1	2	3	4	5	6	7
Cycle Two						
Area Nets						
EAN	31	3095	99.8	1.560	98.4	
CAN	31	2051	66.2	.889	100.0	
PAN	62	1815	29.3	.634	100.0	
Region Nets						
1RN	62	1124	18.1	.535	91.0	100.0
2RN	62	882	14.2	.590	91.9	100.0
3RN	31	580	18.8	.600	98.4	100.0
4RN	62	1927	31.1	.775	81.3	100.0
RN5	31	855	27.6	.477	95.6	100.0
RN6	90	1213	13.5	.361	70.0	100.0
RN7	80	2002	25.0	1.060	100.0	100.0
8RN	62	861	13.9	.548	88.7	100.0
9RN	62	882	14.2	.457	100.0	100.0
TEN	31	658	21.2	.411	82.4	100.0
ECN						90.3
TWN	60	442	7.4	.439	62.6	100.0
TCC						
TCC Eastern	165[1]	1931				
TCC Central	85[1]	986				
TCC Pacific	103[1]	1252				
Cycle Four						
Area Nets						
EAN	31	4900	158.1	3.025	96.8	
CAN	31	2495	80.5	1.671	100.0	
PAN	31	2873	92.7	2.039	99.5	
Region Nets						
1RN	59	1336	22.6	.810	91.5	90.3
2RN	93	1485	16.0	.855	93.3	90.3
3RN	62	890	14.4	.715	100.0	100.0
4RN	62	1812	29.2	.900	95.9	100.0
RN5	62	1858	30.0	.842	91.7	100.0
RN6	62	1794	28.9	.610	95.7	100.0
RN7	62	1659	26.7	.998	98.2	100.0
8RN	59	998	16.9	.654	95.0	100.0
9RN	62	937	15.1	.630	99.0	100.0
TEN	62	869	14.0	.575	91.6	100.0
ECN	62	953	15.4	.843	96.8	100.0
TWN	62	969	15.6	.549	96.5	98.4
TCC						
TCC Eastern	211[1]	2452				
TCC Central	98[1]	916				
TCC Pacific	172[1]	2142				
Sections[2]	6368	47,747	7.5			
Summary	7987	101,641	12.7			
Record	7987	106,074	28.5			

[1]TCC functions not counted as net sessions.
[2]Section and local nets reporting (218): APSN ATN (AB), ABN ACN ASN SSN (AK), AENJ AENK (AL), HARC (AZ), NCN NCTN (CA), CN CPN NVTN RTN WCN (CT), FAST FMTN FPON FPTN GN MEN NFPN PEN QFN QFNS SPARC SWFTN TPTN (FL), CGVHFN CVEN GCN GSN GSSBN GTFCN (GA), BSN IMN MARES MSN MTN (ID/MT), ILN (IL), ICN ITN QIN (IN), INPMN TLCN (IA), KPN KSBN QKS (KS), 3ARES 4ARES 5ARES 11ARES 13ARES BARES CARN CCEN KEN KNTN KPON KRN KSN KTN KYN MEN MKPN PAEWTN PAWN SEKEN TSTMN WARES (KY), LAN (LA), EM2MN EMRI EMRIPN EMRISS HHTN NEEPN RIEM2MN WMN WMPN (MA/RI), MEPN MMN MTN WRIN (MB), MDD (MDC), AEN HCEPN MPSN MSN PTN SGN SPSN (ME), MACS MITN MNN QMN UPN (MI), APN (MR/NF), MTN (MS), 160MN MNARES NCHN NE4O NE75 NE160 NMPN NSN P2MN PVTN WNN (NE), GSFM GSPN NHN NHSN (NH), JSARS MCN NJN NJPN NJSN NJVN NWNJVN OBTTN SJVN SOCTN UCETN (NJ), NSN (NV), BAVHF CDRN CNYTN EPN HVN NLI NLIPN NLIVHF NLS NYPON NYS SDN STAR SVHF WDN (NY), ALERT BN BNR BRTN COARES FRCN HCARES LCNWARES O6MN OSN OSSBN OSSN SCRESN TATN (OH), OFON OLZ ONON OPEN OTWN (OK), OATN ORARES OSN PDXAARES PTTN SOFM SOARES WCN (OR), D6ARES LCARES MCESN NWPATMTN SMRA WARCVTN WPA WPAPMTN WPAPTN (PA), WQVUARESN (PQ), BR2MN GPD2MN LC2MN SCNTN SCSSBN (SC), PWXN RARA S2MN SATN SPN (SK), TNCW TNPN TNVN (TN), DFW TEX TSN TTN (TX), BUN UCN (UT), VLN VN VNTN VSBN VSN (VA), VTN (VT), EWTN NTN NWSSB PSTS WARTS TSN (WA), WVARES WVFN WVHN WVMDN WVN WVNN (WV), WCN WTN (WY).

1 — NET
2 — SESSIONS
3 — TRAFFIC
4 — AVERAGE
5 — RATE
6 — % REP.
7 — % REP. TO AREA NET

Transcontinental Corps

TCC naturally had a busy month, with many extra skeds being conducted. W1QYY is keeping an eye on TCC-E/c2, while N2YL partakes of an IBM internship. KN6C, WDØAIT and WB7NHR all received TCC-P/c4 certificates.

1	2	3	4	5
Cycle Two				
TCC Eastern	177	93.2	3813	1931
TCC Central	92	92.4	1583	986
TCC Pacific	124	83.1	2471	1252
Summary	393	89.6	7867	4169
Cycle Four				
TCC Eastern	226	95.0	4861	2452
TCC Central	101	97.3	1828	916
TCC Pacific	187	92.0	4261	2142
Summary	514	94.8	10,950	5510

1 — AREA
2 — FUNCTIONS
3 — % SUCCESSFUL
4 — TRAFFIC
5 — OUT-OF-NET TRAFFIC

TCC Roster

The TCC Roster (December) *Cycle Two* — Eastern Area (N2YL, Director) — K1s CE EIC, N1BHH, W1s QYY XX, AH2M, K2s KIR PH, KB2HM, KO2H, N2s CER YL, W2s, CS XD ZOJ, WB2s IQJ MCO, K3JSZ, WB3GZU, WA4CCK, WB4PNY, AF8V, W8PMJ, WB8YDZ, VE1WF, VE3s GOL HTL. Central Area (W9JUJ, Director) — WD4HIF, K4VM, W4s OGG ZJY KA4MZY, W5s CTZ KLV, KB5TC, N5AMK, WA5EQQ, WB5s NKC OXE YDD, K5s BNH KJN, W9s HOT JUJ NXG, WB9WGD. Pacific Area (WØHXB, Director) — KA5DDW, KM6I, KN6C, KT6A, KU6D, N6s ANL FTQ, VE6CHK, W6JGS, WB6EIG, KD7I, KF7R, W7s DZX GHT VSE, WA7WQE, WB7s DZX TQF, KØDJ, KBØMB, KJØG, NØACW, WØs EJD HXB, WAØYNP, WBØMTA, WDØAIT. *Cycle Four* — Eastern Area (W2CS, Director) — W1s EFW NJM QYY, K1s BA GN, N1s BHH NH, WB1CPF, W2s CS FR GKZ MTA RQ XD, N2YL, AH2M, KO2H, WA2SPL, W3s ATQ FAF PQ YQ, WB3GZU, W4UQ, KZ4K, N4KB, AB4V, WA4s CCK STO, WB4s PNY UHC, W8PMJ, K8JQ, N8XX, AF8V, WB8s MTD WTS YDZ, VE1WF. Central Area (W5GHP, Director) — W4s WXH ZJY, W5s RB SBE, N5s RB TC, K5s GM TL, W9s CXY DND, WB9UYU, WØs AM HI, KØEZ. Pacific Area (KØDJ, Director) — K5MAT, W5KH, N6s GW PZ, W6s EOT OZ VZT, KN6C, KT6A, K7s HLR KSA, KN7B, KD7I, W7s AK DZX EP GHT LYA VSE, WB7NHR, KØs BN DJ, KCØD, NØIA, WØs HXB LQ OGH, WDØAIT, VE7ZK.

Independent Nets (December 1981)

1	2	3	4
Central Gulf Coast Hurricane	31	847	2707
Clearing House	31	654	468
Early Bird	31	1349	428
Eastern Area RTTY Traffic	31	251	228
Empire Slow Speed	31	105	427
Hit and Bounce Slow	31	265	423
Hit and Bounce Traffic	31	1035	699
IMRA	27	704	1418
New England Teleprinter	13	151	76
North American SSB Traffic	26	379	237
20-Meter ISSB	31	2250	780
75-Meter ISSB	31	1898	1291
7290 Traffic	53	1879	3235

1 — NET
2 — SESSIONS
3 — TRAFFIC
4 — CHECK-INS

Public Service Honor Roll December 1981

This listing is available to amateurs whose public service performance during the month indicated qualifies for 60 or more total points in the following nine categories (as reported to their SCM). Please note maximum points for each category: (1) Checking into cw nets, 1 point each, max. 30; (2) Checking into phone/RTTY nets, 1 point each, max. 30; (3) NCS cw nets, 3 points each, max. 12; (4) NCS phone/RTTY nets, 3 points each, max. 12; (5) Performing assigned NTS liaison, 3 points each, max. 12; (6) Delivering a formal message to a third party, 1 point each, no max.; (7) Handling an emergency message, 5 points each, no max.; (8) Serving as emergency coordinator or net manager for the entire month, 5 points, max. 5; (9) Participating in a public service event, 5 points, max. 5. This listing is available to Novices and Technicians who achieve a total of 40 or more points.

783
KA9CPA
237
WB2IQJ
233
WB3GZU
213
WA4PFK
211
WD8LRT
209
KA1ON
208
VE3KK
202
WA2SPL
KA3CDQ
183
WD4COL
179
WA1TBY
174
VE3FGU
163
N4EDH
WB4FVV
162
WB7WOW
160
W9JUJ
154
KBØMB
149
WB5YDD
147
AA4FG
146
W2XD
K4SCL
142
W4OGG
141
WB2MCO
140
W9TLU
137
KA8CPS
WB7TQF
136
WD4HIF
135
N1BHH
132
WD4AWN
KB3DT
131
W1EOF
NG4J
WA7LGN
129
AG2R
AF8V
127
WB2EAG
K2HD
123
N1BFD
121
WA4EIC
VE3GOL
120
KA1BJY
WB1CRH
119
WD4ALY
WB7DZX
118
N9BYK
W5DTR
KO2H
KB4WT
117
N7AKX
KA2KVZ
116
W9DM
K1OSM
WA4STO
114
KC9CJ
KC5FX
W7GHT
W2MTA
VE1WF
113
WB5CIC
KC5NN
WB1GXZ
WA4JDH
112
W9YCV
111
WD4CNQ
WB4FDT
WD8IBY
110
N7BGY
WA4SRD
KZ4K
109
W7EP
WØOYH
K4JST
K7GXZ
WB5MMI
108
AK1W
K6YD
K8OZ
N1ARI
KAØAID
WB8YDZ
K3JL
107
K3JSZ
W7FJZ
KB2HM
106
KB3XO
N7AFZ
WB4AID
WA4EYU
105
KY4U
WB1HIH
104
KA5CXW
NT4S
AC3N
KA4ASZ
KA1FE
N9AUG
WB8JGW
103
W4ANK
KA1BBI
WA7MEL
VE2PJ
WB8MTD
102
N7NTG
K4ZB
WB7OGA
W6HUJ
WA3WIY
101
K4VWK
KB4OZ
100
WØEJD
N2WX
N4BZH
N4PL
W7VSE
99
N1NH
KA6BNW
W1TN
N6GW
KC4MM
K1BSO
98
KA4GFU
WB3ELG
W2ZOJ
KA5AZK
KB8MX
W5KLV
W5CTZ
N6AWH
N2BNB
97
VE3DPO
WD5JYI
WB8SYA
96
WD9ESZ
W7LNE
WA4PIZ
95
VE3WM
KØEZ
K9BVE
N2APB
WB6DNT
KF4U
KG9B
WA4QXT
W8GGX
94
WA5RKU
K4EV
WA4UTC
WB2BNY
KT6A
WB1CGK
KB5NX
93
N5DKW
KØDJ
W6CPB
K3CR
VE2EDO
92
KB3LF
KA4AUR
KE6JV
K2GCE
W4WXH
N8BQK
WD8RHU
WA2HEB
AG9G
91
N4UF
WB4TZR
90
VE3LDU
WB3IDS
W2BIW
W4CKS
N2XJ
89
VE3HGJ
WD5HOC
88
KB3UD
KA3GJT
N3CJP
WBØQAM
KCØZ
KA9HPQ
KA7ELI
87
W2YJR
K3RZR
KB5UL
86
VE3HTL
KB5EK
NØBDG
WA6LVO
W2AET
VE5HG
K1JHC
85
WBØZEN
AK1E
KA4PNF
K4IWW
VE2GAG
84
K2ZM
N6FTQ
WB3FKP
W3VA
N2BLX
WB7OEX
83
AA3B
N1ALM
W9NXG
KY4K
WØKJZ
N8AUH
K2VX
82
WAØTFC
N5TC
KA4MZY
81
W9JIJ
WØOGH
W5RB
W5VMP
80
KA1T
79
WB2HDU
KA4ASZ
WA3EHD
KD4PJ
78
WB3CAI
KA6A
W9UMH
KA1BBU
77
VE3GT
W2GLH
KA2CTU
WP4AOH
KB5TC
76
W1RWG
WB9YPY
W9FC
KK9N
WA8GMT
N7BGW
75
KB2KW
WB9WGD
N5BT
VE5AE
WB8YTD
KA1EMQ
74
WA1YNZ
K2ZVI
WB6QBZ
N4DZW
N9ATP
W1TM
WA4LXP
KV5N
WØOTF
73
WB2OWO
W4HON
WB4NTW
KA9IKR
WA2CUW
72
KS2G
WB8RSM
VE3JRT
71
N2BDW
KAØJQG
K4ZN
WD8KBW
KA2JMH
70
KGØL
W3DP
KA3DTE
N7AFY
W9IEM
WA7IHS
KA4IUM
69
K5TL
W9HOT
WA4LJI
W4NFA
K6INK
KA4LNA
N9AZI
68
W4LXB
N5DZT
67
KA4BBA
N5CRU
W2ZQ
66
K3QXC
KN6C
KM6I
W8EK
KA8LHJ
N5AMH
65
WA2KOJ
WBØGOB
64
WØOUD
WA3WQP
WØRJW
WD9FRI
KA2GSX
WA7DPK
KA2GSL
63
N6WP
KA5IWF
N3ADU
NN4D
W4ZJY
VE5XS
WA8DHB
KA1GGE
KØSI
62
KA4BCM
N3BFL
WB5LBR
WA6QCA
KD4TY
KA1EHR
60
W6ZRJ
VE3DUK
KC4LA
KA4ERP
WB4WII
WB6BZZ
KA2GOH
N2ARD
K5HGX
KY4L
W9QLW
WB8SIQ
KA8DEZ
W5TI
59
WB2TWO/T
WP4BCV/T
52
KA5MAY/T
KA8IWW/N
KA2GTE/T
49
N8DAD/T
46
KA2DBD/T
43
N2CPX/T
KA8GGZ/T
42
KA4SAA/N
KA9MVF/N
N8BZC/T
KA4VFC/N
41
KA2NIL/T
KA5MSP/T

Brass Pounders League December 1981

BPL Medallions (see April 1979 *QST*, page 77) have been awarded to the following amateurs since last month's listing: WB7WOW, W9UMH.

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	769	1192	1584	96	3641
WB2IQJ	323	1310	1447	131	3211
NØBQP	58	1734	344	913	3049
KA9CPA	62	1320	393	729	2504
W9JUJ	4	1195	1115	44	2358
WA2SPL	0	1039	1079	96	2214
WA4JDH	25	1046	986	12	2069
W5SHN	297	593	969	32	1891
W7DZX	14	872	850	10	1746
VE3KK	402	443	640	147	1632
N4PL	87	608	670	46	1411
KBØMB	29	686	600	86	1401
AF8V	12	656	667	28	1363
WAØHJZ	31	808	505	10	1354
WB4FVV	6	646	622	62	1341
W3ATQ	2	654	638	14	1308
WB4EIG	14	644	642	2	1307
WA4STO	93	506	673	10	1282
WA1TBY	3	570	575	78	1226
KY4U	4	606	594	14	1213
K4TH	17	564	372	232	1185
W2MTA	29	534	536	8	1107
WB5YDD	31	521	453	90	1098
WB2EAG	8	539	508	28	1083
WA4PFK	161	373	422	120	1076
W2ZQ	271	253	501	20	1045
N7AKX	128	385	496	26	1035
WB4PNY	11	484	515	5	1015
WD4IIO	437	66	451	48	1002
N6FTQ	42	469	479	10	1000
WB7TQF	86	377	435	68	966
W7VSE	30	492	426	11	959
N7AFZ	124	378	393	52	947
K4SCL	4	458	425	40	927
WB8MZZ	20	426	468	7	922
VE1WF	66	403	430	22	921
WB7WOW	28	375	441	51	895
KT6A	9	433	429	22	893
W5KLV	2	445	423	22	892
KB5W	24	416	405	28	873
N5AMH	65	369	429	7	870
W4SIZ	17	425	411	31	852
K3JSZ	4	406	421	6	837
WD4AWN	2	391	390	45	828
W3VR	284	198	320	20	822
K4JST	43	384	381	8	816
W6IPL	0	469	342	1	812
WA4CCK	0	380	420	2	802
WAØTFC	0	380	418	1	799
WA2HSB	33	390	348	18	789
KE6JV	18	374	371	25	788
WD9ESZ	20	339	417	7	783
N1BHH	26	350	372	29	777
WD4CNR	0	399	353	1	753
W5CTZ	0	345	382	9	746
KA3DTE	8	351	376	10	745
KØDJ	2	408	323	12	745
WD4CNQ	3	389	344	5	741
WD4HIF	14	349	337	38	738
VE3HGJ	115	265	341	16	737
N3ADU	1	373	353	4	731
W4WXH	36	324	363	8	731
K8OZ	2	354	360	15	731
NG4J	9	396	282	31	718
WAØAUX	30	338	340	0	708
W7GHT	0	343	345	16	704
KD4PJ	4	337	353	9	703
KØEJD	5	354	329	8	696
WD8LRT	29	318	233	110	690
W8PMJ	4	357	327	2	690
W2RQ	0	339	325	15	679
AA4FG	209	119	299	49	676
W1EFW	15	302	302	20	669
K8NCV	10	323	328	4	665
W1EOF	5	279	343	35	662
AK1W	3	318	325	12	658
N4EDH	142	171	261	84	658
W4MGO	61	215	241	24	658
KO2H	13	288	325	29	655
WB2IDS	44	280	293	31	648
W5REC	1	311	317	8	637
KA1BJY	39	290	288	19	636
WA4HXU	299	15	307	6	627
VE4PG	165	256	203	0	624
KB8MX	5	324	247	30	606
N6WP	0	290	307	3	600
K4ZK	19	280	294	4	597
W6HUJ	26	261	283	25	595
KN7B	10	274	308	3	595
W1UD	19	289	254	28	590
W5TI	9	280	289	12	590
AB4S	104	210	261	12	587
KCØAS	3	450	122	7	582
KA8CPS	84	206	210	74	574
NB4L	9	260	294	7	570
VE3GOL	41	235	240	54	570
N1NH	29	250	279	4	569
VE3CYR	0	309	256	4	569
AG2R	47	222	272	28	569
W9FC	5	327	222	12	566
KV5N	133	168	249	14	562
AB4V	1	310	244	5	560
WA4LJI	14	256	284	5	559
W6YBV	23	249	277	6	555
WB8MTD	3	302	243	7	555
WA7LGN	44	210	231	69	554
W8GGX	2	255	262	33	552
W9CXY	0	260	285	4	549
AC3N	5	280	247	15	547
WDØAIT	0	288	257	0	545
WD8ODV	51	222	252	18	543
W4WXA	2	258	270	12	542
KA4MZY	1	285	247	4	537
WB2MCO	10	280	210	35	535
WB5CIC	45	229	234	26	534
WA4EIC	16	256	211	49	532
KA6BNW	2	248	279	3	532
W9NXG	0	261	262	5	528
WD4FTK	2	261	255	7	525
KU4W	3	269	227	26	525
WØACH	31	231	262	0	524
N4EFB	40	151	317	14	522
KD8G	7	247	244	24	522
K3RZR	23	234	254	3	514
W2AET	27	222	261	1	511
WD8KFN	5	262	230	8	505
WD4ALY	1	259	224	18	502
WB8YDZ	11	234	250	7	502
WB3GZU (Feb.)	61	371	365	75	872
WB3GZU (Oct.)	51	483	478	60	1072
KS6T (Nov.)	4	322	315	6	647

Multioperator station:

K3CR	293	98	353	15	759

BPL for 100 or more originations plus deliveries:

KC1G	390		
K4VWK	249	W4HIR	134
N4AET	207	WØQMJ	130
W4PIM	190	W4SME	127
N5CDN	181	KA2KVZ	126
KA5DQP	181	KB1G	125
WP4BDS	180	KA1ON	120
WA4AOG	178	KB5NX	116
WB1EZT	160	K3MXM	115
WD4COL	158	KB4WT	107
K5PE	147	K4EUK	106
WAØQIT	147	KA7DBS	106
WB4TZR	146	WD4RDT	104
WAØVRE	140	VE3FGU	103
WB4PIB	139	WØBMA	101

Multioperator station:

W4DW 100

1 — CALL
2 — ORIG.
3 — RCVD.
4 — SENT
5 — DEL.
6 — TOTAL

Contest Corral

Conducted By Mark Wilson,* AA2Z

A Roundup of Upcoming Operating Events

MARCH

3

West Coast Qualifying Run, 10-35 wpm at 0500Z March 4 (9 P.M. PST March 3). Frequencies are approximately 3590/7090 kHz. Underline one minute of the highest speed you copied, certify that your copy was made without aid and send to ARRL for grading. Please enclose your full name, call (if any) and complete mailing address. A large s.a.s.e. will help expedite your award/endorsement.

6-7

ARRL International DX Contest, phone, Dec. *QST*, page 94.

10

W1AW Qualifying Run, 10-35 wpm at 0300Z March 11 (10 P.M. EST March 10). Transmitted simultaneously on 1.835 3.58 7.08 14.08 21.08 28.08 50.08 147.555 MHz. See March 3 listing for more details.

13-14

Nebraska QSO Party, Feb. *QST*, page 88.

Virginia QSO Party, Feb. *QST*, page 88.

RSGB Commonwealth Contest, Feb. *QST*, page 88.

20-21

Bermuda Contest, sponsored by the Radio Society of Bermuda, from 0001Z March 20 until 2400Z March 21. Open to amateurs from USA, Canada, United Kingdom and Federal Republic of Germany. Single operator only; must operate from home QTH (no guest operators). Operate maximum 36 hours; off-times must be at least 3 hours each. 80-10 meters. No cross-band or cross-mode QSOs. All stations send signal report and QTH. (U.S. stations send state; Canadian stations send province; U.K. stations send county; West German stations send DOK number; Bermuda stations send parish). W/VE stations work West German, U.K. and Bermuda stations only. West German and U.K. stations work U.S., Canada and Bermuda only. Only one QSO per band (either phone or cw). Count 5 points per QSO (7 points for G, GW, GM and GI contacts) and multiply by the total number of Bermuda stations worked on all bands (the same VP9 may be worked on five bands). Logs must be received by May 31. Send to: Contest Committee, Radio Society of Bermuda, Box 275, Hamilton 5, Bermuda.

Spring RTTY Contest, sponsored by the British Amateur Radio Teleprinter Group, from 0200Z March 20 until 0200Z March 22. Operate 30 hours maximum. Off-times must be at least 3 hours long and noted in the log. Single and multioperator categories; SWL category. 80-10 meters. Exchange time in UTC, signal report and serial number. Work stations once per band. Count 2 points for QSOs in own country, 10 points for different country. Count 200 bonus points for each country worked per band. For final score, add (QSO points × total different band countries) plus (band countries × 200 × continents). Mail entries to arrive by May 31 to Ted Double, G8CDW, 89, Linden Gardens, Enfield, Middlesex, EN1 4DX England.

Tennessee QSO Party, sponsored by the Tennessee Council of ARCs, from 2100Z March 20 until 0500Z March 21, and 1400 until 2200Z March 21. No list or repeater QSOs. Work same station once per band and mode. Work mobiles and portables again as they change counties. Single transmitter entries only. Mobiles compete against mobiles, portables against portables. Exchange signal report and QTH (TN stations send county; others send state, province or country). Suggested frequencies: cw — 50 kHz up from lower band edge; phone — 3.980 7.280 14.280 21.380 28.580; Novice — anywhere in Novice bands. Count 1 point per QSO except 1.5 points per 10 and 15 meter QSO. TN stations multiply by total states, provinces and TN counties. Others multiply by total TN counties worked. TN stations count 200 bonus points for each TN county outside home county with which 10 or more contacts are made. Stations running less than 200 watts multiply score by 1.5. Awards. Mail entry by May 31 (include large s.a.s.e. for results) to Dave Goggio, W4OGG, 1419 Favell Dr., Memphis, TN 38116.

Wisconsin QSO Party, sponsored by the West Allis RC, from 1800Z March 21 until 0200Z March 22. No repeater QSOs. Work stations once per band and mode. Work mobiles again as they change counties. Exchange signal report and QTH (county for WI stations; state, province or country for others). Suggested frequencies: phone — 3.990 7.290 14.290; cw — 3.570 7.070 14.070. Count 1 point per phone QSO and 2 points per cw QSO. WI stations multiply by sum of states, countries and WI counties worked; others multiply by number of WI counties worked. WI mobiles add 100 bonus points for each county outside home county from which 10 or more QSOs are made. Mail entry by May 1 (enclose large s.a.s.e. for results) to West Allis ARC, P.O. Box 1072, Milwaukee, WI 53201.

YL ISSB QSO Party, cw, sponsored by the YL ISSB Communications System, full 48-hour period UTC (phone April 24-25). Two 6-hour rest periods required. Full information, log sheets and application forms are available from KØRDJ or KAØALX.

25

W1AW Qualifying Run, 10-35 wpm at 1400Z (9 A.M. EST) March 25. See March 10 listing for more details.

27-28

CQ World Wide Prefix Contest, phone, sponsored by *CQ* Magazine, 48-hour period with 30 hours of operating time permitted. Off-time may be taken in up to five periods. Multioperator stations may operate the entire 48 hours. Two-way ssb only, 160-10 meters. Competition categories are: single op, all band; single op, single band; QRP (5W output maximum); multiop all band only, single transmitter and multi-transmitter. Multi-singles must remain on a band for 10 minutes; multi-multis are permitted one signal per band. All transmitters must be located within a 500-meter circle or limits of property; no remote stations. Exchange signal report plus serial number starting with 001. Multi-transmitter stations use separate numbers on each band. Points: Contacts between stations on different continents count 3 points on 20, 15 and 10 meters, 6 points on 160, 80 and 40 meters. Contacts between stations in the same continent but not the same country, count 1 point on 20, 15 and 10 meters, 2 points on 160, 80 and 40 meters. Exception: Contacts between different North American countries count 2 points on 20, 15 and 10, 4 points on 160, 80 and 40. Contacts with your own country count for multiplier credit only. Multipliers are prefixes, to be counted once only. A prefix is considered to be the two- or three-letter/number combination that forms the first part of an amateur call, as in W1, AA2, 4X4, DL2, etc. Score is total QSO points from all bands worked times the number of different prefixes worked. For single band, multiply QSO points on that band by number of different prefixes worked. A station may be worked once per band for QSO point credit, but prefix credit may be taken only once. Club competition. Entries must be postmarked by May 10 (July 10 for cw). Send to *CQ* Magazine, 76 N. Broadway, Hicksville, NY 11801.

Spring VHF/UHF QSO Party, sponsored by the Ramapo Mountain ARC, from 2100Z March 27 until 0500Z March 29. Single or multi transmitter. Single transmitters permitted only one transmitted signal at any given time; multi-transmitter stations permitted one signal per band. The number of operators, loggers, etc., does not affect entry class. Exchange call sign, class of entry and section designator. A section is defined as a geographical area 1 degree in longitude by one degree in latitude, identified by a 4- or 5-digit number indicating the next lowest degree of longitude and latitude. Example: WA2SNA (Oakland, NJ), at 74 deg 15 min west and 41 deg 03 min north, would use a section designator of 7441. Scoring: Each QSO has a different point value based on the distance between stations. To arrive at the point value, take the difference between your section lat/long and that of the station you work. Use the larger number difference, plus 1. Example: WA2SNA in 7441 works W3XX in 7638. The difference between 74 and 76 (long) is 2, and the difference between 41 and 38 is 3. Take the larger of the numbers (3) plus 1 equals 4 points for that QSO. Each QSO may have a point value between 1 (for contacts with stations in your own section block) and 10. Multiply by the number of different sections worked per band. Score each band separately, and then multiply each band by the band multiplier (50 MHz, ×1; 144 MHz, ×2; 220 MHz, ×4; 432 MHz, ×8; 1296 MHz, ×16; 2304 MHz and above, ×32). Final score is the sum of the individual band scores. Example: You work 3 stations in 2 sections on 144 MHz and 5 stations in 3 sections on 432 MHz. 144-MHz QSO points (5) times 144-MHz sections (2) times 144-MHz band multiplier (2) equals 144-MHz band score (20). 432-MHz QSO points (15) times 432-MHz sections (3) times 432-MHz band multiplier (8) equals 432-MHz band score (360). Final score equals 144-MHz band score (20) plus 432-MHz band score (360) for a total of 380 points. Use separate logs for each band. Summary information includes a breakdown by band of QSO points, multipliers and band score, as well as total final score. Be sure to include your section designator, ARRL section and ARRL division (see page 8 *QST*) on the summary sheet. Official entry forms (suggested) are available from sponsor for s.a.s.e. Log deadline May 1. Mail to Ramapo Mountain ARC, Box 364, Oakland, NJ 07436.

APRIL

3-4

ARRL International EME Competition, part 1, this issue, page 82.

ARRL Open CD Party, phone, this issue, page 82.

SP-DX Contest, cw, no rules received.

6

West Coast Qualifying Run, 10-35 wpm at 0500Z April 7 (9 P.M. PST April 6). See March 3 listing for more details.

7-8

DX-YL to North American-YL Contest, cw, sponsored by YLRL from 1800Z April 7 until 1800Z April 8. YLs only. Exchange signal report, serial number and state/country. Count one point per QSO; multiply by total states/provinces/countries worked for final score. Additional multiplier of 1.25 if running less than 150 W dc (300 W PEP). Mail entry by April 29 to Sandra Heyn, WA6WZN, 962 Cheyenne St., Costa Mesa, CA 92626.

10-11

Commonwealth Contest, sponsored by the Canadian Amateur Radio Federation. For amateurs in Commonwealth or British Mandated Territories only. For complete rules and information contact CARF Contests and Awards Committee, P.O. Box 2172 Station "D", Ottawa, ON K1P 5W4, Canada.

14-15

DX-YL to NA-YL Contest, phone, see April 7-8 listing for more details.

15

W1AW Qualifying Run, 10-35 wpm at 0300Z April 16 (10 P.M. EST April 15). See March 10 listing for more details.

17-18

ARRL Open CD Party, cw, this issue, page 82.

SP-DX Contest, phone.

QRP ARCI QSO Party

24-25

ARRL Morning Special

Helvetia Contest

YL ISSB QSO Party, phone.

25

W1AW Qualifying Run

MAY

1-2

ARRL International EME Competition, part 2, this issue, page 82.

*Assistant Communications Manager, ARRL

CANADIAN DIVISION

ALBERTA: SCM, E. Roy Ellis, VE6XC — SCM/SEC: VE6XC. ASCM: VE6AMM. STM NM (ATN) & ANM (APSN): VE6ABC. VE6AFO, NM & EC, changed QTH and ham gear is still packed. Tnx for FB report on SET. After much discussion on the air it is expected that January will see the beginning of an "on the air" hookup over the ARES net between officials of the Alberta Disaster Services and their local directors stationed throughout the province each week to promote use of ham radio in emergencies. We invite all hams to get into the act. For details contact your local EC STM or SCM. Traffic: VE6CHK 326, VE6BLY 50, VE6VV 29, VE6QN 24, VE6XC 20, VE6ABC 18, VE6YW 6, VE6ARN 6, VE6WN 4, VE6CFQ 1.

BRITISH COLUMBIA: SCM, H. Ernie Savage, VE7FB — Well, Canada Post must be storing this SCM's mail as we haven't received any reports nor BCEN's. But British Columbia Public Service Net 3755 reports — high 200, low 91. Total checkins in 31 days 5299, averaging 173, with Christmas being the low, 90. Vancouver ARC Christmas party at the UBC Faculty Club. Fantastic food and a good turn out of members and guests. VEØMCQ left Vancouver to sail solo nonstop around the world. The "Burnaby Connection" is a newsletter of the Burnaby ARC, and it contains good reading of club's activities. We hear from the snow birds, VE7LL and VE7CB. All doing fine. Traffic: VE7FB 251, VE7ZK 108, VE7EWI 100, VE7BLO 38, VE7EDN 23, VE7CDF 20.

MANITOBA: SCM, Peter Guenther, VE4PG — ASCM: JP. SEC: HK. STM: RO. NMs: VJ NM ACX TE. We wish speedy recovery to VE4NE and VE4AJE. As usual, all nets show an increase in traffic in December. Hope Santa was good to all. A merry, happy and prosperous new year. Thanks all for your support in 1981. WRIN QNI 218, QTC nil, sess 7. MTN QNI 289, QTC 170, sess 31. MMN QNI 545, QTC 41, sess 31. MEPN QNI 1169, QTC 75, sess 31. Traffic: VE4PG 624, VE4ACX 120, VE4RO 108, VE4FK 41, VE4TE 33, VE4AJE 31, VE4AAU 22, VE4AGS 22, VE4JA 21, VE4AAD 20, VE4CR 16, VE4ID 15, VE4NM 14, VE4TL 14, VE4YE 12, VE4LB 11, VE4HK 8, VE4QI 8, VE4AAT 7, VE4LU 7, VE4CF 5, VE4EN 4, VE4GW 4, VE4XN 4, VE4ADJ 2, VE4OE 1.

MARITIME — NEWFOUNDLAND: SCM, D. R. Welling, VE1WF — ASCM: VO1FG. SEC: VE1EI. NMs: VO1JN VE1WF. STM: open. Hosp. VO1EL. SONRA Exec: VO1IM, pres.; VO1JN, v.p.; VO1IS, sec; VO1CR, treas. Congrats. VO1NP presided over Xmas Aero Reindeer Flight Dec 24th. The Provincial associations can use more help. Won't you volunteer your services? MAARC active in visiting hospitals in Moncton bringing Santa to the kids via 2 meters. VE1AMA received Base Commander's, Summerside PEI, commendation for his work with CFARS and Amateur Radio. FLASH...A Convention will be held in Charlottetown, PEI, Aug. 20/21/22. Mailout in mail soon. APN: 31 sess, 199 QNI, 151 tfc, 546 time. Traffic: VE1WF 921, VE1LCR/RO 264, VE1XF 59, VE1BXA 27, VE1ALU 23, VE1CEN 22, VE1OC 4, VE1CK 3.

ONTARIO: SCM, Larry Thivierge, VE3GT — ASCM: VE3GOL. SEC: VE3GV. STM: VE3QI. Special thanks to KB4LB who kept me in touch with the NTS while we were holidaying in Florida. Six metres had one final peak this month and VE3s CVX FIB DSS CRU GFU BQN EVW LNX BAS NAS were all heard chasing DX there. Regretfully, the following have become Silent Keys: VE3s MB XD AAZ BWI DGZ FYI. VE3MB, along with his XYL, VE3EVA, was one of the founding members of the Scarborough ARC. VE3s BKB FKK and PQ, members of TFMCS and Scouters, are developing a program of demos, films and small scale public service activities which they hope will bring Amateur Radio more to the attention of the scouting organization, initially in Greater Toronto and ultimately across Canada. VE3DSS looking for solutions for improving the IC-551 noise blanker and a data sheet for a Telrex 220 MHz 16 el long yagi. VE3CYR had his first OSCAR QSO recently. VE3EFX, hosting YO7CCO for a couple of months, managed to listen to telemetry from RS3 thru RS8. Under VE3FQV, ONTARS had another successful year. VE3GRO starting to feel like a "real ham" again as he is on the air more with a new TU for RTTY and a small beam. VE3KK won the Florida Skip plaque for 1981 with the highest total for all of Canada and the US, apart from Florida itself. W3HDH advises that VE3BR finished 2nd among out of staters in the PA QSO Party. The annual RSO Convention will be held again in Waterloo on October 1-3. Campbellford rptr VE3KFR has changed frequency to 147.99/.39. VE3s FGV HNJ and LYV are on 2 meters. Homebrew night for the Skywide ARC is March 8. VE3UR was voted "The Outstanding Member of the Year" of that club. New members of the Ontario Trilliums are VE3s KGS LQA MCG. BPL: VE3s KK HGJ GOL CYR FGU. Traffic: VE3KK 1632, VE3HGJ 737, VE3GOL 570, VE3CYR 569, VE3FGU 391, VE3HTL 305, VE3DPO 247, VE3GNW 229, VE3CUR 205, VE3GFN 173, VE3GT 162, VE3JRT 153, VE3BZB 124, VE3EUI 124, VE3KXB 123, VE3KCZ 119, VE3WM 114, VE3WG 97, VE3AWE 92, VE3FGV 69, VE3AJN 58, VE3DVE 54, VE3DUK 49, VE3EHL 45, VE3LNN 45, VE3LSJ 42, VE3DZH 41, VE3ANJ 30, VE3AYZ 24, VE3FPI 22, VE3LDU 17, VE3KLX 16, VE3MO 8, VE3EWD 5.

QUEBEC: SCM, Harold Moreau, VE2BP — SEC: VE2DEA. STM: VE2PJ. NMs: VE2PJ VE2FSA. Change of call: VE2DYD is now VE2YW. VE2BJC is now VE2OO. VE2BUJ is now VE2AW. Congrats to all QSN operators, for handling the holiday season's traffic, with no back log. VE2s MC BUO EKC BP and W2PCG were present at VE2WH's 50th wedding anniversary party. Avec regret j'ai a vous annoncer le deces de VE2s FLD EK and VE3BWI. Traffic: VE2PJ 296, VE2FKI 295, VE2EDO 143, VE2FFE 66, VE2BP 46, VE2EC 31, VE2GAG 26, VE2EKC 22. (Nov.) VE2FSA 28.

SASKATCHEWAN: SCM, W.C. (Bill) Munday, VE5WM — STM: VE5QY. SEC: VE5II. NMs: VE5DC VE5HG VE5OI VE5SF. The Saskatoon Amateur Radio Club, Inc., celebrated its 50th anniversary of ARRL club affiliation with a dinner meeting on November 13, attended by approximately 75 members, YLs and XYLs SARC President VE5HG presented commemorative plaques to two of the original charter members, VE5FD and VE5HC. A third charter member, VE5HR, was unable to attend and will receive his plaque at a later date. ARRL/CRRL Assistant Director VE5RP presented VE5HG with the ARRL certificate commemorating 50 years of ARRL club affiliation. VE5CU also received a plaque in recognition of his years of dedication in teaching ham classes for SARC. Traffic: VE5ADZ 168, VE5DC 102, VE5AE 71, VE5HG 69, VE5XS 65, VE5KS 51, VE5QY 50, VE5LN 42, VE5AEJ 35, VE5WM 29, VE5AAT 20, VE5TT 14, VE5MP 8, VE5OI 1.

ATLANTIC DIVISION

DELAWARE: SCM, Harold K. Low, WA3WIY — SEC: W3PQ. Column by outgoing SCM W3DKX. As I write my last column after 12 years as SCM, I recall the excellent cooperation given by the amateurs of Delaware in making Amateur Radio an efficient means of communication and an interesting and enjoyable hobby. While names change, the general attitude and interest seems to remain fairly constant. I am glad to be turning the office over to as capable a person as WA3WIY and his helpmate WB3DUG. We are most fortunate to have them in our section. WB3JVX asks that we check the 220 and 440 MHz bands for a vhf net Mondays at 2000 local time. WA3WYO and WA4RTX has been coming through on the DTN from FL. By press time, W3QQ and W3DKX should have joined them. For the 2nd time in section history we handled over one thousand pieces of tfc in a month. Fourteen stations passed a total of 1013 messages. Unfortunately, more was handled but not reported. Please get your monthly reports in to WA3WIY. DTN QNI 352, QTC 87. DEPN QNI 59, QTC 18. SEN QNI 38, QTC 15. DSSN QNI 58, QTC 12. Traffic: W3QQ 281, W3PQ 275, WA3WIY 100, W3DKX 84, K3JL 79, WB3DUG 50, N3AKC 49, N3AXH 26, WA3DUM 24, KA1GGE/3 17, W3WD 12, WA3PWT 8, W3FEG 4, K3ZXP 4.

EASTERN PENNSYLVANIA: SCM, Karl W. Pfeil, W3VA — SEC: WA3PZO. STM: K3JSZ. DECs: N3BFL N3CJP W3EEK W3YZW.

Net	Freq.	Time	QNI	QTC	Sess	Mgr
EPA	3610	7/10 P.M. Dy	647	635	59	AA3B
EPAEPTN	3917	6 P.M. Dy	597	502	31	WA3EHD
PFN	3958	5 P.M. Dy	378	498	31	WA3WQP
PTTN	3610	6:30 P.M. Dy	282	140	31	K3JSZ

New appointments: K3JSZ, STM; N3BFL, DEC District 5; WB3IWZ, EC Wyoming Co., WB3JYY, EC for Carbon Co.; KA3DLY, ORS; KB3XO, NM & OO; W3GTN, OO; WA3FKT, OBS & OVS. Congrats to all. BPL: K3JSZ K3MXM. OO reports: N3BFL W3FAF W3GVR W3KEK. OBS reports: K3EBZ KB3VV N3CJP W3AVJ W3CL W3ID W3VA WA3ENE WB3FVJ. OVS reports: N3BHS W3GOA. Local & vhf nets reports: (QNI, QTC, sess) D3ARES 187, 43,4; D6ARES 30, 20, 5; D10ARES 65, 12, 6; LCARES 143, 44, 9; MCESN 53, 13, 4; SMRA 40, 1,3; SWOT 66, 0, 5; WARCTVN 50, 26,4 with total QNI 634, QTC 157, in sess 40. KB3XO new call of WB3HTW. N3AVZ now Extra. EPA net welcomes new member KA3BQS and return of KE3U. EPAEPTN welcomes KA3DLY. PFN welcomes W3IQD KB3BG KB3UD. PTTN welcomes W3AI. Congrats to Penn Wireless Assn. for winning the gavel in Pa QSO Party. Also to WB3DJF for highest single op and K3ZUF for multi-op catagories. K3MXM W3PTM and WA3INW report for first time. Welcome aboard. WB3FKP has new multiple quarter wave ant for 20M. A new V-beam for 40 & 15 at WA3OFD. AA3C reports Red Rose Net reorganized with KA3FGH as new director and KA3JBJ as new NCS and new computerized autopatch on RR rpt. N3BFL, DEC D5, announces D5ARES net now active Sunday at 9 P.M. local time on 146/865 rpt. I wish to thank WB3JYZ for the FB job he did as STM. He had to give up the job because of heavy work load as he expects to enroll in MIT in the fall. Good luck from EPA gang. All NM appointees, etc., please note that I have appointed K3JSZ as new STM. Please give him your cooperation by submitting reports to him before the 10th of the month. KB3JK is now on ATV in Wilkes-Barre area. KB3LF reports Xmas station in Bethlehem a success. KB3XO sez traffic heavy, phone bill high and Santa brought him a new mike and new call sign. WB3AAC, EC Chester Co., reports 35 Chester Co. ARES members participated in 3 separate events recently using 146.52 and WA3GMS & WR3ABI repeaters. N3BHS had good results with QRP (3W) on 6M. AA3B, NM EPA, was well pleased with results in recent SET. PSHR reports: AA3B AA3C K3QXC KA3DLY KA3GJT KB3LF KB3UD KB3XO N3BFL N3BHS N3CJP W3DP W3VA WA3EHD WA3TKU WA3WQP WB3CAI WB3FKP WB3FYT K3JSZ. Traffic: K3JSZ 837, WA3WQP 465, KB3UD 464, W3IPX 383, AA3B 380, N3CD 367, KB3LF 365, W3DP 304, K3MXM 230, KB3XO 230, KA3GJT 224, W3FAF 203, W3VA 196, WA3EHD 190, WB3FKP 161, W3TWV 115, WB3CAI 110, WB3KUZ 104, K3KW 94, WA3OFD 80, WA3INW 70, K3QXC 66, KA3DLY 53, W3YZW 52, N3CJP 49, W3ADE 45, N3BFL 42, WB3FVJ 28, W3ID 26, WA3VIL 21, WB3FYT 16, AF3Z 15, W3AVJ 13, KA3FJJ 12, W3CL 10, W3EEK 7, WA3CKA 6, W3PTM 6, KE3U 6, WA3TKU 5, AA3C 2, K3EBZ 2, W3HK 2, K3YD 1.

MARYLAND — DISTRICT OF COLUMBIA: SCM, Karl R. Medrow, W3FA — The PONs meet daily at 1700 local time 3905 kHz except Sundays. MEPN meets daily 1800 local 3920 kHz. MDD daily at 1900 and 2200 local on 3643 kHz. Statewide coverage plus. Net/manager sessions/traffic/QNI average. MDC PON/W3OYY Nov-3/6/25.2. Dec-5/13/25. WR PON/WB3BFK for W3DFW 22/34/21. MEPN/WB3GZU 30/336/29.3. 100% W3DKX WA2YFM WB3GZU and K3CNU. Three or less were KA3AMK WB3BFK KA3CDQ W3HTB and W3LDD. MDD/W3PQ 62/450/7.7. BPL: WB3GZU W3FA W3QQ WA3FYZ has good pix of his VOA coverage of the SHUTTLE. WA3ZAS sends a postal of the big dishes at his ETAM earth station. W3HDH tells us that AE3Y took out-of-section and top MDC honors in the PA QSO Party. Congrats. KC3D is into RTTY and plans more gear! N5EAZ/3 likes radio repair. W3ZNW is into the thick of things with his new keyboard keyer. WB3IVO gets off ten messages per day to SOWP members. WB3LTA is plotting new drills for the RACES/ARES group. W3OYY's parents are in their nineties. W3HVS is reexamining his prioroties. The AARC's new slate is N3FN, pres.; WB3KIW, v.p.; N3BDW, secy.; KA3ERP, treas. KA3GWH has again upgraded to ADVANCED. Congrats to KA3CDQ, BPL on O & D. W3LDD confirms 200. W3DQI misses the summer Bar-B-Que. W3UT says that horizontal polarization has opened up 80 meters. W3FZV had fun in the 160-meter fray. AK3X is happy to see the New Year. WB3BFK covers for W3DFW on the WR PCN. KB3NL is going to increase his code speed. WB3GZU surpassed to monthly 2000 point. Bet W3CDQ is in a warm climate WA3VPL had a busy month. WB3KJT's new ht gear took a temporary back seat for a meter gear. Traffic: WB3GZU 2199, KA3CDQ 444, W3FA 242, WB3IVO 234, W3UT 187, W3DQI 72, W3LDD 46, WA3VPL 43, W3FZV 36, WB3BFK 30, WB3KJT 23, KB3NL 20, W3ZNW 18, AK3X 11, WB3LTA 4, KC3D 4.

SOUTHERN NEW JERSEY: SCM, Bill Luebkemann, WB2LCC — SEC: W2HOB. STM: WB2LCC. Response to my request in the Dec column was underwhelming. You regular readers (if there are any) will recall that I asked information on what your club was doing to license new amateurs. A whopping response of one letter was received, that being from W2ORA. He reports that the South Jersey RA in Cherry Hill ran licensing classes with 14 students in the Fall term, and that all of the students are well on their way to becoming new hams!!! Congrats to Joe, the instructor, and to SJRA for another job well done. What are you other clubs doing along this line??? If you don't get the word to me it will never appear here in this column for public recognition. Along another line, Dec was a busy month indeed for tfc handlers across the country and in NJ. All of the statewide and local nets here did a booming business, and I don't recall totals ever being much higher. All of the nets could still use more new blood. Why not give tfc handling a try? If you don't know where to go or what to do, give me a call and I'll apprise you of the times and freqs of the various NJ nets. Traffic: WB2IQJ 3211, W2ZQ 1045, WA2HEB 401, K2UL 172, WA4JRP 119, WA2CUW 106, WB2PKG 91, KM2E 65, KA2GSL 55, KA2GTE 46, WA2GTJ 41, WB2JCE 33, WB2GFM 31, WB2LCC 23, KA2KTR 12, KD2Q 8.

WESTERN NEW YORK: SCM, William W. Thompson, W2MTA — SEC: W2BCH. STM: N2APB. ASCM: W2GLH. DECs: WA2AIV KA2BHR WA2DHZ WB2NAO WB3CUF. ARES need you! Silent Keys: K2RZI, Rochester; W2SPU, Aurora; W2SSJ, Niagara Falls. BPL: W2AET KO2H WA2HSB WB2IDS W2MTA. PSHR: W2AET N2APB N2ARD N2BLX KA2CTU KA2DBD/T W2GLH KA2GOH KO2H WB2IDS WA2KOJ W2MTA KA2NIL/T WB2OWO W2ZOJ; (Oct.) KA2DBD/T. Appts: OES — WB2HJK K2NV WA2RXB; OO — WB2HJK K2LGJ; ORS — KA2GOH KB3RG. THANKS: WA2GJI for dedicated service as EC. Reports: OO — WB2MMB 11, W2AET 13, WA2PJC 1; OES — W2AET WB2KWF WB2SGI; OVS — W2AET 10 GHz ready, 220 active; OBS — W2GLH K2KWK. Traffic Handlers Info Net, WDN, OCTEN and 3913 kHz.

Net	Freq.	Time/Day	QNI	QSP	QND
NYS/1*	7077	1000/M-S	132	92	27
NYSCN	3677	1000/Sn	44	40	4
THIN	3913	1600/Sn	51	—	4
NYPON*	3913	1700/Dy			
ESS	3590	1800/Dy	427	105	31
NYSPTEN	3925	1800/Dy	805	161	31
OCTEN*	34/94	1830/Dy	627	184	31
Q NET	31/91	1830/Dy	413	18	31
STAR/E*	99/39	1830/Dy	68	68	20
WDN/E*	04/64	1830/Dy	530	159	31
NYS/2*	3677	1900/Dy	433	311	30
SLVARES	31/91	1930/Sn	43	1	5
JCARCN	10/70	2000/Dy	374	5	29
OARCN	25/85	2000/W	95	0	5
WIN	04/64	2000/M	(SKYWARN)		
WNYECN	3955	2000/3rd Sn	(ARES)		
CNYTN*	90/30	2115/Dy	479	161	31
NARASEN	75/15	2100/Sn	52	1	4
STAR/L*	325/925	2130/Dy	63	60	19
WDN/L*	04/64	2130/Dy	867	265	31
NYS/3*	3677	2200/Dy	325	187	30

*NTS nets. (Nov.) OCTEN 495-62-27; CNYTN 464-71-29. Blueline 147.93/33 Adirondacks down. Chenango Valley 07/67 resurrected for '82. Contact WB2IEY Longwave Experimenters WNY (LEWNY) 160-190 kHz info, 146.22/82 Wed 2000 or sase. W2RQF celebrates 81st birthday with Robot 800/400 RTTY and SSTV. W2PHQ hits 79th with blast at Tompkins Co. gala. Officers: Fulton W2TQF K2DUR WB2LBI WB2LBE; Drumlins N2COJ N2CSY KC2GZ AB2F; Oswego RS: KC2CL WB2ZEL W2AET. Congrats: WA2ANU ARRL 1980 TECHNICAL EXCELLENCE AWARD for article July QST "Impedance Match Indicator". GB CR. Traffic: W2MTA 1107, WA2HSB 789, KO2H 655, WB2IDS 648, W2AET 511, W2ZOJ 367, WB2OWO 327, KA2CTU 271, N2BLX 216, KA2CLT 176, W2FR 162, WB2QIX 156, K2GWN 148, KB2YU 146, KG2D 142, N2NW 133, KA2NIL 131, N2APB 114, WA2KOJ 112, KA2GOH 110, AF2K 97, KA2DAI 93, K2QR 90, W2GLH 76, WA2NAD 66, WA2PJC 66, W2GJ 65, WA2PUU 58, W2PZL 58, KA2BHB 39, AF2A 36, N2ARD 33, KA2DBD 32, N2ABA 30, W2RQF 30, WB2SGI 30, WB2LJK 20, WA2RXO 20, WA2AIV 10, KA2BHR 9, K2RN 9. (Nov.) KO2H 250, KB2YU 12, WA2DHZ 2, K2VR 2. (Oct.) KB2YU 74. (Sept.) KB2YU 12.

WESTERN PENNSYLVANIA: SCM, Otto L. Schuler, K3SMB — ASCM/STM: N3EE. NMs: AC3N N3ADU W3NEM W3MML. SEC: AB3Q. DECs: WB3JDI WB3EFQ WB3KJH.

Net	Sess.	QNI	QTC	kHz	T/D
WPACW	31	359	315	3585	7:00 P/D
WPAPTN	31	624	356	3983	6:15 P/D
WPA2MTN	31	559	180	146.28/88	8:00 P/D
NWPA2MTN	28	375	19	146.04/64	9:00 P/D
PFN	31	378	498	3958	5:00 P/D

We have two Silent Keys this month, and, with deep sorrow, they are W3OMA and W3CBX. Upgrades are: to Novice, KA3IGU KA3IGV; to Tech, KA3HBB N3CKU; to Advanced, WB3IZJ WB3ERE N4BIX; to Extra, KA3BMU; and a promotion for W3GQ to Captain for USAIR Line. Congrats to all. New calls: KB3WN (KA3DBO), N3CMV (KA3GWA), KB3WX (KA3DEH). New officers for 1982: WACOM — N3BKW, pres.; K3QKS, v.p./sec; N3AOK, treas. Crawford ARS — WA3ZSC, pres.; WB3JDI, v.p.;

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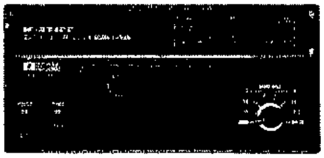

COVERS 160-80-40-20-15-10 meters plus new WARC-79 bands.
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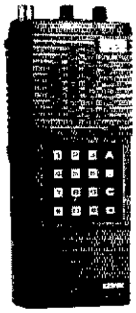

Brand new transceiver covers entire 220MHz band, provides simplex and duplex operation. Identical in size, appearance to popular IC-2A series and fully compatible; can use same accessories. Power output, nominal 1.5W w/standard IC-BP3. Comes complete with NiCd battery pack, wall charger, belt clip, "rubber duckie" and wrist strap.

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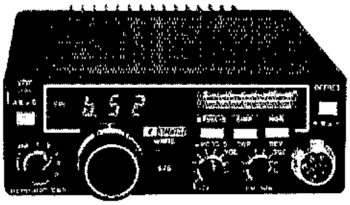

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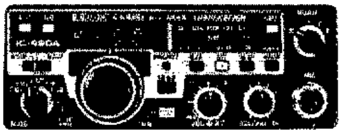
430 MHz, FM, USB/LSB, CW.



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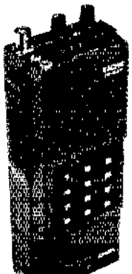

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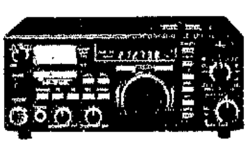

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7.2-3	40M 3 el. beam	$529.95	$449.00
7.0-7.3-4A	40M 4 el. beam	$749.95	$629.00
144-148-13LB	2M, 13 el. long boom	$ 89.95	$ 77.95
432-16LB	432MHz, 16 el. long boom	$ 74.95	$ 60.70
144-150-16C	2M, 16 el. Cir. pol.	$116.95	$ 93.55
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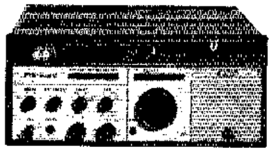

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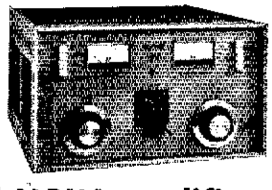

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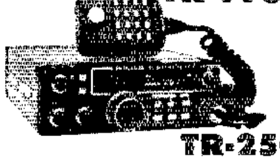
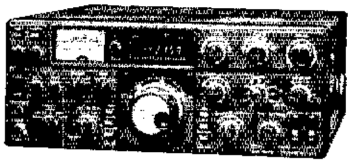


TR-7730

TS-830S



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KA3DQH, sec/treas.; WA3ZBY N3BLI, dirs. Beaver Valley ARS — KF3B, pres.; WA3ZJN, 1st v.p.; KB3LU, 2nd v.p.; WB3HWB, treas.; KA3DJO, sec. Radio Amateurs of Corry — W3AGF, pres.; W3KJE, v.p.; K3BNH, sec. Thanks to the amateurs who provided communications for the Thiel College students who walked from Greenville to Pittsburg collecting for the Childrens Hosp. They collected about $35,000. Cheers. ECs are needed for Clarion, Elk, Fayette, Greene, Jefferson, Potter & Warren Cos. Traffic was heavy this month; N3ADU K3CR AC3N made BPL. Traffic: K3CR 759, N3ADU 731, AC3N 547, KB3DT 433, W3IA 304, N3FM 255, W3EGJ 144, KB3NV 101, KA3CDV 97, W3RUL 83, WA3UNX 82, KB3BG 76, WA3QNT 67, K3SMB 67, W3SMV 67, W3KMZ 66, K3LTV 65, N3WS 64, W3NUO 60, WB3GWJ 52, N3BPY 51, W3IQD 50, KB3WX 42, W3MML 38, W3EXC 34, W3TTN 32, KA3BGC 32, W3KUN 29, KF3B 28, K3VQV 26, W3HDH 22, WB3IAB 22, N3KB 20, K3HCT 17, W3SN 14, W3VX 9, AB3X 8, N3BKV 4, W3LOD 1. (Nov.) N3WS 83, WB3GXG 22.

CENTRAL DIVISION

ILLINOIS: SCM, Larry M. Keeran, K9ORP — SEC: W9QBH. STM: WB9JSR. ASCM: WD9EBQ.

Net	Freq.	Times/Days	QTC	Sess.
ILN	3690	2300/0300 Dy	545	58
Il Phone	3915	2130 Dy	385	
NCPN	3915	1200/1700 Dy	283	53
IEN	3940	1400 Sn	5	4
ITN	3705	1900 local Dy		

9RND 100% stations: W9HOT W9NXG WB9WGD K9EHP K9UZA. DRN9 100% stations: W9HOT WB9WGD W9NXG. W9VEY memorial station had a QTC of 6 during 4 sessions. W9HOT and W9NXG are the BPL recipients for this month. Congrats on a job well done. Knox Co. has three new Novices, KA9MFN KA9MFY KA9MGO. As of November 23, WB9JSR has one more female harmonic making the QRM total three. W9UR was nominated for the good operators list in December. The Illinois Training Net which meets each night at 7 P.M. local time gives newcomers to the message handling (traffic) nets a chance to participate while not emphasizing cw sending speed. Checkins are shown the proper methods of servicing messages that are sent in and out of the state each month. This month 882 messages were passed by traffic stations. All stations that are interested at all in using Amateur Radio for public service should check in on 3705 kHz tonight at 7 o'clock. The regular traffic stations report each month the volume of messages they handle to the SCM and you see it at the end of this column. Also, each month many stations keep regular schedules informing others in their area with bulletins received from ARRL. These stations many times spend equal or greater time on the air as the traffic men. You will see the number of bulletins sent by the Official Bulletin Stations at the end of this column. Listen to those stations or to W1AW for the latest Amateur Radio news on operating regulations. The SCM requested the Official Observers in Illinois to keep on the watch for exceptional operators that exhibit good operating procedures and by example promote gentlemanly practices on the airwaves. These nominations will be mentioned from time to time in Section Activities. This is the time of the year to check your battery powered equipment and familiarize yourself with the tornado safety procedures. If you do not have an emergency plan in your mind right now, contact your Emergency Coordinator or write to the Illinois SCM listed on page 8 of this *QST*. Ask for the address of the Emergency Coordinator for your area. Ask at each hamfest you attend for the time of the Amateur Radio Emergency Service (ARES) seminar. Bulletins: WB9EBQ 162, W9RYU 6. Traffic: W9HOT 647, W9NXG 528, K9BVE 378, W9JIJ 348, WB9WGD 347, W9TLU 218, KB9X 199, W9OK 190, K9EHP 155, WØRJW 115, KN9BAM 98, K9SW 69, W9HLX 53, W9QBH 51, W9LNQ 35, N9TN 23, KA9BYB 21, W9HBI 15, W4IZI 12, W9RYU 12, WD9EBQ 10, W9SSP 10, W9KSU 8, K9DCG 6, WD9HZF 6, AB9M 5, K9HVS 3.

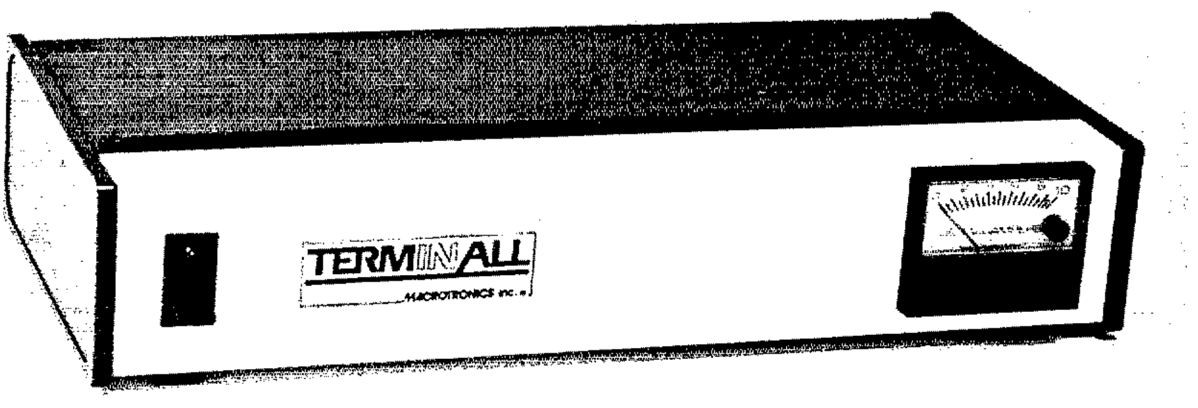
INDIANA: SCM, Bruce Woodward, W9UMH — SEC: W9UMH. STM: W9JUJ. NMs: ITN-W9QYY; QIN-WD9GXW; ICN-WD9CSZ; VHF-W9PMT; IWN-K9DCX; IPN-W9DLF.

Net	Freq.	Time/UTC/Daily	QNI	QTC	QTR	Sess.
QIN	3656	1430/0100/0400	979	755	2967	93
ITN	3910	1330/2300	2580	1005	3593	62
ICN	3708	0015	166	69	998	31
IPN	3910	2130	1042	294	1258	31
IWN	3910	1310	1455		509	31

Hoosier VHF Nets: QNI 5027, QTC 221, QTR 7683, bulletins 45 for 23 nets. D9RN: QTC 882 in 62 sessions. QNI: W9JUJ W9URQ K9CGS WB9MIK W9DLF. CAND: QTC 2051 in 31 sessions. IN QNI: N9AEI W9YB W9QLW W9JUJ AB9A. 9RN: QTC 983 in 1645 minutes. QNI: W9QLW W9JUJ W9EI W9XD N9AEI N9HZ KJ9J WD9GXW KI9R KK9K K9WWJ WB9UYU WA9QCF W9YB. Appointments: ICN NM WD9CSZ. Silent Keys: W9HAV WA9AMY WA9HKE W9OU. The Indiana Precipitation Reporting Net, "The Wet Net," is managed by K9DCX, assisted by KA9BTV. The NCSs are: Monday, K9DCX; Tuesday, N9BHT; Wednesday, WA9TTB; Thursday N9BHT; Friday, KC9JV; Saturday, KA9BTV; Sunday, WD9IHE. The net is providing a valuable service to Indiana. Thanks to all who participate. This was taken from the Lake County's "Short Skip." In the past year I have tried to say thanks to many people. This is for those I have missed. To one and all Happy Birthday, Happy Anniversary, congrats on the new baby, congrats on your upgrading, welcome to the new Novices, and also welcome to the new club officers and to the new clubs, congrats to all net members and to all net managers, both hf and vhf. To any I might have missed Happy Whatever. Congrats to the Hancock ARC and the Sugar Creek RA for their new ARRL affiliation. Thanks to W9PEV and the "Bison" for the cartoon. I needed that. Congrats to WD9EEB for the first edition of the Clinton Co. ARC newsletter. Clinton Co. boasts two families with 5 amateurs in each family. The Reeders — K9DGS WD9FIA WD9FHZ KA9FVY KA9GAB. The Walkers W9QYY WB9QQO KA9CJL WD9EEB WB9WAB. The Reeders and the Walkers challenge anyone to beat their record. Condolences to W8LKU W9WKM and others with antenna problems. Let's keep them in the air fellows. Traffic: W9JUJ 2358, W9FC 566, W5NPM 383, K9FZX 342, N9AEI 320, W9URQ 283, WB9UYU 277, W9UMH 245, KJ9J 219, W9EI 195, WD9GXW 169, W9QYY 165, KB9HH 151, WB9ZQE 151, W9QLW 146, W9WKM 133, WD9ART 113, W9MR 104, WA9QCF 101, WA9OKK 101, WB9MIK 94, K9WWJ 92, KK9N 91, K9DCX 79, KK9K 74, W9IOH 61, KI9R 57, W9XD 56, WA9JNC 40, WD9EXI 36, KB9WI 33, WA9OHX 32, WB9DIX 31, W9WEI 28, K9DIY 27, W9RVM 27, N9PS 26, WD9DWD 25, W9RTH 24, WB9AWI 22, W9EUP 19, W9JZV 17, KG9K 17, WB9YAY 16, N9BLK 15, K9FVN 15, W9DKP 14, KC9C 13, K9CGS 12, WA9KWH 9, W9QWI 9, W9ZGC 8, W9UPI 8, N9AST 5,

TERMINALL

The communications terminal that does it all!



TERMINALL is a hardware and software system which converts your TRS-80* (Model I or Model III) into a state of the art communications terminal. TERMINALL is simple to use. TERMINALL gives you more for your money. TERMINALL works with a general purpose computer and is expandable. TERMINALL has it all!

Simplicity

TERMINALL was designed from the outset to be easy to connect to your radio and easy to use. Plug into your receiver headphone jack and copy Morse code or radioteletype (RTTY). Plug into your CW key jack and send Morse code. Attach a microphone connector and send Baudot or ASCII RTTY using audio tones (AFSK). That's all there is to hooking it up.

The software may be loaded into your computer from cassette or disk. Enter your callsign and the time and you will start receiving immediately. No settings or adjustments are necessary to receive Morse code - it's fully automatic - and it works! You may type your message while receiving or transmitting.

You will be on the air, receiving and transmitting any mode in minutes. As we said, TERMINALL is simple.

More for your money

- TERMINALL has the RTTY terminal unit - demod and AFSK - built in. This results in a lower total cost because separate terminal units usually cost at least $225 assembled, and most do not even have a crystal controlled AFSK. TERMINALL eliminates not only the higher cost of an external terminal unit, but also eliminates the hassle of interfacing to another piece of equipment.
- **Fantastic Morse reception;** Six stage active filter demodulator copies the weak ones. Auto adaptive Morse algorithm copies the sloppy ones. Keyboard selectable noise threshold. Received code speed displayed on status line.
- **Outstanding documentation.** Professionally written, 90 page user manual - contains: step-by-step instructions - explicit examples - numerous photographs and illustrations - theory of operation - parts layouts - schematic diagrams - trouble shooting guide
- **Built in software backup** - set up the program parameters and messages the way you like to operate - then have the program save a new copy of itself - on either cassette or disk!
- **Software** supplied on both cassette and auto-run diskette at no additional cost
- **Built in separate, multi-stage active filter RTTY and CW demodulators.** No phase lock loops. RTTY demodulator has 170 and either 425 or 850Hz shift - 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.
- **Built in crystal controlled AFSK.** Rock stable for even the most demanding VHF or HF application. A must on many VHF RTTY repeaters.
- **Built in hardware clock** - one second readout maintains correct time even during cassette I/O. User programmable time/date format.
- **Built in 110 or 220** volt AC power supply.
- Built in parallel printer driver software. Simply attach a parallel ASCII printer (e.g. the EPSON MX-80) to your printer port to obtain hardcopy in all modes. Note: parallel printers typically cost less than serial ASCII printers.
- **Word wrapping,** word mode editing, diddle, ignore carriage returns, user programmable end of line sequence, adjustable carriage width. Transmit delay (fixed, none or auto adaptive) Break mode and more!
- **The all-in-one TERMINALL design** makes it great for use on HF or VHF - Ham, Commercial, SWL or MARS! SWL's: TERMINALL may be jumpered for either 425 or 850 Hz reception to copy news and weather services.

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TERMINALL has capabilities far surpassing other "dedicated terminal" systems. And yet, since it works on a general purpose computer, the majority of your investment (the TRS-80) is spread out over many different applications - not just Radio communications. And your system is expandable. For example, Disk based mailbox software may be added at any time.

Simplicity of operation. Lower cost. General purpose computer. What are you waiting for? This is the way to go!

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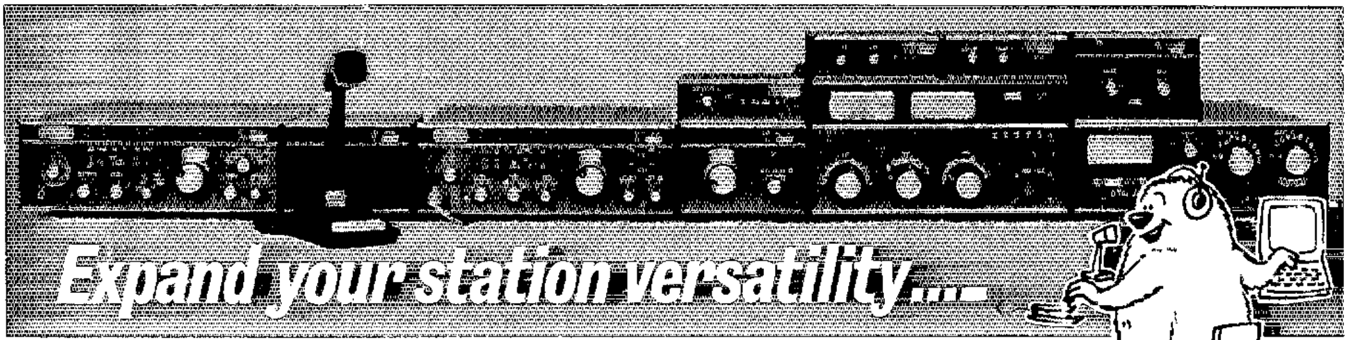
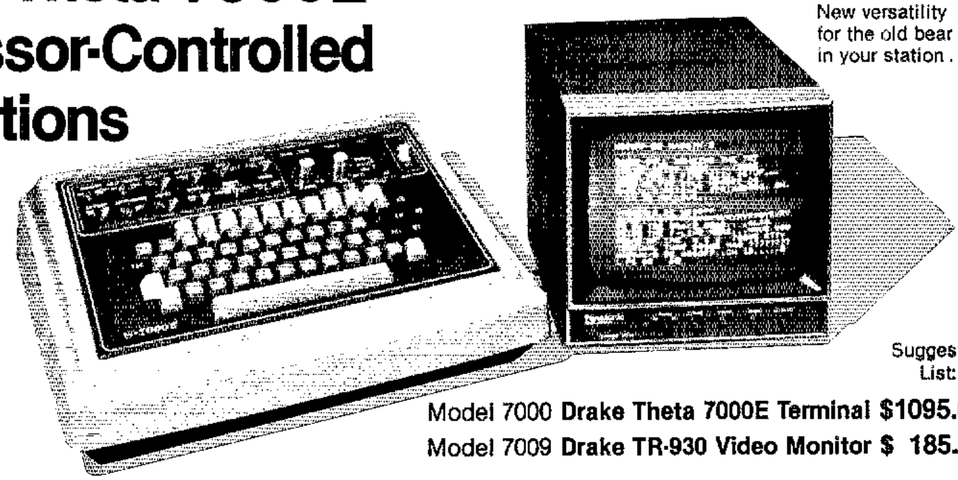


DRAKE® Theta 7000E Microprocessor-Controlled Communications Terminal

New versatility for the old bear in your station . . .



The perfect addition to any amateur radio installation! Complete, automatic send/receive of Morse code (cw) Baudot code (RTTY) and ASCII code (RTTY). Works with any video monitor.

Suggested List:

Model 7000 **Drake Theta 7000E Terminal $1095.00**

Model 7009 **Drake TR-930 Video Monitor $ 185.00**

7-Channel Battery Back-Up Memory, the Theta 7000E has seven keyboard-selectable, non-volatile, random access memory channels each of which can hold 64 characters. Data in these memories is alterable at any time and is retained when power is removed. Messages in these memory channels can be repeated 1 to 9 times via keyboard command. All channels may be daisy-chained for continuous read-out. Channel number in use is indicated on display.

Wide Range of Transmitting and Receiving Speeds, 5 to 50 wpm in Cw with autotrack on receive. Standard RTTY speeds of 60, 67, 75, and 100 wpm Baudot code and 110, 150, 200, and 300 Baud ASCII code.

Self Contained Demodulator, three-step shift selects either 170 Hz, 425 Hz or 850 Hz shift with manual fine tune control of space channel for odd shifts. High/low tone pair select. Mark only or space only copy capability for selective fading.

CONVENIENT KEYBOARD FEATURES, automatic keyboard-operated transmit, (KOX) or manual keyboard transmit. **Unshift on space,** reverts to LETTERS case after reception of each space character in Baudot code. **CR/LF is automatically inserted** every 60, 72 or 80 characters while transmitting. **Cw identification,** in RTTY mode. **Echo function,** prerecorded cassette tapes can be read and transmitted. **Test messages,** "RY" and "QBF". **Transmit word mode,** characters can be transmitted in word groupings.

Crystal Controlled AFSK Modulator:

High Tone Pairs	Shift	170 Hz	425 Hz	850 Hz
	Mark	2125	2125	2125
	Space	2295	2550	2975
Low Tone Pairs	Shift	170 Hz	425 Hz	850 Hz
	Mark	1275	1275	1275
	Space	1445	1700	2125

• **Printer Interface for Hard Copy,** all modes for parallel ASCII printers. Loop keyer for conventional teleprinters. • **Composite Video Output,** for any standard video monitor. •**Kansas City Standard AFSK Output,** KCS tone pair for ASCII. • **Large Capacity Display Memory,** two page display memory contains 32 X 16 lines per page. • **Split-Screen,** with a keyboard command, the display can be divided in two; the upper half for transmit and the lower half for receive. Messages can be composed while receiving. • **Buffer Memory,** 53 character type-ahead keyboard buffer. • **Word Wrap-Around,** in receive mode, word wrap-around prevents the last word on a line from becoming split in two. Moves whole word to next line. • **Automatic Letters Code Insertion,** if desired, LETTERS (diddle) code can be transmitted continuously in a pause of transmitting from the keyboard. • **Audio Monitor,** a built-in audio monitor circuit with automatic transmit/receive switching enables checking of the transmit/receive tones. • **Transmitter Keying Circuitry,** keys either grid block, cathode keyed, or solid-state transmitters. • **Power Requirement,** The Theta 7000E requires only 13.6 Vdc @ 1 amp. Plugs into 13.6 Vdc accessory jack on PS7 or PS75 power supplies. • **Effective Packaging for RFI Protection,** well designed metal cabinet and protective circuits prevent RFI. • **Terminal Size:** 15.8"W x 11.8"D x 4.7"H (40 x 30 x 12 cm) • **Weight:** 11 lbs (5 kg) • **Monitor Size:** 8.7"W x 9.8"D x 8.9"H (22.1 x 24.1 x 22.6 cm) • **Weight:** 11 lbs (5 kg)

Model 1230 LA7 Line Amplifier $49.95 Suggested List

Line output, input levels as low as 15 mV rms (47 kilohm) will result in an output of 1 mW nominal into a 600 ohm balanced line. Output level adjustable by internal pre-set level control. Interfaces low level audio to RTTY terminal unit or phone line that requires a 600 ohm balanced/unbalanced input. One 36" phono to phono cable supplied. • **Size:** 4.5"L x 1.3"H x 2.5"W (11.4 x 3.3 x 6.4 cm). **Weight:** .3 lbs. (.14 kg).

Specifications, availability and prices subject to change without notice or obligation.

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W9YEW 5, WB9AJY 2, WD9CIV 2, W9BDP 1, K9OUP 1.

WISCONSIN: SCM, Roy A. Pedersen, K9FHI — SEC: W9OAK. STM: K9UTQ. BWN 3984 1215Z QNI 1142, QTC 1341 WB9YPY. BEN 3985 1800Z QNI 729, QTC 359 WB9ESM. WSBN 3985 2300Z QNI 1165, QTC 556 WD9ESZ. WNN 3723 0000Z QNI 236, QTC 76 KA9HPQ. WSSN 3645 0030Z QNI 243, QTC 62 N9BYK. WIN-E 3662 0100Z QNI 440, QTC 280 W9YCV. WIN-L 3662 0400Z QNI 381, QTC 226 K9LGU. XPO 3925 1831Z QNI 386, QTC 51 W9AKY. NWTN .34/.94 0030Z QNI 564, QTC 42 WB9YPY. Gr. Bay .72/.12 W 0030Z QNI 19, QTC 1 WB9NRK. WCWTN .31/.91 0030Z QNI 358, QTC 64 N9AUG. WNA picnic slated for Sept 11. Details later. New hams Baraboo area KA9s LUT MDR MDQ LVL MAX MAY. KA9MCM new Novice Stevens Point. WD9DHF now KC9KQ. KA9BHL & WA9UJK have Advanced. W9IAL has Extra. W9OFL worked VP9IB on 2 meters. W9IEM operated at Pine River Library Dec. 12 & handled 25 Xmas for local people. WNN certificates to KA9KZD KA9MFV. WSBN certificate to KC9CJ. BPL: KA9CPA WD9ESZ W9CXY. FLARC operated radio station on Solstice Day on 2 and 15 meters. Tri-State Emergency Service Net had 4 sess, 57 QNI, 24 QTC. New time 0015-0045Z 3985 Th. Because of those hams who squawk about sometimes high total in PSHR column, no thanks to you, he won't send me any more. Why don't you get out and work a little harder. Maybe you can get a high total, and we can squawk about your high totals. Traffic: KA9CPA 2504, WD9ESZ 783, W9CXY 549, KC9KQ 356, WB9YPY 314, W9YCV 296, WA9WYS 288, N9BYK 281, W9DND 265, K9GDF 251, W9UCL 222, WB9RGO 214, K9FHI 208, W9IEM 208, K9AKG 180, N9AZI 169, N9AUG 146, W9SO 143, KC9CJ 135, KG9B 123, K9UTQ 117, WD9FRI 113, KA9HPQ 101, AG9G 96, W9KTG 88, WA9GYF 72, W9UW 67, WB9ESM 63, WB9NRK 61, N9CP 60, W9LDO 60, WB9ICH 58, K9LGU 49, WA9UJK 47, N9ATP 46, N9BCX 46, W9IHW 45, KA9GYD 42, WB9JSW 42, K9JPS 36, KA9IKR 35, WA9ZTY 35, W9SFL 34, WD9BKT 33, K9AQ 31, KC9GW 30, K9HDF 30, WB9JGA 30, K9VSY 30, KE9C 28, K9EC 28, KC9KJ 27, K9UU 27, N9BDL 26, KB9NG 26, WB9WNA 26, KA9HZD 25, KA9MFV 25, KA9EMF 24, KA9IHR 22, KB9CV 21, AD9X 18, KB9W 17, WA9GGH 15, W9FDY 14, WD9IMZ 11, W9NF 8.

DAKOTA DIVISION

MINNESOTA: SCM, Helen Haynes, WBØHOX — ASCM: KCØT. STM: ADØS. SEC: KNØJ. NMs: W9DM KAØEPY. I would like to thank AFØO for the work she has contributed to the section, but we understand that schooling and business does come first. We must also say goodby to KAØALF, who finds it impossible to continue his position in the section. Thanks to both and join us anytime that you can. FCC announced that exams will only be given the 3rd and 4th Friday of each month in St. Paul. Out-of-state and Dakota tests will only be given once a year. For exam schedule, contact FCC in St. Paul. Upgrades : Extra — KAØDNR, who is now KNØP; Advanced — KAØAJE KAØATE NØCXC; General — WA8TCF/Ø KAØKTB KAØMJG; Technician — KAØHNP KAØIVP KAØJWO KAØKWM. Silent Keys: WDØFTP and WØKRH.

Net	Time	Freq.	QTC	QNI	NM
MSPN/N	1805	3945	76	668	WAØAIN
MSSN	2315	3710	13	129	WBØWXU
MSPN/E	2345	3929	440	1210	KCØT
MSWX	0015	3929	461	624	WDØCGM
MSN/2	0400	3685	104	149	KØJCF

Congrats to the following winners in the Minnesota QSO Party: 1st — ADØS AFØT; 2nd — WDØBIE; 3rd — WDØEPE; 1st Novice — KAØLRR. PSHR: KBØMB W9DM KCØZ WAØTFC. Traffic: KBØMB 1401, WAØTFC 799, WAØQIT 296, W9DM 282, WØHZU 186, WDØCGM 154, WØMFW 140, KAØIAQ 126, KAØJUX 123, WØDFX 110, WBØHOX 73, WBØWXU 68, KCØZ 64, KØCSE 63, KØJCF 61, WØPNE 59, WBØNZB 56, NØCLS 49, KNØP 49, AEØM 47, WBØHDD 37, WAØAIN 33, WBØFMI 21, WBØVYE 16, KNØJ 10, NØJP 8.

NORTH DAKOTA: SCM, Lois A. Jorgensen, WAØRWM — SEC: WBØTEE. OBS: WØDM. NM: WAØCRH.

Net	QNI	QTC	Sess	Time	Freq
GOOSE R.	72	5	4	1400Z Sn	1990 kHz
D.A.T.A.	338	20	28	0030Z Dy	3996.5
YL WX	343	270	25	1330Z Dy	3996.5

Congrats to those that upgraded: KAØLXH to Tech (he is dad to KIØE), NØCMC, Tech to Gen, and WØKZU to Extra. KJØS is now KS2H who will leave ND in March for NY. Others we have lost to other lands are KE4EV to VA and KAØJJR to MS. Good luck and we will listen for you. Congrats to WAØRWL and XYL on their new harmonic. WAØVGJ & WAØRWM are grandparents, and WAØRWK is aunt. Traffic: WAØRWM 131, WØCDO 72, WAØCRH 20.

SOUTH DAKOTA: SCM, Erwin Helmbuck, KØOTZ — Well, if the antenna work was not done, it sure didn't get done this month. The Signal Hill ARC of the northern Black Hills elected officers. The new officers are KAØDDS, pres.; WBØUBW, v.p.; WØDVB, sec.; WØKJZ, treas. Sadly KAØDDS passed away only 2 wks after the election. Jack will be missed by all. The South Dakota picnic will be held in Rapid City again this year. Upgrade: NØBVW, Extra. Mark the weekend of July 17 on your calendar. Will be at Surbeck Center at SD M&T campus for the third time. Plans are now under way for some more rousing activities. (HOW DO YOU TOP A DYNAMOTOR TOSS???) At any rate the midnight oil is being burned at the Brass Rail for the planning sessions. BE THERE. Traffic: WAØVRE 394, WØHOJ 69, WAØUEN 67, WØKJZ 43, WBØOMF 32, NØBVW 24, WØRWE 17.

DELTA DIVISION

ARKANSAS: SCM, Dale E. Temple, W5RXU — April 3 & 4, the first weekend in April 1982, the CAREN Club will sponsor the ALL ARKANSAS Hamfest and ARRL State Convention at the North Little Rock Community Center. Talk-In on 146.34/.94. The Banquet Speaker at the saturday night banquet will be W5CH, newly elected Delta Division Director. Several new dealers are expected this, the first year of a full two day hamfest. For details, contact Dale Temple, W5RXU, 1620 Tarrytown, Little Rock, AR 72207, 501-225-5868. flea market space is available under roof but yet outdoors. All Arkansas hams are hereby appointed Hamfest Ambassadors. Please talk the hamfest up on all nets and with your friends. Plan to attend. Traffic: AE5L 227, W4AZJ 80, W9YCE 78, W5QFU 66, W5KC 24, W5UAU 17, KØSXQ 14, W5TUM 3.

LOUISIANA: SCM, Jim Giammanco, N5IB — This LA report will be my last as your SCM. By the time you read this, N5JM will have assumed the reigns. His address is on page 8. Many thanks to everyone who has helped during my term as SCM. And I look forward to continuing

to meet you at hamfests and club meetings. Please give N5JM the same assistance you have given me. At the GNOARC, W5VUH gave an informative talk on lightning protection for the hamshack. Many members left the meeting resolved to do some careful checking in their own shacks. In Lafayette, the Acadiana ARA held a Christmas dinner and collected gifts for the residents of a local nursing home. In the absense of a regular NM, N5ANH has been serving above and beyond the call, picking up NCS chores for 20 sessions of the LTN. Why not check in and maybe volunteer to call a session or two. Don't forget that the Lafayette hamfest is in March at Evangeline Downs. See you all there.

Net	Freq.	Time	QNI	QTC	Mgr
LAN	3615 kHz	7 & 10 P.M. Dy	421	306	K5TL
LSN	3703 kHz	7:30 P.M. Dy			WB5IYH
LTN	3910 kHz	6:30 P.M. Dy			

Traffic: W5LQ 306, K5TL 287, KC5SF 163, WB5LBR 106, AC5R 66, N5RB 48, N5IB 6.

MISSISSIPPI: SCM, Paul Kemp, WB5SNB — SEC: WB5FXA. STM: KB5W. Freq. Coord. WD5DCI. With regret report WA5OKF Silent Key. It is that time of year when the wx will be of concern around the section. Make preparations for emergency. Contact the service agencies in your area to let them know your availabilities and communication capability. Congrats to upgrade WD5CNU, now Adv. Congrats to KB5W making BPL, two months in a row. New NCS and MSN KD5P. Reports from persons with appointments are very scarce. Remember to retain your appointment, you must be active and report your activities. Hamfest time again, Jackson April 17 & 18. CAND (W5KLV) sess 31, QTC 2051. DRN5 (WB5YDD) sess 31, QTC 855. MTN (K5OAF) sess 31, QNI 178, QTC 209. MSBN (WD5EYM) sess 31, QNI 2494, QTC 148. MSN (KA5GGG) sess 21, QNI 124, QTC 7. CAEN (KA5AGD) sess 4, QNI 87, QTC 3. GSEN (KB5W) sess 23, QNI 521, QTC 194. Traffic: KB5W 873, K5OAF 347, KT5Z 151, W5HKW 150, WD5EYM 17, W5LSG 17.

TENNESSEE: SCM, John C. Brown, NO4Q — STM: K4YOL. SEC: K4TKQ. The Oak Ridge hamfest will be early this year. It is now planned for April. Will be looking for you there and for your part in the TN Council of Clubs meeting. W4WXH has been named RTTY NM. He will be looking for those of you with that mode to help get the net off and running. That will also be an excuse for some to get involved in a new mode of traffic handling. Have received the calendar of events from some of the clubs, like DXCC forums, long range planning for ARRL and League leadership meetings. If you don't belong to a club better look around and join in on the activities. The amateur upgrade run is still going. Good news. The QCWA will be holding its national convention in the Music City this year. Another first for TN. See you at the hamfest. Come meet your League Officials. TSN Honor Roll: KA4BSG WA4CMS NN4D W4DDK N4EAM N4EFB KA4HPW NG4J KY4L WA4LXP KA4OVE KA4OXO/(KE4IK) KA4PWU KA4RJC WB4YSN W4ZJY WD5JYI. FB. Net traffic: LF 97, QNI 4808, QTC 298; VHF sess 98, QNI 2480, QTC 489; CW sess 63, QNI 811, QTC 446. Traffic: W4WXH 731, NG4J 718, N4EFB 522, W4OGG 400, W4ZJY 397, W4MRD 184, N4DZW 165, WD4SIG 143, W4DDK 140, KY4L 126, K4VM 112, K4WOP 90, N4EAM 67, KA4BSG 64, W4TYV 62, WA4OME 62, NM4W 47, KA4IKT 43, KA4RJC 42, K4YOL 32, NN4D 30, WD4EKA 22, N4ARH 21, W4PFP 12, K4UMW 10, W4EWR 10, WA4GLS 9, W4PSN 6, W4DPO 3.

GREAT LAKES DIVISION

KENTUCKY: SCM, Dave Vest, KZ4G — STM: KA4GFU. Nets reporting: KRN MKPN KTN KYN K6N KNTN KEN BARES CCEN CARN 3ARES 4ARES 5ARES 11ARES 13ARES TSTMN WARES KPON 8EKEN PAEWTN MEN PAWN. Sessions 322, QNI 6042, QTC 1379. New appointments KA4BCM, ORS. Upgrades: KE4CZ KC4VB KA4MBF KA4MBG K4OQQ N4FKF W4RHZ has qualified for one thousand club on OSCAR. Paducah hamfest to be April 18. Etown hamfest April 3. Stations reporting activities this month are at an all time high. A new traffic award coming to the KY section. Ask KA4GFU for details. BPL KA4MZY. Traffic: KA4MZY 537, WA4JTE 365, WD4IYI 256, KA4GFU 155, KC4WN 140, KC4AV 136, KB4OZ 128, KZ4G 123, KA4BCM 111, WD4BSC 109, KC4VB 100, K4JLX 92, K4TXJ 82, WB4ILF 79, KA4SAA 79, W4WQV 70, WD4CQF 68, KD4TY 66, WB4NHO 61, K4MHL 60, WA4AGH 55, KS4V 51, WA4YPQ 42, N4EZE 26, WB4APC 23, K4HOE 22, WD4IYH 21, N4EEL 19, KA4GBZ 19, W4PKX 18, WA4SWF 18, KA4SKV 15, K4AVX 14, WA4AVV 13, WD4CJQ 13, WA4JAV 13, KA4MBF 13, NN4H 12, W4RHZ 12, WA4UIV 12, WA4GAL 10, WA4UQA 8, KA4MAP 7, N4OYI 5, KA4ADF 3, K4AXE 3, K4OQQ 2, KU4A 2, KD4SN 2, WD4RWU 2.

MICHIGAN: SCM, James R. Seeley, WB8MTD — ASCM: WA8DHB. SEC: WA8EFK. STM: AF8V. DECs: KC8DN WD8MBB K8RCT W8VWY. NMs: KA8DEZ WA8DHB K8LNE K8KMQ WD8LRT WD8NKT WA8PIM W8SCW WD8RNQ WB8YDZ W8YIQ K8ZJU.

Net	Freq.	Time/Day	QNI	Tfc	Sess	Mgr
QMN*	3663	1800 Dy**	1349	680	93	WA8PIM
MITN*	3953	1900 Dy	774	563	31	WD8LRT
GLETN	3932	2100 Dy	1255	301	31	WD8LSV
MACS*	3953	1100 Dy**	689	266	31	K8LNE
MNN*	3722	1730 Dy**	446	184	62	KA8DEZ
UPN*	3922	1700 Dy	841	169	35	WA8DHB
WSSBN	3935	1900 Dy	720	46	31	WB8SUR
BR	3930	1730 M/S	419	28	27	WB8ZGP
MEN	3930	0900 Sn	133	12	4	WB8SUR
TASYLS	3922	1900 M				KM8E

VHF Nets 12 reports, 1037 QNI, 32 traffic, 76 sess, WD8NKT. *NTS nets. Times local. **QMN late net, 2200; MNN late net, 2000; MACS Sn 1300. 3932 is MI emer. freq. Traffic Workshop Sn 3953 kHz, 1600. ARES net Sn 3932 kHz, 1730. OO reports: W8QG AC8Y. Silent Keys, with deep regret: W8GNK & W8LR. New Extras: N8CCE N8CGW. WB8NII is now KC8BW. Motor City RC, celebrating their 50th anniversary in 1982, will award a special certificate for contacts made with their club station, W8MRM, during Michigan Week. Details forthcoming in *QST*, *HR Report*, etc. New officers for L'Anse Creuse (Mt. Clemens) ARC: WB8ZJI, pres.; WD8PQH, v.p.; KA8DRV, sec.; WB8UCB, treas.; WB8ZME, act. mgr. Congrats on the ECHO repeater group's new newsletter. Super job! Congrats also on the honor of being chosen to coordinate the Super Bowl Parade. December was a banner month for traffic. Reported net totals of 2281 and individual totals of 8343, and six BPLs all adds up to a lot of hard work by a lot of people. Lots of "Hamgrams," as my wife calls 'em. Appointtees: When you move or change your call, *please* let me know, and *let Headquarters know.* ECs ARES/RACES people: Spring is nearly upon us. Are you ready? Tune in on the ARES Net, 3932 kHz, 1730 each Sunday for your SEC's on-the-air


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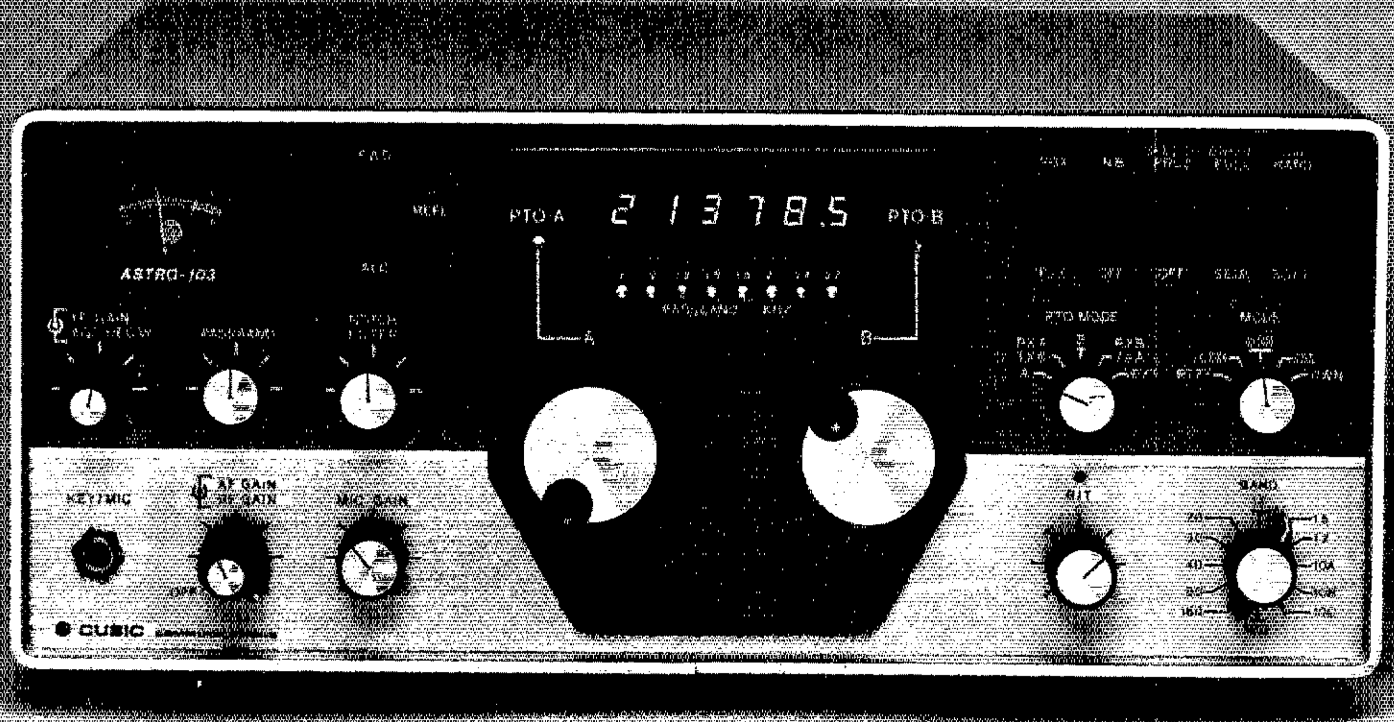

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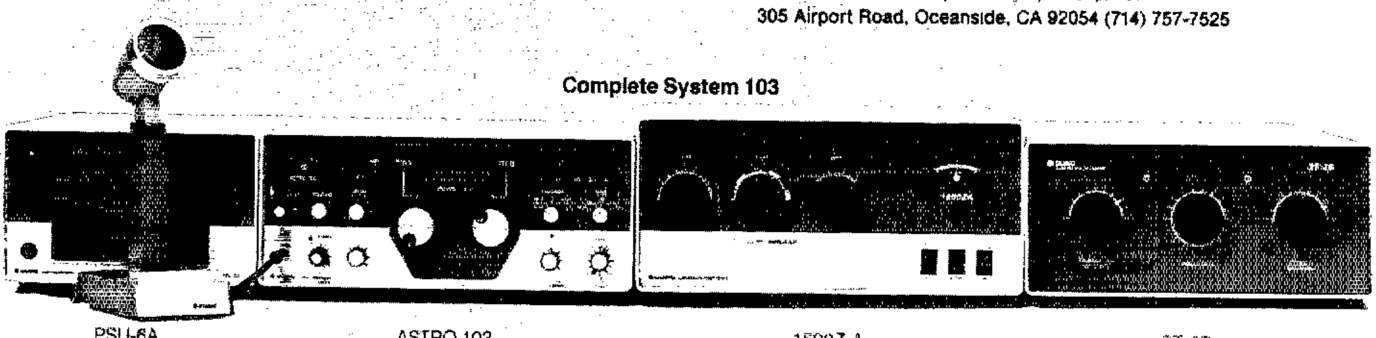

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training program and other timely information. BPL: KA8CPS WD8LRT WB8MTD KB8MX AF8V WB8YDZ. Traffic: AF8V 1363, WD8LRT 690, KB8MX 606, KA8CPS 574, WB8MTD 555, WB8YDZ 502, WD8RHU 247, KA8AID 224, WD8IBY 224, W8DSE 166, K8KMQ 154, K8GXV 150, WA8WZF 148, N8BNC 146, KA8DEZ 139, WA8DHB 138, WA8TAQ 127, KC8DC 116, W8IHX 113, WB8JAD 110, WB8SYA 97, WD8OEP 90, W8SCW 85, WD8OSE 83, WD8EIB 82, K8DD 81, KA8IWW 81, WD8NKT 80, K8OCP 79, WB8YRY 76, K8BP 72, W8VIZ 64, N8BBY 63, KC8K 61, WD8DWG 60, WA8PIM 57, WD8RNQ 56, KA8LHJ 47, WB8TTA 47, K8KQJ 43, W8YIQ 43, WB8HPZ 38, K8UPE 38, WB8DJS 36, K8LNE 36, W8JUP 34, N8DGN 31, W8LDS 31, N8CQT 30, WB8YWA 25, K8ZJU 25, K8KCS 24, W8TBP 21, WB8ZGP 21, WD8JRT 18, K8CIP 16, KI8Z 16, W8BEZ 15, WD8JQL 12, KA8APN 8, WD8LIP 8, KE8X 8, WD8JOH 5, W8MOF 5, KI8Q 5, WA8YBP 5, KB8TD 3, W8LOU 2, W8SDB 2, KA8AMX 1, W8WVL 1.

OHIO: SCM, Allan L. Severson, AB8P — ASCM: W8MOK. SEC: K8AN. STM: K8OZ. NMs: WA8BUW W8EK KF8J WB8JGW WD8KFN WB8YGW WB8YTD.

Net	QNI	QTC	Sess.	Time (local)	Freq.
BN	430	476	62	6:45/10 P.M.	3.577
BNR	231	72	30	6 P.M.	3.605
ONN	219	76	27	6:30 P.M.	3.708
OSN	243	208	31	6:10 P.M.	3.577
OSSBN	3186	2201	93	10:30 A.M. 4:15 & 6:45 P.M.	3.9725
OSSN	125	51	28	6:45 A.M.	3.577
O6MN	636	71	31	9:00 P.M.	50.160

Happy New Year to all! And didn't we traffic handlers finish 1981 with a bang! An even 102 stations reported traffic & eight reported totals over 500. Total traffic reported for the section was 12,973. I've never personally reported a sum approaching that figure. A hearty "Well Done!" to all our very active NMs, traffic handlers, and STM K8OZ. Welcome to our newest club, the Delaware ARA of Delaware. Contact WD8ZTD for further info. 1982 Dayton Hamvention debuts on April 23 and runs thru the 25th, and, as every year, should be an even bigger and better show than the year before. Rooms are going fast so don't delay. Considering how early storms hit in this section, it is not too early for our ECs to start laying the groundwork for this year's emergency planning. Know what your area's capabilities are and what equipment is available. As an example, WD8JIK KA8CDF WD8CBC and WD8GOI furnished power for 18 hours and 20 minutes to the Bellaire Police and Fire Depts. and to Belmont Co. Sheriff's Dept. after power lines were blown down. Does your group have such capability? If so, do the authorities in your area know it? Appointments: KA8ATI, EC, Warren Co.; N8COU, EC, Monroe Co.; WD8IOL, EC, Erie-Huron Cos. Upgrades: Extra — WD8RAN KQ8T KS8M KS8W KS8X; Advanced — LEARA RO, N8ACT. Imagine this will put pressure on the other RO, N8CPI, to haul out the books again.

Local Nets	QNI	QTC	Sess.
BRTN	429	309	31
CCOMF	86	10	8
COARES	111	5	4
Firelands Red Cr.	46	5	5
HURON CO ARC	45	6	4
LCNWOARES	826	301	62
MASER	73	12	4
TATN	324	645	31
TSRAC	892	82	40
VWCEN	58	5	4

Traffic: WB8MZZ 922, K8OZ 731, W8PMJ 690, K8NVC 665, W8GGX 552, WD8ODV 543, WD8KFN 505, K8BYR 504, WD8DMF 407, WB8JGW 376, K8JDI 342, W8QZK 316, W8WEG 252, WD8DYW 244, WA8SSI 221, N8BQK 208, WB8QHV 191, WA8LOI 190, KF8J 189, KA8HCT 188, WD8KBW 186, WA8GMT 177, AB8P 176, WB8WTS 176, W8UPD 160, WD8IKC 158, KK8L 157, KA8IUK 155, N8CJM 145, WB8QHU 143, WB8RSM 134, WD8JAJ 125, K8DL 122, WD9HDZ 114, N8AUH 108, WB8HL 103, KA8HGH 92, WD8NEC 91, WB8YTD 91, WB8SIQ 86, KA8KFW 80, N8AKS 78, W8MOK 78, K3RC 72, W8EK 66, K8GET 66, KA8DJZ 65, K8PYT 65, K8AN 60, WA8BUW 60, N8BZC 58, WB8JJU 56, W8FUP 55, WA8QYJ 55, WB8GMN 52, WD8MIO 50, KC8JV 49, WB8NCD 49, AC8X 48, KA8GGZ 46, K8NJQ 46, K8YUW 46, N8JR 44, N8DAD 43, WB8YGW 42, WD8NJO 40, WB8HHZ 36, WA8WCU 36, WB8CJU 32, WA8ZID 31, N8CJS 29, WB8TTQ 27, WB8AWM 24, K8CKY 24, WB8SJE 24, KA8DGO 22, W8LZE 22, KB8YS 22, W8MGA 21, WB8KJQ 19, WD8RGS 18, WB8TRK 16, N8AEH 13, WD8CHL 12, WB8MRL 12, WD8OYO 12, WB8PIY 12, WA8HED 12, K8CMR 10, WD8JIK 10, WB8NHV 10, W8OQL 8, W8RG 8, WD8EKI 7, N8AJU 6, KA8GVR 6, WB8KKI 6, WB8YUS 6, WD8DOS 4, W8DYF 4, WB8NTR 4, WA1QAA 4.

HUDSON DIVISION

EASTERN NEW YORK: SCM, Paul S. Vydareny, WB2VUK — SEC: KB2KW. STM: WA2SPL. ASCM: W2IT KB2TM.

Net	Time/Day	Freq.	NM
EPN	2300Z	3.902	WB2MCO
ESS	2300Z	3.590	W2WSS
NYS	0000/0300Z	3.677	KA2CTU
NYS/M	1500Z M-S	7.077	WB2EAG
NYPON	2200Z	3.913	K2KQC
NYSPTEN	2300Z	3.925	AA2Y
NYS RATT	2330Z	3.625	W2ODC
CDN	2330Z	146.34/94	WB2ZCM
HVN	0030Z T-S	146.37/97	N2BDW
HVN	0030Z S-M	144.535/135	N2BDW
SDN	0230Z	147.66/06	K2ZVI
SCRN	0200Z	147.735/135	WB2HDU

WB2HDU reports SCARS set up new training sked for all members. They want to be first in next PD! AARA reports new officers: KB2CR, pres.; KC2IX, v.p.; WA2GYW, sec; KA2DDQ, treas.; K2QF W2DSK, dir. Also reports Silent Keys: W2GTI W2BRS K2OJB. RVWARS reports its Ham of the Year is WA2LSU. W2WSS in ESS bulletin made interesting comments about cw traffic. Cw is *not* dead! Take NYS/M as example! WA2CJY reports new 2M mobile rig for public service. W2DW busy as OO. W2YJR active on nets. Congrats to KC2IU, new EC. Congrats to first time BPL KA2KVZ and to other BPLers, WB2EAG WB2MCO and WA2SPL. PSHR: WA2SPL WB2MCO WB2EAG KA2KVZ W2BIW W2YJR K2ZM WB2HDU K2ZVI N2BDW WB2TWQ N2CPX. Traffic: WA2SPL 2214, WB2EAG 1083, WB2MCO 535, KA2KVZ 355, W2BIW 209, W2EFU 178, KB2KW 141, K2ZVI 132, K2ZM 127, N2BDW 82, K2MI 64, AA2Y 50, WB2VVS 45, WB2TWQ 38, W2YJR 35, WA2CJY 32, WB3ELA 30, WB2HDU 28, N2CPX 22, WB2SON 18, W2IQK 17, N2CSX 15, K2HNW 15, W2DW 3.

NEW YORK CITY — LONG ISLAND: SCM, John Smale, K2IZ — SEC: WA2KKJ. STM: WB2BNY.

NLI CW	3630 kHz	1900/2200	K2GCE
NLIPN	3928 kHz	1815	KS2G
NLS	3720 kHz	1930	WB2EUF

NCVHF	146.04/64	2100 MWTh	WA2SOE
BAVHF	147.915/315	2030 M-F	N2BMF
SCVHF	144.77/5.37	2030 M-F	WA2ARC
LIMARC	146.25/85	2100	WA2SOE
ESS	3590 kHz	1800	W2WSS
NYS	3677 kHz	190/2200	KA2CTU
NYS	7077 kHz	1000 M-S	WB2EAG

Note: All times are local. Please try and help out by checking in whenever you can. Plan now to attend the Hudson Division convention being held Oct 29-31 at the Playboy Club at Great Gorge, NJ. KA2CLQ is now Extra. New time and meeting place for the Great South Bay ARC IS the last Thur. of the month at the Babylon Village Hall. KS2G has 10 and 15 completed towards 5BWAS. Thanks to donations, JHS 22 in Manhattan is on 2 with a TR2400 and an isopole. The kids, using WB2JKJ, monitor 146.52 and would appreciate a call, 9-3 schooldays. K2UB is preparing to move to 4X4-land. We wish him lots of luck. KC2DC and KC2BP are now Advanced class. KA2LIT is now General. The Staten Island award is available to any ham who contacts ten Staten Island hams. Contact WA2ZBE for info. Club officers for Suffolk for 1982 are: KA2T, pres.; WB2PLT, v.p.; AC2P, treas.; KA2LCC, corr. sec.; WB2TYN, rec. sec. Officers for LIMARC for 1982 are: WA2NIC, pres.; WA2WKV, v.p.; K2MZ, treas.; WA2IMP, sec. Please note the new listings for NYS in the traffic section. The net at 1000 on 7077 incorporates stations from NYC LI and will provide a convenient early morning outlet for traffic instead of having to wait for the evening sessions of NTS. If you have the time and the rig, why not try checking in and see what it's about. Suffolk Co. ARC had their annual dinner dance at the Old Mill in Bohemia. They also had K2PWG, who gave a slide presentation on the Little Gull Island DXpedition, at their Jan meeting. LIMARC has a TAG Committee. That stands for "Technical Assistance Group". W2MVS and others will check out any 2-meter radios brought to them. You can usually find this group at the LIMARC flea markets. Traffic: N2AKZ 224, K2HD 204, W2GKZ 164, WB2BNY 125, WA2ARC 104, K2GCE 92, KA2GFU 92, KS2G 58, W2DBQ 53, KA2NMA 53, K2IZ 26, K2YQK 24, KR2B 20, WB2VEX 17, N2CON 12, WB2JAY 3. (Nov.) WA2ARC 32, KA2NMA 19.

NORTHERN NEW JERSEY: SCM, Robert Neukomm, KB2WI — ASCM: W5DTR/2. SEC: WB2VUF. STM: W2XD. NMs: W2CC AG2R N2BNB N2BOP KA2GQQ KA2HNQ WB2IQJ W2PSU.

Net	Freq.	Time	Sess	QNI	QSP
NJPN	3950	6 P.M. Dy 9 A.M. Sn	35	544	392
NJN/E	3695	7 P.M. Dy	31	369	279
NJN/L	3695	10 P.M. Dy	31	274	262
NJSN	3753	6:30 P.M. Dy	29	189	127
OBTTN	72/12	8 P.M. Dy	30	582	182
UCETN	085/685	7:30 P.M. Dy	31	316	92
NJVN	49/49	10:30 P.M. Dy	31	287	212
NWNJVN	90/30	8:30 P.M. Dy	6	39	21
NJRTTY	147.51	Autostart			

NJ traffickers Confab was a big success. W2SWE Memorial Award presented to AG2R for his outstanding support of new net members and all around activity. He also was named Net Manager of NJN replacing N2XJ. Are you a member of the Amateur Radio Emergency Service? If not, sign up and also support your local and state net. Be trained when your help is needed. Congrats to WA2CLP KC2CY and N2BNC on upgrading to Extra, and to K2BOG KA2BWQ and KA2FYJ on upgrading to Advanced. Also, to KA2MKK on upgrading to General. Sussex Co. ARC members let hospitalized children talk to Santa via two meters. K2TKN and several others interested in developing a packet radio network linking East Coast repeater groups recently met in Holmdel. The Cherryville RA has scheduled the next Flemington Hamfest for. April 3. CRA presented public service awards to members who in total gave over 500 hours of time to charities and communities in 1981 at the annual Christmas party. Also, a slide show was presented by WB2NQV highlighting the past year's public service activities. The Holmdel ARC exhibit at Doll and Toy Night sparked a lot of interest and radiograms were handled as part of the Amateur Radio demonstration. Remember to send reports and other information for this column to W5DTR/2, RD 3, Box 175, Califon, NJ 07830 (201-832-2821) until KB2WI returns. Congrats to W2RQ and AG2R on making BPL! PSHR: W2XD AG2R W5DTR KB2HM N2BNB N2XJ K2VX KA2JMH WA7DPK KA2GSX. Traffic: W2RQ 679, AG2R 569, W2XD 449, KB2HM 380, N2XJ 215, K2VX 201, KA2JMH 169, N2BNB 167, WB2KLF 103, W5DTR 89, N2SU 73, KA2GSX 68, N2BOP 67, N2BC 66, W2UH 62, WB2RMJ 40, W2CC 37, KA2DLV 28, WA7DPK 24, KS2B 20, KC2AK 18, WA2CLP 10, WA8ZNH 9, K2WM 6, W2IU 5, W2NKD 2. (Nov.) N2SU 6, W2NKD 2.

MIDWEST DIVISION

IOWA: SCM, Bob McCaffrey, KØCY — SEC: WØRPK. STM: KAØX. NMs: WBØAVW WAØAUX WDØHND WØYLS. A number of different nominations for the Iowa "Ham of the Year" Award. Now is the time to plan for SKYWARN programs. Contact SEC if you need assistance. See you at the Hamboree in Soo City. "Win Mager Award" in DSM goes to KBØVI. Congrats. New officers in Ottumwa are NØANN, pres.; WBØQAH, v.p.; KØJGI, secy/treas. Remember July 23-25 for the National ARRL Convention in Cedar Rapids. KAØLLI now General. WDØEOD now Advanced. New roster for ICN show great participation. Join the net. AKØP is a new Iowa station on the satellites. Fairfield Community School ARC is now a 100% club.

Net	Freq.	Days	UTC	QNI	QTC	Sess.
75M Phone	3970	M-S	1630-2330	2331	253	54
TLCN	3560	Dy	0030-0400	253	240	62
ICN	3713	TThS	0100	120	40	13
ITEN	3970	Dy	2230	52	3	4

Mt Pleasant officers reelected are WBØVHB KAØBTE WDØENR WAØKLD. ARES tone ALERT callup system being promoted in CVARC. Need all of your local newsletters. Thanks to the many who have taken the initiative and represented Iowa on the regional phone and cw nets. Show 100%/96% rep. Traffic: WAØAUX 708, WBØQAM 319, WØSS 274, WØYLS 202, AEØR/KAØX 201, KØCY 191, WBØUPF 119, KØGP 189, WDØHND 115, KAØJQG 86, WØBW 34, WBØAVW 27, KBØOZ 26, NØWA 22, KAØGBG 20, WDØEOD 20, KFØD 18, KOØO 12, KØEVC 12, NØCUB 4, KØWKT 4, WØSR 4, KNØO 4. Nice Going!

KANSAS: SCM, Robert M. Summers, KØBXF — SEC: WØKL. NMs: WØFT KAØCUF NØBDG WAØLBB. Don't know if quite a few of you just took a break this past month or perhaps the US Mail service took the break. Seems like I missed quite a few reports this month. In fact it has been some time since I have heard from several clubs — Douglas Co. ARC no reports for about 4

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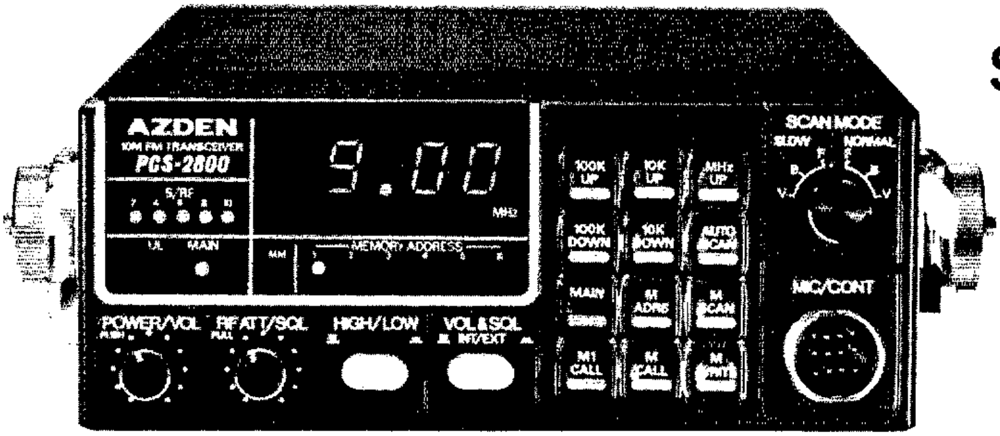

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or 5 months. Nothing from any of the clubs in NW Kansas or SW Kansas. Neosho repeater is now operating on 147.87/.27. This bit of info from the Pittsburgh Rptr Org. bulletin, the "PROcrastinator." Those of you in SE Kansas will no doubt be interested. The Parsons ARC held December meeting and a Xmas dinner the same evening. WØCY of Salina presented the program on AMSAT satellites. WBØOCK has become the new editor of the "Grounded Grid", the publication of the Wichita ARC, NØGP is the retiring editor. The Jayhawk ARC, Kansas City, elected WBØKIA, pres.; WBØZYU, v.p.; KØTHP, secy; KØBXF, treas. Also elected as Board members were WBØZON and KAØGBW. QKS-SS QNI 37, QTC 2, CSTN QNI 1764, QTC 209; QKS QNI 365, QTC 112; KWN QNI 1085, QTC 653; KSBN QNI 1295, QTC 207; KPN QNI 398, QTC 34. Traffic: WØQMT 370, WØAM 302, KØEZ 283, WBØZEN 185, WØHI 150, WØOYH 142, WØKL 136, WØFIR 101, KØBXF 88, KAØCUF 77, WBØWEB 65, WBØYLP 48, WØCHJ 42, ACØE 36, NØBDG 27, WØPB 26, WØASY 25, WØNYG 16, WØRBO 14, KAØDRC 10, WØFT 10, KØFPC 3.

MISSOURI: SCM, L. G. Wilson, KØRWL — ASCM: WØOTF. SEC: NØAJI. STM: KMØL. The Eastern Ozarks ARC had 60 in attendance at their annual Christmas Dinner and a good time was had by all. New officers for the Missouri Valley ARC are: WBØVPS, pres.; KØJZI, v.p.; KAØDJW, secy.; WBØHNO, treas. New officers for the Ozark ARS are: KEØW pres.; KAØELU, v.p.; NØAQC, secy/treas.

Net	QNI	QTC
HBN	415	54
MON	218	233
MON2	150	51
NEMOE	122	8
ACE	50	2
MOSSBN	841	117

Enjoyed KØTPX's articles concerning the Highway Patrol. Old-timer WØGCL is now sporting a newly purchased pair of Kenwood Twins. At least we got him away from the spark gap and into tubes. Maybe in another five years, we'll get him into transistors. WBØFKY is sporting a new TS-830S and TR2400. Traffic: KCØAS 582, WØBMA 302, KØBM 270, KIØK 246, KØSI 160, KGØL 114, WØOUD 83, KCØCL 43, WBØFKY 19, KCØHB 14, KMØL 14, KØRWL 6, WØNUB 5.

NEBRASKA: SCM, Shirley M. Rice, KAØBCB — SEC: NØAIH, STM: WDØBQG. Our sympathy to the families & friends of WØTIP & WØTVS who graduated to the rank of Silent Key. Congrats agn to WDØFJY who upgraded to EXTRA and as far as I know is the first YL Extra in NE. FB Mary! Also KAØIIG to Adv, KAØKUC Gen, WBØYMK Tech. I'll bet WAØOQX's granddaughter put a smile on his face when she got her Novice call, KAØMUR. Hats off to WBØPKR for his new baby boy. Have you made your reservations for Kearney? NØAIH plans a State ARES meeting there. Hope u all come! Anyone interested in being an OO, OES, or other appointments, please let me know. We can sure use u. Traffic: WBØGOB 133, WØHTA 50, WØZNI 27, WØHOP 25, WAØBOK 24, KAØBCB 23, WAØDXY 17, WBØGMQ 12, WBØGWR 8, WDØBQG 6, WØDJU 5, WØNIK 4, WBØSGB 4, KØTUH 4, KØSFA 2.

NEW ENGLAND DIVISION

CONNECTICUT: SCM, Pete Kemp, KA1KD — STM: K1EIC. SEC: K1WGO.

Net	Freq.	EST	QTC	QNI	NM
CN	3640	1900/2200	446	380	K1EIR
CPN	915/315	1800/1900 Su	101	206	WB1AIU
NVTN	28/28	2130			WA1ELA
RTN	13/73	2100			WB1CPF
WCN	78/18	2130	270	475	W1DPR

High QNI: CN — K1UQE WB1EKV WB2PJU. Appointments: OO — N1AEC; OES — K1WGO; OBS — WB3ANC WA1DWE. Upgrades: Extra — KA1FEX WA1GNA; Adv — N1BST KA1GMG; Tech — KA1GGT KA1BZY. Call changes: WA1ZKS/KA1XJ; KA1GDS/N1BVS. CRIS, Connecticut Radio Information Service, is looking for hams to assist them in their fine work of providing news/information to our section's blind and print handicapped community. Clubs will be receiving further info on this most worthwhile public service activity. SMAG "Elmer of the Year" Award to W1ICQ. BPL: W1EFW. KE1K is busy mountaintopping on vhf. FARA aided Pequot Runners Road Race on Thanksgiving Day. WA1LOU keeps piling up the DXCC countries with his new tower. WB1AJG & K1HWL keeping busy on RTTY. Now is the time for all ops and clubs to begin their planning for Field Day. KB1T is now operating computer RTTY. Thirty three new novices are now on the air, courtesy of the Bethel Middle School ARC. All people holding League appointments are reminded to have their reports in to the SEC, STM or SCM not later than the 8th of the month. NMs should have their reports to the SCM or STM not later than the 10th of each month. New DEC: KA1AMK. New ECs: KA1HGH WB1COB W1UWV K1GZP WA1WPJ AA1U KA1JH WB1HHQ WB1DWW WA1BAM. Congrats to all of the active traffic handlers for their super effort in getting the messages handled during the recent holiday season. Traffic: W1EFW 669, KA1BHT 277, WB1EKV 257, K1AQE 251, N1BFD 251, WB1GXZ 242, WB1CRH 237, WB2PJU 237, K1EIR 196, K1AQE 171, K1EIC 124, W1XX 83, K1EUW 81, W1BDN 67, KA1KD 57, KA1AMK 37, W1DPR 34, W1ICF 12, K1WGO 11, K1XA 10, W1CUH 9, W1QV 8, WB1ESJ 6, WB9IHH 2.

EASTERN MASSACHUSETTS: SCM, Rick Beebe, K1PAD — STM: WA1TBY. SEC: WA1BLG. ASCM: K9HI.

Net	Mgr	Freq	Time(loc)/Dy	QNI	QTC
EMRI	N1GQ	3.658	1900/2200/Dy	373	481
EMRIPN	KA1BJY	3.898	1730/Dy	461	427
EM2MN	N1BNI	90/30	2000/MWF	239	87
NEEPN	K1BZD	3.945	0830/Sn	69	32
HHTN	K1BSO	04/64	2230/Dy	494	389
EMRISS	N1BHH	3.715	2030/Dy	119	59
MFARAD	WA1DWS	3.924	1300/M-S	224	170

I understand that a lot of hams and unsuspecting neighbors are having trouble with cable TV systems these days. I know of two cases, one in NH and one in Framingham where the cable is a problem. It seems that cable services are licensed right now to put RF carriers on a very broad range of frequencies, some of which are in the ham bands. If the connections are not right, or if they deteriorate, then RF can go in or out. The result is interference to us primarily on two-meter frequencies and potential of our RF getting into the cable with TVI being the consequence. This is important to us because you know who will win any battles between a relatively few people trying to enjoy their hobby and hoards of people wanting to watch Sesame Street, etc. Please let me know about any such problems that you know of and especially how you are handling them. I have made our director aware of this problem and I am sure that the League will put its full weight on our side with the FCC. The Framingham club is looking for candidates for their

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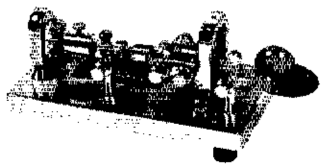

In 1890 Horace Martin searched for relief from the "glass arm" wireless operators were getting from pounding straight keys. He innovated by placing the key on its side and our semi-automatic key was born. Press the thumb piece and the vibrating lever bar produces dots. Make dashes manually with the finger piece. Speeds as low as 20 wpm or as high as practical can be sent with the speed lever. The original bug is still buzzing wherever speed and perfection are desired.

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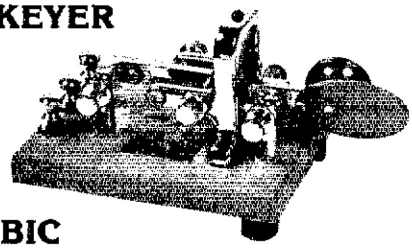

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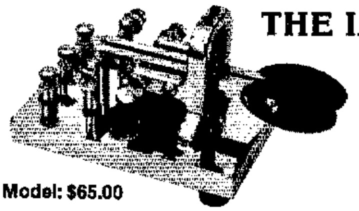

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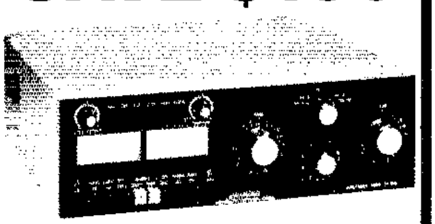

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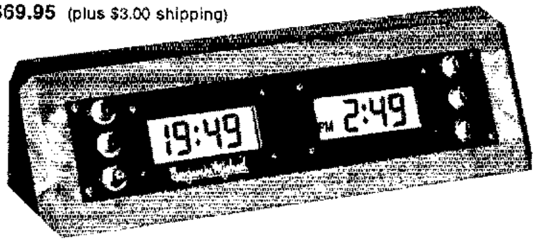

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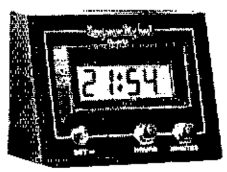

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yearly scholarship which totals $500. Contact K1AZE for more info. Middlesex club has produced an interesting slide show in their '81 Field Day effort. 19/79 member WA1DFL completed 50 MHz WAS. Good going. Massasoit club enjoys an interesting social event where members bring their wives and a dish of some sort to a fun filled evening which is enjoyed by all. Billerica club had an interesting slide presentation by OM K1OJH and XYL WA1UQA on their DXpedition to St Pierre and Miquelon. Wellesley club completed another very successful year at the Natick Mall sending Christmas traffic. Great PR gained on TV ch5 for their efforts. Traffic: WA1TBY 1226, N1BHH 777, KA1BJY 636, KA1ON 359, WB1EZT 325, K1BSO 284, W1CE 246, K1GN 180, KA1BBU 170, WA1LPM 170, W1ATX 152, WB8TDA 147, KD1B 120, KA1EMQ 90, K9HI 88, W1MJ 84, KA1MI 74, K1BZD 59, N1AJJ 48, WB7TPY 33, KA1R 16, WA1FNM 14, AE1X 8, N8TM 3.

MAINE: SCM, Cliff Laverty, W1RWG — SEC: KL7IJG. STM: AK1W. Sess/QTC/QNI/NM: AEN 5/4/79/WA1YNZ; PTN 38/320/416/W1KX; SGN 27/383/1121/K1GUP; MSN 13/28/110/N1BJW; SPSN 15/151/171/N1BCE; CMEN 8/43/116/W1WCI; RACES 4/6/59/W1RWG. PSHR: AK1W W1RWG WA1YNZ. BPL: AK1W. OBS WB1GKI has a new call, KA1SY. The Somerset ARA sent over 87 messages for nursing home residents and made Christmas just a little brighter. Send me your news. Traffic: AK1W 658, W1KX 441, WB1BYR 257, KA1AVU 182, N1BUN 180, W1AHM 161, W1RWG 140, W1HDC 101, KA1TJ 70, W1WCI 69, W1JTH 66, N1BKC 61, KA1WS 52, N1BLZ 51, N1BCE 44, N1BJW 44, K1OQV 37, W1BMX 28, KA1AIF 27, KA1EIW 24, N1AII 23, KA1ENL 22, WB1EIL 22, W1CTR 18, W1GCB 18, W1GKJ 18, KA1GCW 17, WA1JHT 17, WA1YNZ 12, KL7IJG 8, K1NAN 5, WA1JZL 3.

NEW HAMPSHIRE: SCM, Robert C. Mitchell, W1NH/W1SWX — STM: W1TN. SEC: AK1E. NMs: N1NH K1OSM W1VTP. Mark your calendars now for ARRL Boxboro, MA, convention October 2 & 3. Radio clubs, let us know three months in advance of ham radio classes so it can be seen here. WA1PEL is state MARS director. Great Bay club "Hamfest 82" date is April 17. N1NH made BPL again. The GSFMN had 14055 QNI, 3067 QTC, in 726 sessions. New Nashua club officers: WB1BRE KA1BBI KE1E K1YET K1LGO. Seen on hyways and byways: W1RCC KB1A W1MHD W1BXM K1MRK and WA1VIB. Welcome to new hams KA1HWN KA1HXL K1NSW WA1NIK WA1NIL KA1HWH KA1HWM KA1HWX KA1HXO KA1HWO N1BVI and WA1EYL. WA1VIB, State Police's Eye in the Sky, gave excellent talk at Nashua club. W1BYS sends warm greetings from FL. Traffic: N1NH 569, W1QYY 366, W1TN 311, K1OSM 227, KA1BBI 226, KA1CXP 165, KA1BJ 158, KA1FWQ 157, K1YMH 155, W1VTP 147, N1ALM 136, AK1E 119, W1ALE 67, KB1A 52, KA1CJI 45, K1NH 41, WA1PEL 32, N1AKS 20, KA1FKM 17, K1UQX 15, W1NH 12, N1BOF 9, WA1YAZ 2.

RHODE ISLAND: SCM, Gordon F. Fox, W1YNE — SEC: KA1EHR. STM: KA1FE. NM: WA1OSL, RIEM2MTN. Appointments: NM RI Teletype Net, KC5G; ORS — KC1G N1RI. RI Teletype Net established as NTS section net. More details next month. ARES Nets: RI State 146.10/70 W 1930 Local; Providence Co. 147.51 Th 1930; Newport Co. 147.96/36 Sn 0800; Bristol Co. 146.40 Sn 1930; Kent Co. 146.43 T 2000; Washington Co. 147.765/165 W 2000. Traffic: W1EOF 662, KC1G 575, KB1G 290, KA1FE 269, W1YNE 168, KA1EHR 106, AE1S 62, WA1CSO 41, N1RI 25, N1BEE 12, KA1FPP 3.

VERMONT: SCM, Bob Scott, W1RNA — SEC: WB1ABQ. STM: N1ARI. K1WQU & N1BSB upgraded to Adv. GMN 27/576/46; Carrier 27/551/44; VSB 31/522/187; VTN 25/89/53; VPN 4/79/4. Thanks to the many stations who delivered tfc, especially those who had msgs with incorrect names, phone nbrs and the like, but still got them delivered. In my book, there is limited excuse for the inaccuracies that appear much too often in msg handling, not just in the address, but also in the text. Example: I sent one with the name Omar in the text. It was delivered with the word "yours" instead of Omar. Figure that one out!! Meant just about the same to the addressee, too! In transmitting or receiving tfc, ACCURACY is demanded, NOT how fast you can do it. Out of 10 msgs dlvd only one was completely correct. SAD. Traffic: K1BQB 341, N1ARI 213, W1RNA 67, AE1T 53, WB1ABQ 32.

WESTERN MASSACHUSETTS: SCM, William J. Hall, W1JP — SEC: WB1HIH. STM: W1UD. NMs: KA1T WA1ITL W1UPH. On behalf of myself and the WMA sec., our sincere thanks to outgoing SCM W1KK and STM W1TM for their outstanding contributions to Amateur Radio and ARPSC in past two years. Hats off to W1UD who was elected mbr A-1 Op Club on Dec 14. Also to AC1T who took section single op in Sept. VHF QSO Party, and to WB1HIH for taking top ten honors phone & cw in Oct. CD Party. (What happened to my QCD for January event?) K1IJV K1IJU WB1ABF & W1JP DXpedition to VP2V-Land scheduled Feb 19 — Mar 7. Cw operations on low end of 10-160 as well as 28.6 ssb with 21.36 backup. WB1HIH QRP operations have netted him 22 states on 40 mtrs running 50 mW! Holiday season augmented by public service event in EMa brought on a terrific tfc crunch. Kudos to W1UD with 590 total for BPL and to W1TM who missed it by 11 points. PSHR: WB1HIH WB1CGK K1JHC KA1T W1TM. Traffic: W1UD 590, W1TM 489, KA1T 394, WB1CGK 297, WB1HIH 209, WA1ITL 190, W1YI 172, W1JP 127, W1KK 98, K1IJV 68, WA1OPN 61, K1JHC 51, K1PUG 31, K1BE 10, W1ZPB 10, W1UPH 8, W1BVR 7, WB1DBN 4.

NORTHWESTERN DIVISION

IDAHO: SCM, Lem Allen, W7JMH — SEC: WA7UHW. Club News: Boise club running theory and code classes for Advanced and Extra Classes. Trainees with target ending date in March just before FCC exams. The Mountain Home club is having a club DX contest again this year, and is now developing interest in EME operation. People and Things. K7JV reports his Atlas 210X came back to life with $75 worth of parts and 24 hours work, after being killed by accidently connecting 120 VAC across 12VDC input. Congrats to W7GHT on BPL.

Net	Freq.	Time	Sess.	QNI	QTC
FARM	3935	7 P.M. Dy	31	1451	67
CD	3990	8:10 A.M. M-F	23	728	46
IMN	3635	8 P.M. M-F	23	193	100
ECHO 2	146.52	7 P.M. W	4	40	7

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MONTANA: SCM, Les Belyea, N7AIK — New officers for the Great Falls ARC: W7WSW, pres.; N7AGP, v.p.; N7CTS, secy; K7CFA, treas. KA7DWS now N7DKY. An outstanding achievement by KF7T by WAC on six meters running 8 watts with a 5 element beam. He also

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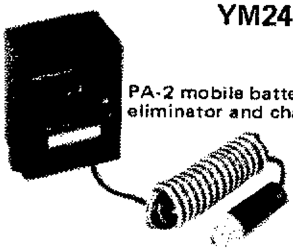
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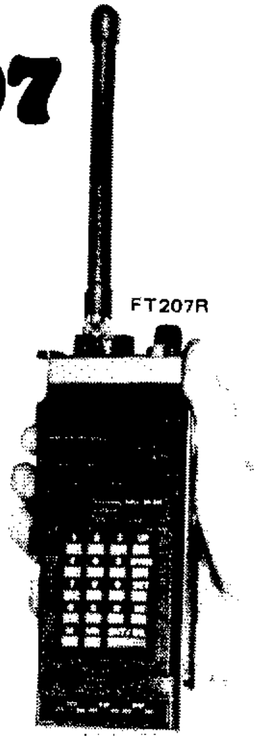
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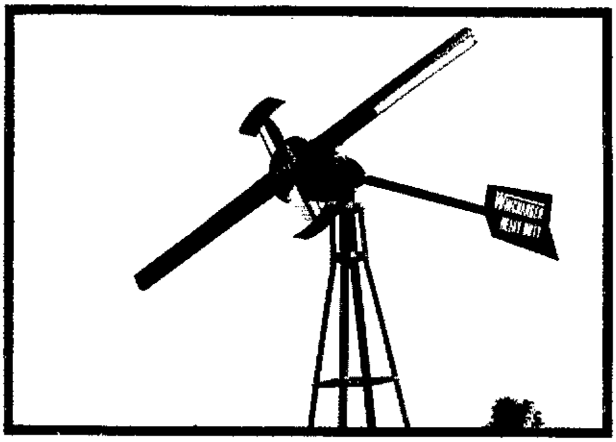

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worked FB8WG on 20 meters. This is a very rare country. W7LR has a country total near 300. FB. Summer hamfests, Glacier-Waterton, July 16, 17, 18 at the Three Forks Campground. WIMU — August 6, 7, 8 at West Yellowstone. This will be the 50th anniversary for WIMU and will combine with division conventions from the Northwest and Rocky Mountain ARRL sections. Active on RTTY is KB7SE N7AGP W7OPTJ. New repeater in Billings: WA7JDX/R. Freq. 147.84/.24 W7BQE in Sidney has been an ARRL member for 25 years. The Hiline ARC set up an Amateur Radio display at the Holiday Village in Havre. Five new amateurs from the class of W7IDK. K7LK and family from Red Lodge made a trip to VK- and ZL-Land. Nets: MTN, QNI 962, QTC 113. IMN, QNI 193, QTC 100. BSN, QNI 230, QTC 15. Traffic: WB7DZX 462, N7AIK 37.

OREGON: SCM, William R. Shrader, W7QMU — STM: W7VSE. SEC: K7WWG.

Net	Time/Day	Freq.	QNI	QTC
OSN	0230/0600Z Dy	3587	453	595
BSN	0145Z Dy	3908	1068	73
OARES	0115Z Dy	3993.5	725	171
OARES	0230Z Dy	3993.5	104	8
PTTN	0300Z Dy	147.84/24	398	105
MPARES	0300Z TTh	147.02	216	4
WCN	0300Z Dy	3702	485	290
SOARES	0300Z MThFS	146.34/94	553	203
SOFM	0330Z T	146.04/64	140	10

Late reports (Nov.): WCN QNI 343, QTC 149; PDXARES QNI 1258, QTC 24. WB7RKU new NM for WCN. Upgrades: KA7HJT KØEKP; Nov — KA7YLO. KA7HOE, daughter of WB7STS, will be 12 in Feb, licensed since 10. KA7JFK new AEC for Sutherlin area. KA7AID giving emergency highway advice to travelers in Douglas Co. New jr. YL op for KA7IHM. Kudos to K7QPC for the "Eager Beaver", BSN letter. Participate in BSN 3908 kHz 0145Z daily so you can get it. KA7EXM will be enrolling at OSC in the fall, meantime active on vhf and OSCAR. Over 200 years of licensed operation present at reunion of W7AHP W7CMK W7CPV W7OPH and W7QMU after a lapse of 25 years. Happy 1982 to All. Traffic: W7VSE 959, KN7B 595, WA7LGN 554, W7ZB 345, W7LNE 288, KA7DBS 279, K7NTS 222, N7BGY 213, WA7IHS 210, WB7OEX 169, KA7ELI 136, KI7Y 90, W7HLF 49, W7FDU 46, W7QMU 36, W7TC 16, W7LT 16.

WASHINGTON: SCM, Joe Winter, WA7RWK — ASCM: KD7G. SEC: K7SH. STM: W7GB.

Net	Time(Z)	Freq.	QNI	QTC	Mgr
NTN	1930	3970	1409	81	W7VL
WARTS	0100	3970	3150	395	W7SFT
NWSSBN	0230	3945	799	57	W7JHR
WSN	0245/0545	3590	591	425	W7GB
EWTN	0130/0530	146.64	80	126	WA7CBN
PSTS	0130/0630	145.33	197	178	W7IEU
SCSRES	0330/W	147.18			W7ERH
IETN	0130/0300	147.30	8	8	KA7CSP

Congrats to all 1982 RC officers. Lower Columbia ARA, W7DG: KB7LQ, pres.; WA7SHN, v.p.; WB7PEI, treas.; N7CFA, sec. Chehalis Valley ARS, WA7UHD, KC7KI, pres.; KA7JPK, v.p.; N7DFV, sec.; K7OGU, treas.; No. Sea. ARC, W7DA: W7GR, pres.; K7KPC, v.p.; W7GPS, treas.; KA7APK, sec.; Radio Club Of Tacoma, W7DK: W7SFT, pres.; K7YLM, v.p.; WA7OII, sec; K7QLC, treas.; Spokane Dial Twisters; K7OLB, Pres Chief D.T.; WA7UJR, 2nd Off. Fuse Blower; WB7TQF, 3rd Off. Tube Chkr; KA7BQI, Tres Short Ckt; KA7FXT, Sec. Capacitor. Also tnx to all the many board mbrs. Let's all help them to succeed. W7JIE, IARU Director in INTRUDER WATCH, reports continued pursuit of pirate & non-ham sigs. Increasing numbers of low band intruders now being watched in Nort'n Hemi. We need more IW stns. Write ARRL Hq for info. Skagit Co. EC WB7SWW conducting on air ARES training in 3 sess. ARES/RACES orientation, message handling (formal-informal), net procedures and discipline. He wants more mbrs. Pse call him. Radio Ams of Skagit Co. collected food for a needy family for Christmas. Nice gesture. CVARS WA7UHD busy in license dept in 1981: 7 Novices and 7 upgrades. Congrats. I.E. VHF has new ap rptr, 144.83/.43 on " Mica Pk. covering Spokane Exch's. LCARA W7DG planning spring dinner, Novice classes, erecting a 2nd tower (80') & upgrading hf gear. Yakima H.F. now 2 dys May 1-2. Yak. ARC holding Novice & General classes. Club has a record 59 mbrs RC Tac. W7OLD Santa heard talking to the kiddies before Christmas. Over 100 W7DK mbrs & guests heard great program on China ham trip by K7LAY W7EA K7HO & KC7CF. W7GCI & K7ETU now have some computers. Novice classes being taught by KC7EQ. OBSs WARNS W7CKZ 7 P.M. Mon. 3,940 MHz. WESTLINK — W7UU 5:45 P.M. M-F 3.975 MHz. ARRL W1AW (see *QST*). WA7LQV plans raising new quad. WB7SWW back on tfc after long trip with Navy. W7JHR also back on WSN after many years. K7OXL fixed ant & has gud sigs now. Traffic: W7DZX 1746, WB7TQF 968, N7AFZ 947, WB7WOW 895, N7ANE 414, K7GXZ 345, W7FJZ 284, K7CTP 266, N7AFY 249, WB7OGA 221, N7CSP 155, WA7BDD 150, W7IEU 128, W7GB 92, WA7JEB 60, WA7RCR 58, WA7LQV 57, KA7CSP 45, W7BUN 39, KC7NA 30, WB7CFH 19, W7APS 9.

PACIFIC DIVISION

EAST BAY: SCM, Bob Vallio, W6RGG — ASCMs: W6ZM N6DHN VE2AQV/W6. SEC: WB6KQU. My apologies for the recent missing column, it was mailed to Hq., but not received in time. KE6JV passed his Extra, made BPL and PSHR, all in the same month! Congrats! W5ZM will soon have his "West Coast Bulletin", 1st and 3rd Mon. 2000 PST, on 3540, 7040 and 14040 simultaneously. FB! EC N6XN of Napa Co. is very busy. The Napa Valley ARES Net meets Wed at 1900 PST on 147.78/18. NCS is KA6IDT. WA6TPE's XYL passed her Novice and is now KA6NRO (New Radio Operator). I have been requested to list the local nets which could use more EB checkins. NCN/1, 1900 PST, 3630, dy. NCN/2 (slow speed), 2030 PST, 3630, dy. NCN VHF, 1930 PST, 144.81/5.41, dy. RN6, 1045, 1345, and 1530 PST. 7272, dy. Traffic: KE6JV 788, K6APW 130, WB6UZX 57, KA6ERF 7.

NEVADA: SCM, Ralph E. Covington, W7SK — SEC: K7WLY. The star appointment this month is WA6AAT, EC White Pine Co. He will be working with WB7WTS, county emergency officer. Officers of NARA of Reno are: KA7AKM, pres.; K7SFM, v.p.; W7UIZ, sec/treas. If you look below you will see N7AKX is still charging onward with his fourth well earned BPL certificate. Fine business. Nevada Sagebrush Net, weeknights at 7:30 P.M. PST on 3906 kHz. NM is W7BS. Traffic: N7AKX 1035, W7BS 155, W7BKQ 20, W7CX 5, W7SK 3.

PACIFIC: SCM, Pat Corrigan, KA6DD — Congrats to KH6JRM, new president of Big Island ARC and his corps of officers for 1982. Kauai ARC officers are: KB3CQ,

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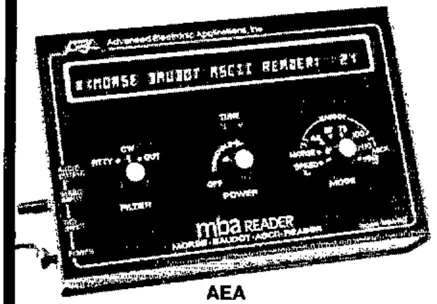

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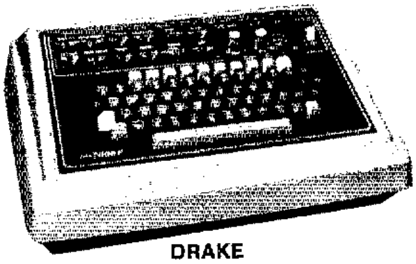

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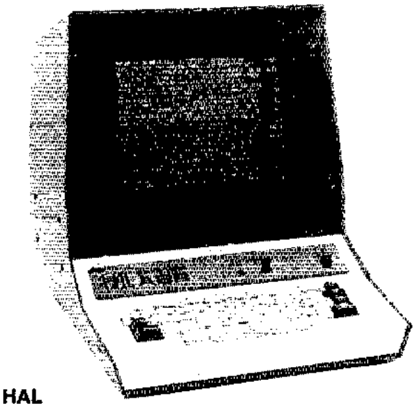

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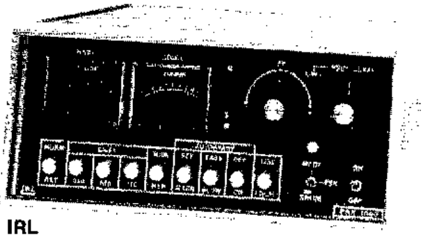

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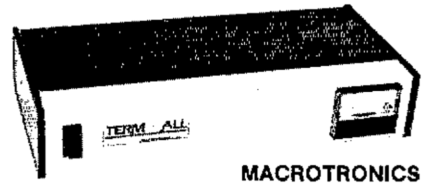

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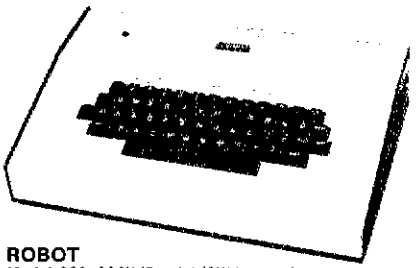

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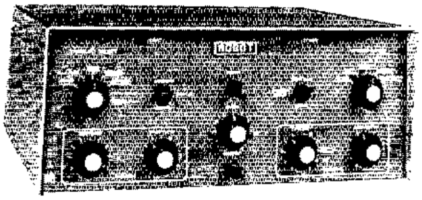

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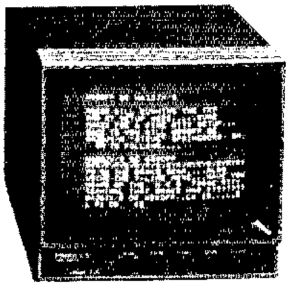

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FT-480R/FT-680R/FT-780R

SC-1 Station Console

NEW!

- Dual VFO System for covering unusual repeater splits or separate TX/RX Frequencies during weak signal work.
- Microprocessor-controlled multimode transceivers with three mode-optimized synthesizer step selections.
- Up-down Scanning, Priority Channel, and four Memories with Memory Scan.
- FT-480R coverage 143.5 - 148.5 MHz, FT-680R coverage 50 - 53.99 MHz, FT-780R coverage 430 - 439.99 MHz. Coverage may differ in other countries.
- Satellite operation provided using FT-480R and FT-780R. Transmit frequency may be varied while transmitting to follow Doppler Shift.
- Scanning microphone provided for instant QSY with fingertip control. YM-48 (option) provides two tone operation for autopatch work.
- Blue fluorescent display for maximum visibility.
- Red - Yellow - Green LED Signal Strength/Relative PO Meter.
- Optional SC-1 Station Console includes quartz LCD Clock, AC Power Supply, DTMF 16 Button Pad, Scanning Controls, and XCVR A - XCVR B Microphone Switching.
- Optional Accessories: FP-80A AC Power Supply, FTS-64E 32 Tone CTCSS/Burst Encoder, YM-34 Desk Microphone, YM-38 Desk Microphone with Scan Switches.

Look to the future with the most complete line of VHF Multimode Transceivers available — The Line of the 80's . . . from Yaesu!

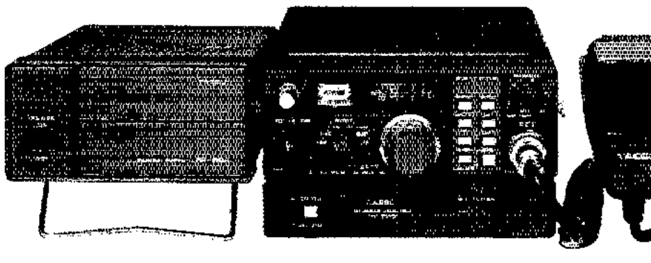
FT-290R

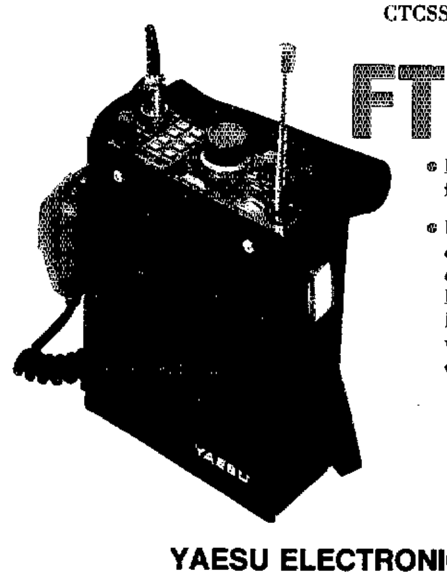
NEW!

2 METER MULTIMODE PORTABLE

Don't miss those great DX openings this year! T FT-290R and FT-690R are ready whenever (a wherever) you are!!!

- Completely self-contained, battery powered 2 meter multimode Transceiver with Telescoping Antenna.
- Microprocessor control for operating convenience usually found only in base station equipment.
- Dual VFO System with two synthesizer steps per mode. Use one VFO for the FM band and the second VFO for SSB, if you like!
- Ten memories, priority channel, and up/down scanning of band or memories for busy or clear channels.
- Built in Noise Blanker, RIT, Hi/Low Power Switch and Battery Condition Meter. Lithium memory backup battery with estimated 5 year life.
- Optional MMB-11 Mobile Bracket, FL-2010 10 watt Amplifier, LCC-90 Leather Case, NiCd C-Cells, YM-49 Speaker/Microphone and CTCSS Boards.





FT-690R

6 METER MULTIMODE PORTABLE

- Repeater splits of ± 1 MHz built in for FM work.
- Use with FT-290R accessories, including YM-50 16 Button Tone Encoder Microphone and NC-11B Battery Charger. Use FP-80A AC Power Supply for base station work. FL-6010 Amplifier available outside USA.
- LCD Display with night light for excellent visibility.
- 2.5 watts RF Output on SSB/CW, 800 MW Output on AM.
- Synthesizer steps optimized for mode in use.

YAESU

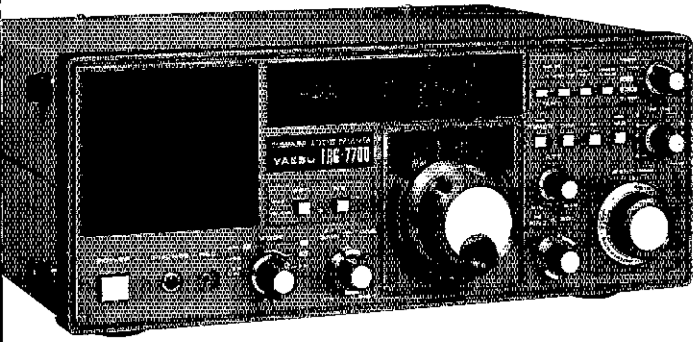
The radio.

382-

YAESU ELECTRONICS CORP. 6851 Walthall Way, Paramount, CA 90723 • (213) 633-4007
Eastern Service Ctr., 9812 Princeton-Glendale Rd., Cincinnati, OH 45246 • (513) 874-3100

FRG-7700

DELUXE HF COMMUNICATIONS RECEIVER



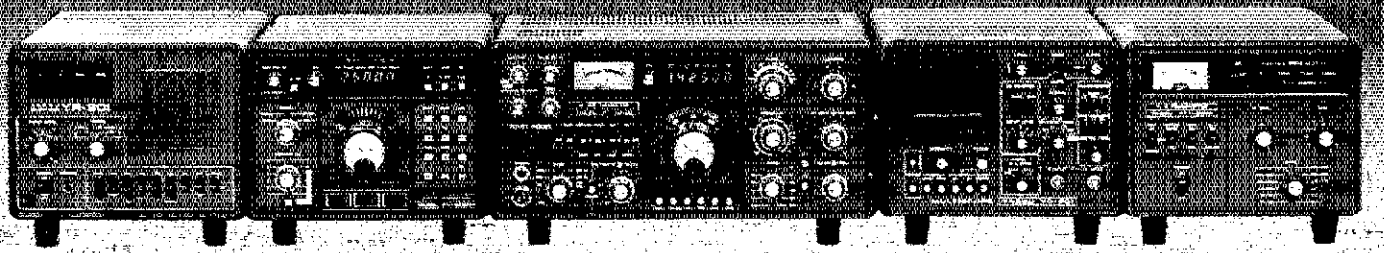
- 150 KHz through 29.99 MHz coverage on AM, SSB, CW and FM
- Three AM bandwidths for changing interference conditions on crowded shortwave broadcast bands.
- Built-in Quartz Digital Clock with timer for control of station accessories.
- Tape Recorder Output Jack on front panel.
- Noise Blanker and AGC Selection controlled from front panel.
- Optional memory unit allows storage and recall of up to 12 frequencies — no more frantic dial twisting at I.D. time!
- Optional Accessories: FRV-7700 VHF Converter, FRT-7700 Antenna Tuner, FF-5 500 KHz Low-Pass Filter, DC-7700 DC Kit, YH-77 Headphones and QTR-24D Deluxe World Clock.

FRG-7 HF COMMUNICATIONS RECEIVER

- Top-selling Shortwave Receiver provides high performance at a reasonable price.
- 500 KHz - 29.99 MHz using Wadley Loop Synthesizer for excellent stability.
- Audio Filter for enhanced reception under difficult conditions.
- Built-in Tunable Preselector for excellent out-of-band interference rejection.
- Front panel Tape Recorder Jack plus Headphone Jack.
- Dial Lamps may be switched off for reduced power consumption.

FT-101ZD MK III

COST-EFFECTIVE DX PERFORMANCE!



- 160-10 Meter coverage on SSB and CW. AM or FM Unit may be added as optional accessory.
- Variable IF bandwidth, using cascaded crystal filters for excellent interference rejection.
- Audio Peak/Notch Filter for razor-sharp selectivity.
- CW Wide-Narrow Selection using optional 350, 450, or 600 Hz CW Filter.
- RF Speech Processor and Adjustable-Threshold Noise Blanker are built in.
- Worldwide Power Capability provided by Multi-Tap Power Transformer, covering 100/110/117/200/220/234 VAC.
- Rugged 6146B Finals with RF negative feedback.
- Optional Accessories: FV-101DM Scanning VFO with 10 Hz Synthesizer and Memory, FTV-901R VHF/UHF Transverter, FC-902 Antenna Coupler, SP-901P Speaker/Patch, DC 101Z DC-DC Converter, FA-9 Cooling Fan, complete line of Microphones.

YAESU

The radio.

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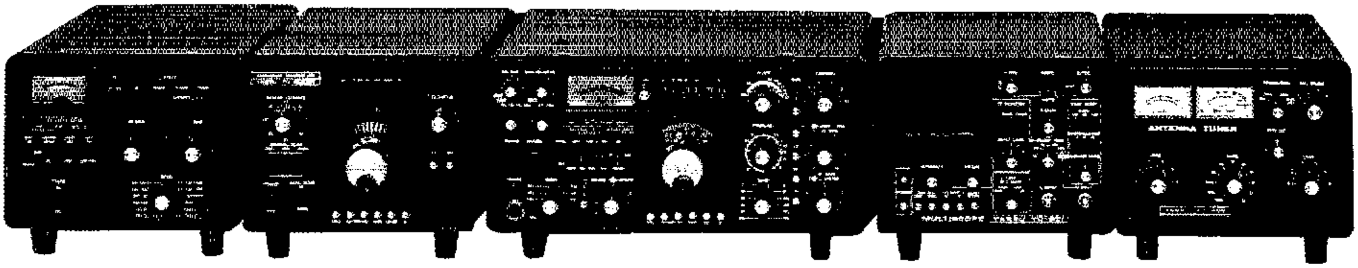
FT-902DM

THE CHOICE OF CHAMPIONS FOR DX AND CONTEST OPERATION AROUND THE WORLD



- SSB, CW, AM, FM and FSK operation built in for All-Mode Versatility.
- 160-10 Meters, including the new bands recently assigned at WARC.
- Variable IF Bandwidth and IF Rejection Tuning for outstanding Selectivity. Cascaded Filters standard, not optional accessories.
- Audio Peak CW Filter provides single signal reception.
- Built-in Curtis 8044 IC Keyer.
- Built-in Memory System for control of Transmit, Receive, or Transceive Frequency.
- Rugged 6146B final tubes with RF negative feedback for excellent spectral purity.
- Built in RF Speech Processor and IF Noise Blanker.

FT-902DM Accessories

- FTV-901R extends coverage to 50, 144, and 430 MHz on full duplex (External Receiver required for duplex operation) for satellite work. 6M/70CM Units optional.
- FV-901DM Synthesized VFO scans in 100 Hz steps and sports 40 Frequency Memory Bank for DX or contest work.
- YO-901P Multiscope includes IF Monitor, Panadapter, and Two-tone Generator for quick station testing.
- FC-902 Antenna Coupler provides for matching 3 Coax-fed Antennas plus one random wire.
- YR-901 CW/RTTY Reader provides versatile Teletype or CW Monitoring using external video monitor.
- SP-901P Speaker/Patch and SP-901 External Speaker round out your FT-902DM Total Communications System.

FT-107M

SOLID-STATE HF TRANSCEIVER

BROADBAND PERFORMANCE FOR EASE OF OPERATION

- All Solid State, 160-10 Meter Transceiver equipped for SSB, CW, FSK and AM operations.
- 12 Frequency Memory System with Digital Memory Shift providing scanning capability (Scanning Microphone optional).
- Excellent VSWR Turndown Characteristics: 75% Power Output at 3:1 SWR.
- Variable IF bandwidth using Cascaded Crystal Filters, Audio Peak/Notch Filter built in.
- Diode Ring Mixer for strong IMD performance. Low-Noise Premix Crystal Local Oscillator.
- Digital plus Analog Frequency Counter Readout. Digital Display utilizes true frequency.
- Built-in RF Speech Processor and IF Noise Blanker.
- Choice of optional internal or external AC Power Supply.
- Optional 350, 450, and 600 Hz CW Filters.
- Optional Accessories: FV-107 External VFO, FTV-107R VHF/UHF Transverter, FC-107 Antenna Coupler, SP-107P Speaker/Patch, SP-107 Speaker.

Price And Specifications Subject to Change Without Notice or Obligation

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382-3

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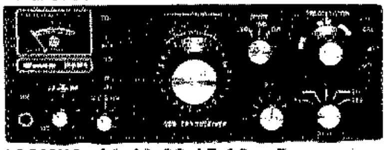
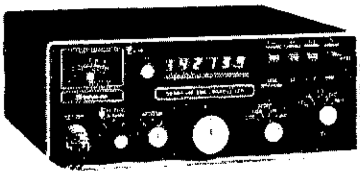
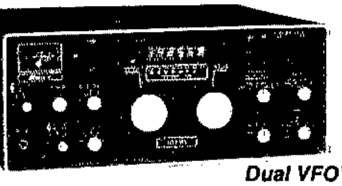
SWAN Closeouts



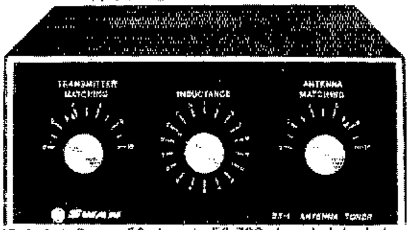
100MXA 80-40-20-15-10m Transceiver
Regular $595 - ***Closeout $469.95***
PSU-5B AC supply *(Reg. $189)* .. ***Closeout $169.95***



ASTRO 150 80-40-20-15-10m Transceiver
Regular $925 - ***Closeout $599.95***
PSU-5B AC supply *(Reg. $189)* .. ***Closeout $169.95***

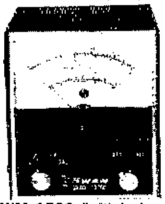


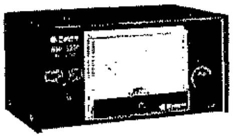
Dual VFO's
102BX 160-80-40-20-15-10m Transceiver
Regular $1195 - ***Closeout $769.95***
PSU-6 AC supply *(Reg. $189)* .... ***Closeout $169.95***



ST-1 Ant. Tuner. 50 ohms to 50-700 ohms bal./unbal. or random. 3 KW PEP, 1.7-30 MHz w/4:1 balun. 5½"h × 13"w × 14½"d *(Reg. $189)* .... ***Closeout $119.95***

SWAN Wattmeters





WM-1500 (left) In-line Wattmeter. 5, 50, 500 & 1500w scales, forward & reverse. 10% accuracy 2-30 Mhz; usable at 50 Mhz with reduced accuracy. 6"w × 6"h × 4½"d, 2 lb. *(Reg. $74)* .... ***Closeout $54.95***

WM-6200 (right) 50-150 Mhz thru-type Wattmeter. 20/200w scales & VSWR. 7% pwr accuracy, 5% VSWR. 4"w × 8"h × 5½"d, 3 lb. *(Reg. $87)* ... ***Closeout $59.95***

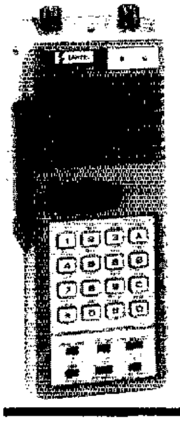
STANDARD C7800 440 MHz FM

Microprocessor controlled, covers 438-449.975 MHz, 1 or 10w out. Loaded with & scan & memory features. 6¾"h × 2⅝"w × 6⅝"d, 6½ lbs. 13.8vdc @ 4½A.
Regular $499.95 - ***Sale Price $389.95***

SAVE $$

ENCOMM

Santec HT's



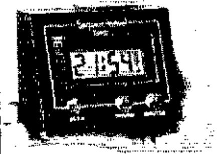
HT-1200 2m FM HT
(Reg. $379).. SALE $269.95

ST-7/T 440 FM HT
(Reg. $349).. SALE $269.95

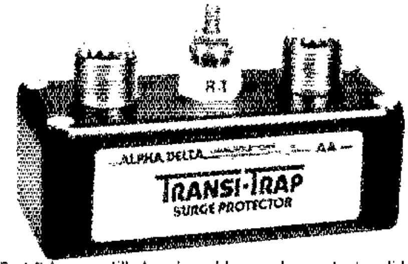
ST-144uP 2m FM HT
(Reg. $359).. SALE $299.95

ST-440uP 440 FM HT
(Reg. $399).. SALE $339.95

BMI 173B 24-hr LCD Electronic Clock



Operates 1 year on AA cell. HOURS & MINUTES pushbutton set switches. Seconds reset to zero in the setting operation for easy correlation with WWV. Pushbutton backlighting. Only 2½"h × 3¼"w × 1½"d, 8 oz. ***$34.95***



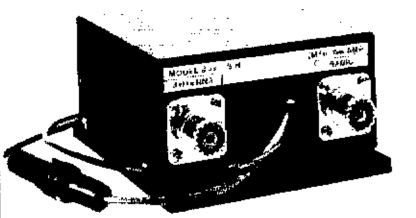
Fast-firing, gas-filled replaceable arc-plug protects solid-state gear against damage from nearby lightning strokes. SO-239 connectors. 50-ohms - low VSWR up to 500 Mhz.

Model R-T for rigs up to 200 watts input ***$29.95***
Replacement arc-plug cartridge for R-T ***9.95***
Model HV for amplifiers up to 2 KW input ***32.95***
Replacement arc-plug cartridge for HV ***12.95***

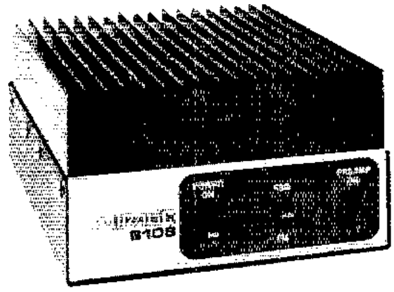
MasterCard VISA

MIRAGE VHF/UHF

Solid-state POWER AMPLIFIERS



B-23 Power amplifier for 2m hand-helds H/T's & low power FM/SSB xcvrs. 100mw-5w in/30w out @ 2w. 4¾"w × 2¾"h × 2¾"d, 1¼ lbs. 13.6vdc/5A.
Regular $89.95 - ***Sale Price $79.95***



B-108 2m amplifier with built-in 10db gain/2.5db NF receive preamplifier to boost weak signals. 1-2w in/15-30w out; 5-15w in/80w out @ 10w. All mode, for FM, CW & SSB with external or automatic internal relay keying with adjustable delay. 5⅝"w × 3"h × 8"d, 3 lbs. 13.6vdc/12A.
Regular $179.95 - ***Sale Price $159.95***

B1016 Same as B-108, except rated for 5-15w in/160 watts nominal output @ 10w. 1-2w in gives 30-60w out. 5⅝"w × 3"h × 12"d, 5 lbs. 13.6vdc/20-25A.
Regular $279.95 - ***Sale Price $249.95***

B3016 Same as B1016, except rated 15-45w in/160w out @ 30w input. 13.6vdc/20-25A.
Regular $239.95 - ***Sale Price $209.95***

D-1010 430 to 450 Mhz All Mode Amplifier. .5-15w in/100w out @ 10w; 1w in/25w out, 3w in/75w out. 3"h × 5½"w × 12"d, 5 lbs. 13.6vdc/20A. **Model D-1010N** same, but with Type N connectors - add $9.00.
Regular $319.95 - ***Sale Price $289.95***

• MIRAGE Wattmeters •

MP-1 Wattmeter. Reads peak or Average 1.8-30 Mhz, 25, 200 & 2000w scales, forward/reverse & VSWR. Measures SWR with only 1-2 watts. Coupler remotes up to 4' away. 5½"h × 4½"w × 5¾"d, 3 lb. *(Reg. $119.95)* ..... ***Sale $99.95***

MP-2 VHF Wattmeter. Same as MP-1 except for 50-200 Mhz, 50, 500 & 1500w scales and VSWR. *(Reg. $119.95)* ..... ***Sale $99.95***

Call Toll Free: 1-800-558-0411

In Wisconsin (outside Milwaukee Metro Area) 1-800-242-5195

AMATEUR ELECTRONIC SUPPLY® Inc.

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Phone (216) 585-7388	Phone (305) 894-3238	Phone (702) 647-3114	5456 N. Milwaukee Avenue
Ohio Wats 1-800-362-0290	Fla. Wats 1-800-432-9424	Pete WA8PZA & Squeak AD7K	Phone (312) 631-5181
Outside Ohio 1-800-321-3594	Outside Fla. 1-800-327-1917	Outside Nev. 1-800-634-6227	Outside ILL. 1-800-621-5802

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ICOM HF

Two Great Systems to Meet Your HF Needs

IC-2KL Solidstate Linear — IC-720A 9 Band Xcvr w/General Coverage Rcvr — IC-720A Phone Patch

IC-720A. ICOM's Top of the Line HF System.

IC-720A. ICOM's full featured HF Xcvr...with top of the line features:

- 9 band Tx/Rx (all new WARC bands included) 160 - 10 meters broadbanded.
- General coverage receiver...0.1 to 30MHz continuous tuning.
- Passband tuning built-in standard.
- Digital display of mode/VFO and frequency.
- 200 watt PEP input...all solidstate.
- Automatically bandswitches IC-2KL/AH1.
- 2 VFO's built-in standard.

IC-2KL. Broadband solidstate linear automatically bandswitched by the IC-720A, IC-730 (w/optional LDA unit), or IC-701...1000 watt PEP input...compact, no tuning required.

ICOM Phone Patch. Works directly with IC-701, IC-720A or IC-730...FCC certified.

IC-730. ICOM's Portable/Affordable System.

IC-730. ICOM's Affordable Portable HF Xcvr. Ideal for mobile/portable use with features found in no other unit in such a compact size:

- 8 bands Tx/Rx 80 - 10 meters broadbanded.
- IF shift standard/passband tuning optional.
- 200 watt PEP input...all solidstate.
- 2 VFO's built-in standard.
- Memories...one frequency per band.
- Compact size...only 3.7 in(H) x 9.5 in(W) x 10.8 in(D).

IC-AH1. 5 band automatic bandswitching mobile antenna for use with IC-720A, IC-701, or IC-730 (w/optional LDA unit).

IC-SP3 - External Speaker — IC-730 - 8 Band Mobile/Base Xcvr — IC-AH1 - Automatic Bandswitching HF Mobile Antenna

ICOM

[illegible] Towerwood Dr., Suite [illegible], Dallas, TX [illegible]

The Unbeatable System

ICOM's IC-AT500, IC-2KL & IC-720A

Enjoy ICOM's new AT500 Antenna Tuner. The perfect companion for the ICOM HF series. Providing 160-10 meter coverage, including the new WARC bands, the IC-AT500 accepts up to 4 antennas and automatically selects the proper one for the band in use.

Silent automatic band switching with the IC-701, IC-720A or IC-730 (w/EX202), the IC-AT500 provides advanced features not found in ordinary antenna tuners. Preset capability allows a "lookahead" tuning to preset each band to a near matched condition without application of RF. This allows the receive function of the transceiver to perform at peak performance without application of RF power (causing RFI).

"Hands off" tuning requires no manual adjustment. Powerful motors quickly drive the capacitors in the "L" network to their optimum value. "Feedthru" control connectors allow channeling of both the IC-2KL linear as well as the AT500 for a complete no tuning 500 watt output system.

The IC-AT500 is designed to match coax fed antennas with 3:1 or less VSWR, allowing your solid state transceiver to run at maximum power into the transmission line.

See it at your local ICOM dealer. You will be glad you did. ICOM, simply the best.

ICOM

The World System

2112-116th Avenue NE, Bellevue, Washington 98004 • 3331 Towerwood Drive, Suite 307, Dallas, Texas 75234

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

ICOM VHF Mobile

Amateur Communications using Space Age Techniques

ICOM

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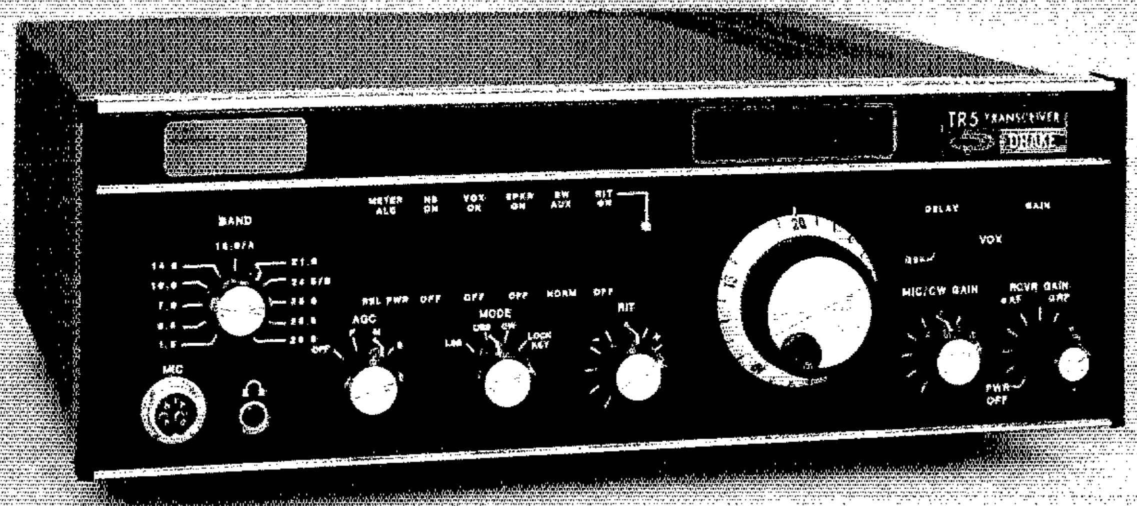
New Drake TR5 Transceiver



far above average!

COMING SOON:
RV75 Synthesized VFO featuring the Drake "VRTO"

• Frequency Synthesized for crystal-controlled stability • VRTO (Variable Rate Tuning Oscillator*) adjusts tuning rate as function of tuning speed. • Resolution to 10 Hz • Three programmable fixed frequencies for MARS, etc. • Split or Transceive operation with main transceiver PTO or RV75

* Patent pending

With the new TR5 versatility and value are spelled D-R-A-K-E . . .

DYNAMIC RANGE

The dynamic range of the TR5 is unexcelled by any transceiver in its class. The TR5's greater than 0 dBm third order intercept point (85 dB two-tone dynamic range) at 20 kHz spacing can be achieved only by the use of a passive diode-ring double balanced mixer. Drake was the first to bring this technology to the Amateur market with a high-level mixer in the TR7.

RELIABLE SERVICE

When you purchase a TR5, or any Drake product, you acquire a product of the latest production techniques, which provide reliable performance.

Yet with a product as sophisticated as one of today's transceivers, after-sales service is a must. Ask any Drake owner. Our Customer Service Department has a reputation second to none.

ACCESSORIES

Drake is the only Amateur Radio manufacturer who offers a full complement of accessories to satisfy almost every desire the HF Amateur may have. This wide selection allows any operator to assemble a station which meets his needs, and assures compatible interfacing and styling instead of a desk full of equipment with a variety of styling and poor operation as a system.

KILOWATT AMPLIFIER

Everyone wants to be heard! The accessory L75 and its 3-500Z (1200 watts PEP input) and a decent antenna will do the trick. This rugged self-contained amplifier/power supply will put the TR5 on an even footing with the best of them.

ENGINEERING

The TR5 and all Drake Transceivers, are backed by the best in engineering. The TR5 is the result of an extensive engineering effort, combining proven past techniques and ideas with new state of the art concepts.

As a result, the TR5 will not be superceded by a new model every six months. It represents a true radio communications value that will provide many years of operating enjoyment.

Features, availability and prices subject to change without notice or obligation.

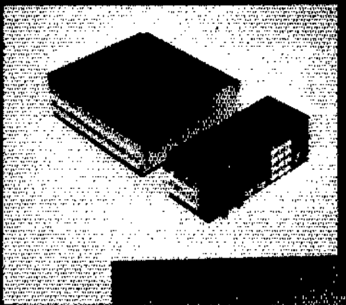
See your Drake dealer or write for additional information.

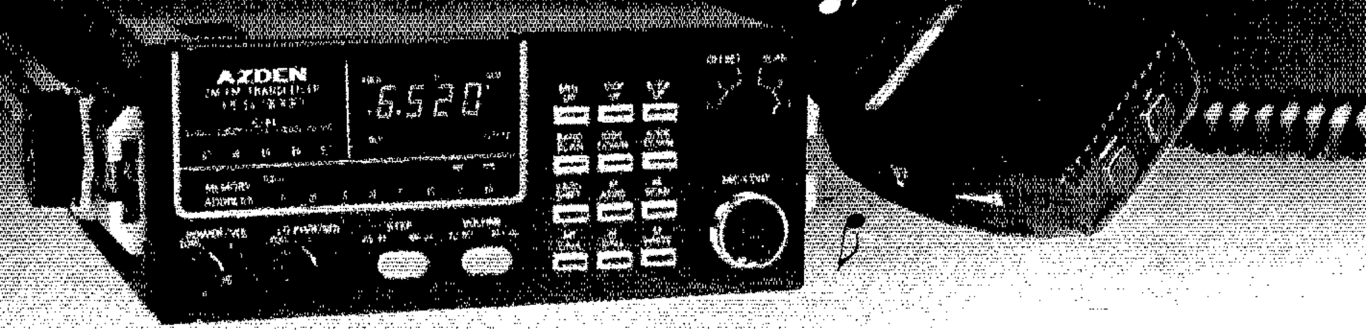
R. L. DRAKE COMPANY DRAKE

540 Richard St., Miamisburg, Ohio 45342, USA
Phone: (513) 866-2421 • Telex: 288-017

AZDEN® PCS-3000

BLAZING THE FRONTIER OF MICROCOMPUTER COMMUNICATIONS





SUPERIOR COMMERCIAL GRADE 2-METER FM TRANSCEIVER

FREE! TOUCH-TONE® PAD KIT INCLUDED

COMPARE THESE FEATURES WITH ANY UNIT AT ANY PRICE

- 8 MHZ FREQUENCY COVERAGE, INCLUDING CAP/MARS BUILT IN: Receive and transmit 142.000 to 149.995 MHz in selectable steps of 5 or 10 kHz. COMPARE!
- SIZE: Unbelievable! Only 6¾" by 2⅜" by 9¾". COMPARE!
- MICROCOMPUTER CONTROL: All frequency control is carried out by a microcomputer.
- MUSICAL TONE ACCOMPANIES KEYBOARD ENTRIES: When a key is pressed, a brief musical tone indicates positive entry into the microcomputer. COMPARE!
- PUSHBUTTON FREQUENCY CONTROL FROM MICROPHONE OR PANEL: Frequency is selected by buttons on the front panel or microphone.
- 8 CHANNEL MEMORY: Each memory channel is reprogrammable and stores the frequency and offset. Memory is backed up by a NICAD battery when power is removed.
- INSTANT MEMORY 1 RECALL: By pressing a button on the microphone or front panel, memory channel 1 may be accessed immediately.
- MEMORY SCAN: Memory channels may be continuously scanned for quick location of a busy or vacant frequency.
- PROGRAMMABLE BAND SCAN: Any section of the band may be scanned in steps of 5 or 10 kHz. Scan limits are easily reprogrammed.
- DISCRIMINATOR SCAN CONTROL (AZDEN EXCLUSIVE PATENT): The scanner stops by sensing the channel center, so the unit always lands on the correct frequency. COMPARE this with other units that claim to scan in 5-kHz steps!
- THREE SCAN MODES WITH AUTO RESUME: "Sampling" mode pauses at busy channels, then resumes. "Busy mode stops at a busy channel, then resumes shortly after frequency clears. "Vacant" mode stops at a vacant channel and resumes when signal appears. If desired, auto resume may be prevented by pressing one button. COMPARE!
- REMOTABLE HEAD: The control head may be located as much as 15 feet away from the main unit using the optional connecting cable. COMPARE!
- PL TONE OSCILLATOR BUILT IN: Frequency is adjustable to access PL repeaters.
- MICROPHONE VOLUME/FREQ. CONTROL: Both functions may be adjusted from either the microphone or front panel.
- NON-STANDARD OFFSETS: Three accessory offsets can be obtained for CAP/MARS or unusual repeater splits. CAP and Air Force MARS splits are BUILT IN! COMPARE!
- 25 WATTS OUTPUT: Also 5 watts low power to conserve batteries in portable use.
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- RECEIVER OFFSET: A channel lock switch allows monitoring of the repeater input frequency. COMPARE!
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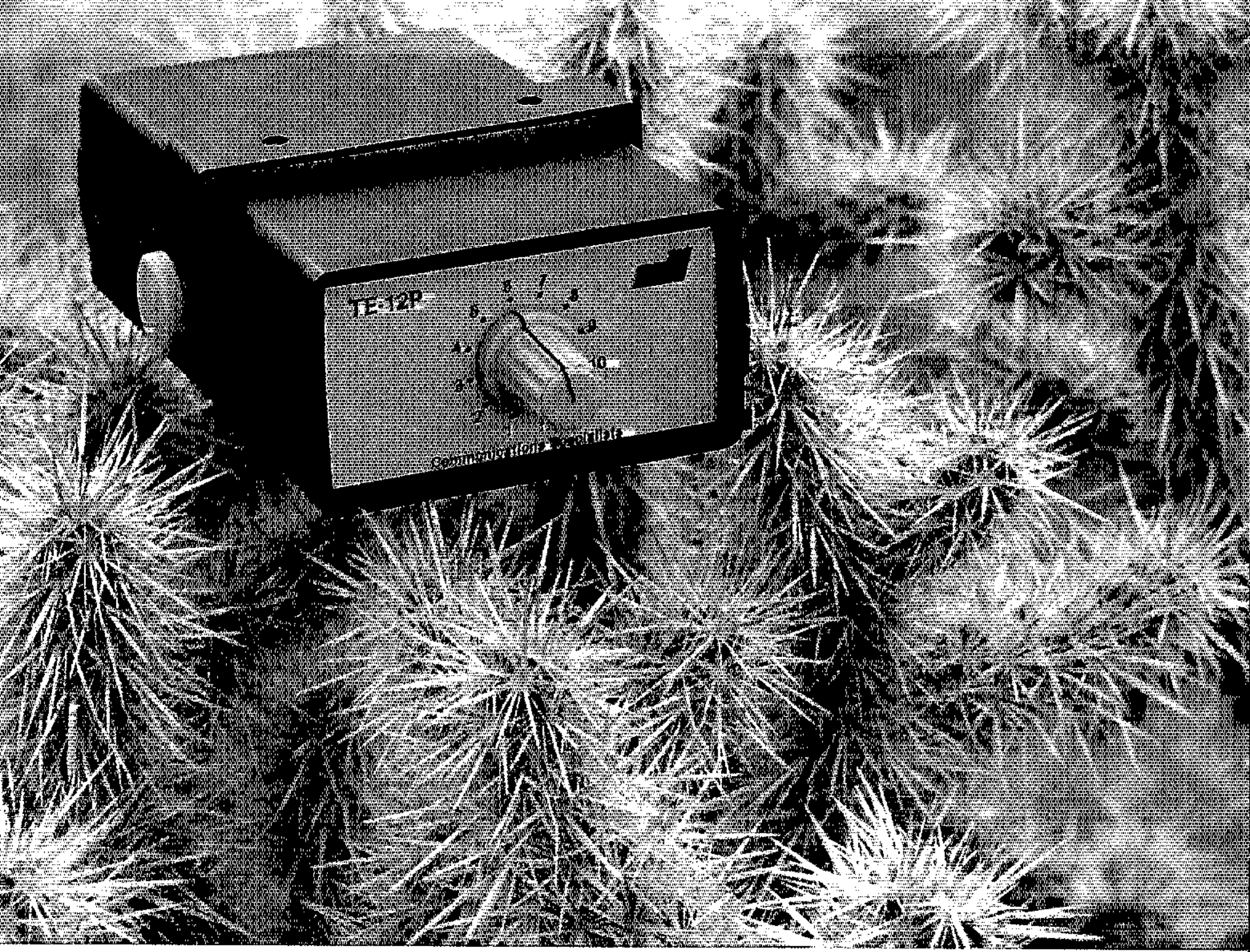
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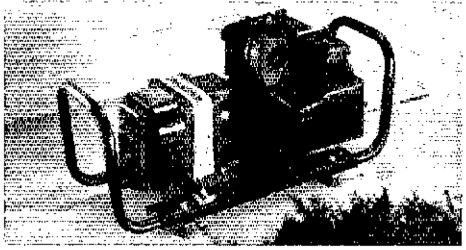

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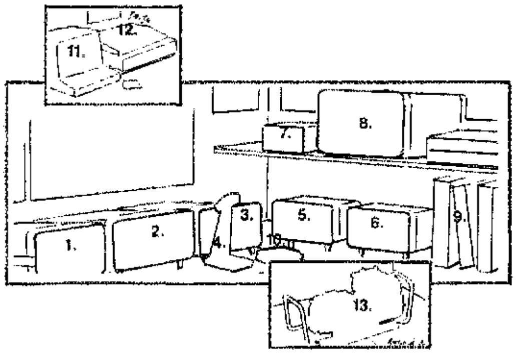

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pres.; KH6JJC, v.p.; KH6E, treas.; KH6MY, secy; KH6DLW, act. mgr. Congrats. KH6S is doing yeoman job as Kauai Co. EC and will soon have agreement with NWS which will complete agreements with all islands. Sad to note the passing of KH6EXB. Much activity on 450 recently with KH6s DM ZD IY CIZ ILR JEO JUZ YUO JJX and FN heard. KH6ILR will be at Golina Airport, AK, after June 1. AH6H and KH6S aided in aborted attempt to rescue three persons from Palmyra Island by N7TA. KH6D is now KE6GX.

SACRAMENTO VALLEY: SCM, Norman Wilson, N6JV — SEC: N6AUB. ASCM: KI6T. The River City ARCS in cooperation with the Fulton-El Camino Recreation and Park Dist. are sponsoring radio classes. KA6QXG has made Advanced class and is now KE6NO. K6RP has new crank up tower and is looking for a beam for it. K6NM has added an SX-28 to his Hallicrafters collection. N6JV got his 5BDXCC plaque for Christmas. New officers for the Golden Empire ARS of Chico are: KE6EP, pres.; WB6AKF, v.p.; Jeanne Cross, sec./treas./editor; WB6CQF, Pub; W6SYX K6RLR WA6WJZ WA6ZGM, dirs. If you are handling radiogram traffic in the section, please send the SCM your totals by the 7th of the month. Traffic: KE6NO 16, N6AUB 2.

SAN FRANCISCO: SCM, Robert Smith, NA6T — STM: K6TP. SEC: KE6CD. Belated Merry Xmas abd HAPPY NEW YEAR. The Dec. and Nov. storms put all the ECs to a test in the section. Sonoma RA, Inc. and MARC amateurs helped in emergency communications with flooding. WB6RTE new pres of HARC. KE6CD new pres of SFRC. SF section made good showing in contests. WA6KLK 1st in Sept. VHF QSO Party in section from Mendocino Co. It can be done! Div. meeting in January should be interesting. New topics of emergency communications, CATVI, and public relations will be discussed. Let your SCM know your thoughts, please. Remember to READ and SIGN the letter to FCC in your club newsletter concerning CATVI. Don't let this topic SLIDE. If it doesn't affect you, you know it will later! Traffic: W6IPL 812, K6TWJ 294, K6TP 206, W6RNL 44, WB6RTE 38, W6GGR 10, WA6QXV 6.

SAN JOAQUIN VALLEY: SCM, Charles McConnell, W6DPD — SEC: WA6YAB. WA6IWW W6CUA and WA6AGS are SILENT KEYS. WB6YAD is the new EC for Amador Co. New officers for the Kings County ARC are: WA6TJW, pres.; KV6M, v.p.; N6EAE, sec.; KC7GT, treas.; Officers of the Amador County ARC are WA6WIY, pres.; WB6RGI, v.p.; WA7QQR, s/t. The club meets the 1st Thursday in Pioneer, operates the 146.235/835 repeater, and has a net on Thurs at 7:30 P.M. local on W6VY/R. Officers of the Kern River Valley ARC are WA6UYW, pres.; WD8AYL, v.p.; WB6UGB, sec. The club meets the 3rd Saturday in Kernville. K6ICK runs code practice on the W6WGZ/R, 78/18. WB6VIN is back on 6 M. WB6BPZ is KE6GM. WA6JDB is Extra. N6EMU and N6ELQ are Advanced. KA6MGQ and WB6OIV are Techs. KA6ODS KA6RUB KA6RUE KA6RUF and KA6RUM are Novices. WØPJD has an IC-251A. WA6OVE has a FT101E. WA6JDB has a SB221. Fresno Hamfest is May 21-23. Save the dates. Traffic: N6AWH 348, WA6YAB 68, K9YBM 35, WA6JDB 31, W6DPD 21, KV6W 12, W6SX 11, N6AM 5.

SANTA CLARA VALLEY: SCM, Jettie Hill, W6RFF — SEC: WB6IZF. STM: W6ZRJ. W6ZRJ made PSHR. Many SCV members aided in the Santa Cruz storm disaster, especially when there was no commercial power for several days. Excellent job!! Section leaders in traffic handling for 1981 were W6YBV with 3433 and W6KZJ with 1616 totals! How about YOU getting more active in the traffic and emergency nets? If you need info contact WB6IZF, W6ZRJ or myself. RFF spoke before the PAARA group. W6CF reports QRL with work but manages a little air time. IZF participated in a weather watch drill. W6OII and WB6OTS from Monterey area had a busy month with tfc. New officers of PAARA are: WA6LNV, pres.; WA6FHC, v.p.; GI3OEN, treas.; W6NIR, secy. Those elected to serve SCCARA are WB6YRS, pres.; KA6R, v.p.; N6CKV, secy.; KB6TO, treas. They were sworn in by Pac. Div. Director W6ZM. West Valley ARA meets twice a month on 1st and 3rd Wed at the Los Gatos Red Cross. OOs K6AYB and N6NF reporting activity on all bands. WB6AAJ is Treas for CCRC. K6GZK back on the air after recent illness. New member of LERA ARC is WD5HPF. WB6PZX gave a talk and demonstration of satellite Earth stations to the SCVRS group. WA6VXF is back on the air and operating from Willow Glen Convalescent Hospital. KE6JH has signed on as crew member on the yacht ERIKA. Winter storms have raised havoc with antenna systems including my rotor. The Pacific Division Directors meeting was held in Dublin and had an excellent turn out. There are several types of ARRL appointments available to members such as ORS, OBS, OES, EC, OO, etc. If interested contact me for info and application form. Traffic: W6YBV 555, W6KZJ 285, W6ZRJ 134, WB6OTS 76, W6RFF 50, W6OII 48, WB6IZF 8, W6CF 4, W6PRI 3.

ROANOKE DIVISION

NORTH CAROLINA: SCM, Ian Black, WD4CNR — STM: W4EAT. SEC: NB4L.

Net	Time	Freq.	Sess	QTC	QNI	NM
CMN	1412	3927	31	626	81	W4EAT
JFK	2115	3923	31	492	1052	WB4WII
THEN	2135	3923	31	551	1256	WA4OBR
CN	7/10	3574	62	767	629	AB4S

VHF totals time 2736, QTC 574, QNI 2728. Happiness is having enough tfc handlers to take care of the Xmas overload. A glance at our tfc totals sez our section had 'em when we needed 'em. Congrats to KU4W. He is our First District EC. SEC NB4L is looking for two more. If you are interested in this job tell the SEC. But be advised, he has set up some rigid requirements. Good luck to N4NH and the new slate of officers for WCARS. Most clubs took a vacation during Dec. Xmas shopping? Two clubs that didn't RARS and the Cary group both did great work at shopping Malls. I can't think of a better way to introduce large groups of "civilians" to Amateur Radio. A pat on the back, a hearty "well done", and my sincere congrats to KD4PJ AB4S NB4L AB4V KU4W and N4AET for BPL this month. Yes, WD4CNQ got one too but I'll congratulate her privately. A tip of the hat to TIP. Our section's "Traffic Information Pool" program is working well under the direction of our STM W4EAT. If your club or group needs a program, get in touch with him. See you in Charlotte. Traffic: WD4CNR 753, WD4CNQ 741, KD4PJ 703, AB4S 587, NB4L 510, AB4V 560, KU4W 525, N4AET 433, WA4UTC 363, W4PCN 344, WB4WII 334, K4MC 297, KD4WP 284, WA4SRD 279, KC4AM 269, W4EAT 266, WD4RDT 213, NJ4L 211, W4DW 200, W8PJS 174, KF4R 148, WA4OBR 144, WB4CYN 139, K4FTB 119, N4CJJ 118, WD4TOP 116, WD4LOO 103, KA4KJI 86, W4FMN 81, K4IWW 76, NT4K 69, WD4LRG 65, K4XE 63, KA4LKF 62, WD4HTE 60, WD4SCH 59,

KA4ATK 56, KZ4A 55, WA4LZD 53, N4CYG 52, N4EII 52, N4CCK 41, WD4AIE 40, NE4J 35, WD4DCY 32, N4EHM 30, N4UE 29, W4OJU 25, WA4CUD 23, W4ACY 20, KA4KDD 19, N4BEX 17, W2JDB 16, W4WXZ 15, KC4WW 13, K4FOY 12, WB4SLF 2.

SOUTH CAROLINA: SCM, Richard McAbee, W4MTK — SEC: WD4HLZ. STM: W4ANK. Congrats to K4LNO for receiving 25 yr. service plaque from Sptg ARC. Welcome new calls into SC, WØIKT & WB3NHW. Looking forward to hearing them on the nets and seeing them at a hamfest. Congrats to N4EOY for receiving the "Bill Wall Award" from the Columbia ARC. Many enjoyed transmitter hunts from the TARC of Chas. & the North Augusta — Belvedere ARC. Congrats to our new DEC for Zones 1 & 2, K4SUG. He made a fine EC, and I am sure he will do equally as well as DEC. QNI/QTC: SCSSBN 1414/269, Blue Ridge 2M Net 2274/98; SC Noontime Net 341/177; Western SC Emergency Net 465/32; Newberry Co. ARES Net 92/5; Carolina State Line Net 49/4; Greater Pee Dee 2M Net 1027/254; CNN 187/78; Trident ARC 2M Net 118/1; York Co. ARES Net 215/47. Traffic: W4ANK 446, K4ZN 356, W4FMZ 299, KA4UFJ 270, KA4AUR 247, K4ZB 236, W4NTO 235, WD4EDM 110, KC4LA 85, K4FRX 48, KA4LRM 27, W4MTK 27, W4DRF 24, WA4MIY 19, WA4JWS 15, NQ4N 14, WØIKT/4 4, WD4DOL 1, WB4NBK 1.

VIRGINIA: SCM, Luck Hurder, WA4STO — ASCM: K3RZR. Chief OO: W4HU. STM: KY4K. SEC: KZ4K. Chief OBS: K3RZR. Chief OVS: N4CD.

Net	QTC	QNI	NM
VNTN	616	321	WD4FTK
VSBN	931	758	W4NWM
VSN	244	282	WB4KSG
VN/E	622	443	K4JST
VN/L	209	224	W3ATQ
VLN	549	608	WD4ALY
WARC	1	34	K4RC
SVEN	70	384	NT4S

Congrats to W3ATQ for high traffic total, and to everyone who helped to make December such an exciting month! We had 13 BPLs and a whopping 19 people who made the PSHR. Looks like more and more amateurs in Virginia are discovering the feeling of personal accomplishment that public service communications provides. Thanks, folks. Several traffic booth efforts were well noticed during the Christmas crunch, including command performances by W4HIR K4VWK KI4W and KB4WT to name a few. The Pembrooke Mall crew spewed forth well over 400 messages for the public and WA4NYZ seemed bent on proving that Cherlton really is on the map! Hi. Congrats to W4NFA and his YL, KA4FMS, for their upgrades, as well as to N4EBU for his appointment as ORS. OO KB4WT is taking on the out-of-banders and topped the OO list for December. Welcome to new OO, KB4PW. K4RC seems intent on learning the ropes of traffic handling and even bought a new Omni! WA3UDB is enjoying his new 720 on RTTY and K4JST is contemplating just how to get teleprinters to work on 12 volts. Requests for the Virginia traffic training program keep pouring in, indicating that everyone is anxious to improve their abilities. WD4CNG and KJ4J active on Navy MARS cw nets while W4XD is chasing the Russian satellites around. What are YOU doing for Amateur Radio? Send me details so that we can all share! Traffic: W3ATQ 1308, WA4STO 1282, WB4PNY 1015, K4JST 816, WA4CCK 802, KA3DTE 745, WA4LJI 559, WD4FTK 525, K3RZR 514, WD4ALY 502, K4VWK 454, KB4WT 434, W3BBN 329, NT4S 329, W4HIR 297, WB4FDT 284, WA4NYZ 248, KI4W 243, W4NWM 225, KA4IUM 213, N4YQ 213, KZ4K 194, KY4K 186, KB4OG 182, WB4DQZ 172, K4JM 167, W4UQ 157, WB4RWY 134, W3BBQ 126, K4KDJ 106, W4NFA 101, WB4UHC 95, KA4PNF 91, NN4I 89, WB4KIT 82, KA4ERP 77, KA4JXZ 74, WB4FLT 65, N4BJX 56, N4EBU 55, W4YVG 50, W4CFV 46, W4LXB 43, N4DW 40, WB4ZNB 38, KE4FM 36, KC4HN 36, KB4PW 36, WB4ZTJ 35, NC4B 30, WA1VRL 27, W4PVA 20, WB4LAB 16, N4FNT 13, W4LXB 11, K4MSG 10, WB2OMZ 10, WB4MAE 8, WB4ODZ 8, W4TZC 7, W4OKN 6, W4DM 6, N4YE 6, N4LE 5, W4KXE 4, N4NK 3, W4YE 2, WA4EQW 1, WD4EUV 1. (Nov.) WA4LJI 200, W4UQ 93, KØJH 44.

WEST VIRGINIA: SCM, Karl S. Thompson, K8KT — SEC: K8QEW. STM: KD8G. NMs: K8MHR W8FZP KD8X. KB8UY is now Extra. K8BDH and KA8BNR now Adv. Congrats to all who upgraded in Dec. FCC to be in Chas. only three times in 1982. Anyone interested in state-wide RTTY net contact K8BCH. Fayetteville Hamfest Feb. 21. New ECs are: KJ8J, Marshall Co.; KC8CR, Ohio Co.; KA8IBO, Fayette Co. WVN 77 QTC, 180 QNI. WVFN 157 QTC, 642 QNI. WVMD 85 QTC, 523 QNI. Hillbilly 96 QTC, 204 QNI. WV 6Mtr 5 QTC, 167 QNI. KARC 2Mtr 0 QTC, 77 QNI. Traffic: KD8G 522, K8JQ 219, KC8CR 79, W8JWX 70, KC8C 54, K8QEW 48, K8KT 40, N8AJC 39, W8FZP 39, W8CKX 24, KD8X 21, KC8CS 20, WB8UDY 12, N8CFY 10, W8CAL 8, N8CFX 8, KB8ZM 3.

ROCKY MOUNTAIN DIVISION

COLORADO: SCM, L. E. Steimel, WØACD — SEC: K3PUR. STM: WBØMCL. NMs: WØHXB NØAXQ WDØAIT WØEJD WAØRYL KBØZ. In 1971 the amateurs of the Colorado section saw the need for a section-wide coordinated unity forming the council of Amateur Radio clubs, with the majority of clubs as members. The main purpose for the council at the time of organization was to organize communications for the Winter World Olympics that was to be held in Colo. This event was cancelled, but not the efforts of the council. The council decided to sponsor an ARRL National Convention to be held in the summer of 1976. This event was a huge success. Since that time the council has been active in several law suits concerning amateur antenna structures, and has been successful as decisions were handed down by the courts in favor of the amateurs. The council has a frequency coordinating committee as one of the many activities. This is a very successful committee with four members in the four quadrants of the state. This committee has done very well in assigning repeater frequencies for good usage, with a minimum of interference to users. Nets: HNN, sess 31, QNI 1724, QTC 158, int 211, QNF 1180; SWN: sess 37, QNI 175, QTC 192, QNF 762; Columbine: sess 27, QNI 1155, QTC 59, int 229, QNF 1086. Traffic: NØBQP 3049, WAØHJZ 1354, KØDJ 745, WØEJD 696, WDØAIT 545, WØACH 524, WØLQ 166, KBØZ 160, WØACD 142, WBØELD 73, WØNFW 43, WØGW 6.

NEW MEXICO: SCM, Joe T. Knight, W5PDY — SEC: W5ALR. NMs: WA5UNO KB5LI W5VFQ. Southwest Net (SWN) meets daily on 3.583 at 1930 local and handled 355 msgs with 312 stations in. New Mexico Roadrunner Net (NMRRN) meets daily on 3.939 kHz at 0100 Zulu and handled 135 msgs with 1092 stations in. New Mexico Breakfast Club meets daily on 3.940 kHz at 0700 local and handled 104 msgs with 830 checkins. Yucca 2 Mtr

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THE AMERICAN RADIO RELAY LEAGUE

Net, 146.01/61 handled 25 msgs with 588 checkins. Abq Caravan Club handled 5 msgs with 124 checkins. Lots of Christmas visitors including WB5AZP WD5IBS WA2FLX W9KRQ and many others. Over 40 SAR Missions in the state this year. Tnx for everyones help. Traffic: KV5U 440, W5DAD 338, W5ENI 168, K5DUV 143, KB5LI 66, WA5MIY 40, KT5X 35.

UTAH: SCM, Leonard M. Norman, W7PBV — SEC: WB7BZJ. STM: W7OCX. Appointments are available to qualified ARRL members. WA7HHE is home from school and has a new handheld 2M rig. KA7EB's new QTH is Price. W7BE is NCS for UT VHF Traffic and Weather Net on 34/94, 01/61, 28/88. WB7ZBO received the D'OM Cozzesn award at the UARC Christmas club dinner. WB7SSS now KO7H. Snowbird 78/18 getting into Grand Junction, Co. WB7UJP is new EC for Davis Co. Beehive Net meets daily on 7272 at 1230 local time. Utah Code Net meets daily on 3710 at 1930 local time. W7PBV attended the Ogden ARC meeting and the UARC meeting and Christmas dinner. WB7UJP conducted a communication exercise TEST, "High Tide" scenario involved a flood in Utah Co. Taking part were: K7BFI K7ERR K7FY WA7AKI WA7BKD WA7MTF WA7GIE WA7SSA WB7BEG WB7UJP N7BJC N7BRJ N7SM. Traffic: K7HLR 414, WA7MEL 116, WA7JRC 70, W7PBV 67, W7RO 36, WB7UJP 19, W7OCX 17.

WYOMING: SCM, Dick Wunder, WA7WFC — SEC: WB7EIN. STM: WØOGH. Carbon County ARS officers are: N7CGN, pres.; N7APV, v.p.; WA7VEX, sec/treas. W7KWR has moved back to Worland from the sunny south. Welcome back, Bill. WIMU will host the Rky. Mtn. & Northwestern Bidivisional conventions Aug 6-9 at West Yellowstone, Mt. The WTN is doing fine with many new checkins. Recent upgrades: KA7GVL KA7IVF to General. Congrats. WB7NHR reports the Wyoming Cowboy Net held 24 sessions with 839 QNI, 42 QTC. Wyoming Jackalope Net held 27 sessions with 734 QNI, 16 QTC. WTN held 28 sessions with 117 QNI, 90 QTC. Traffic: W7LYA 862, WØOGH 356, WB7NHR 303, W7SQT 140, K7TFW 71, K7SLM 45.

SOUTHEASTERN DIVISION

ALABAMA: SCM, Hubert Wheeler, W4IBU — SEC: N4DMA. STM: WA4PIZ. New club officers: WAARS — WD4DAT, pres.; K4DGN, v.p.; W4WYP, sec/treas. Cullman ARC — KD4ZO, pres.; AK4B, v.p.; KA4WMI, sec/treas. Mobile ARC — K4GJJ, pres.; KA4TIQ, v.p.; KA4VJR, sec.; WA4AVC, treas. Enterprise ARC — KD4KT, pres.; K4HKR, v.p.; KA4AFI, sec/treas. Appointees: WA4LXP, NM AEND; NN4R, NM AENW; N4BIT, NM AENM; WB4WLC, EC Shelby Co; N4DMA, SEC; WA4PIZ, STM. New ARRL info net starts soon on Wed nites after AENM. A video tape by ARES, Lauderdale County, to be used by State CD officials as demo for CD directors. Dec. 7 declared Emergency Preparedness Day in AL by Gov. James in memory of Pearl Harbor. CCARA participated. CCARA and Haylarcs also worked in Xmas parades. New repeaters on air in Quad Cities, Mobile Enterprise and Ozark. Get your new hf and vhf directories. Mobile ARC working to provide patches for Coast Guard ice-cutters. CATV creating big problem in state with RFI leakage at 145.25 MHz. HARC devoting time and effort to resolve. EC KA4BNO reports new EOC in Colbert Co. DRN5 represented 100% by W4CKS WA4JDH WB4IRU KD4KT K4LYY W4WJF W4IBU. CAND NM W5KLV reports AL represented 100% by W4CKS. Traffic: WA4JDH 2069, W4CKS 406, WA4LXP 149, WA4PIZ 80, W4IBU 68, WD4DHI 50, K4AOZ 42, KA4VFC 37, N4BIT 25, K4UMD 17, WB4EKJ 15, W4WJF 14, K4GXS 11, W8IM 11, WA4JPK 8, KY4H 8, N4CSX 5, WB4TVY 4.

GEORGIA: SCM, Eddy Kosobucki, K4JNL — SEC: WB4HXE. STM: W4WXA. Chief OBS: W4BIA. NVOAD: WA4PUP. Listed below are the major hf nets in the section. Won't you join us in one or more of them and meet the other hams in the state?

Net	Freq.	Time (all EST)	Mgr
GCN	3995	0700 Dy 0800 Sn	W4HON
GSN	3595	1900 & 2200 Dy	K4EV
GTN	3718	1800 M-F	KA4KOE
GSSBN	3975	1830 Dy	WA4ZOT
GTfcN	7243	1200 Dy	WB4NTW
GERN (RTTY)	3620	2030 F	WA4ZHC
QCWA	3832	0900 S	K4VN
ARES	3975	1730 Sn	N4BGH

Due to out of state employment K4VHC had to resign his SEC position. WB4HXE assumes his duties & solicits your copperation. KA4KOE, GTN NM looking for cw ops who wish to increase code speed & traffic handling experience. Any amateur licensed 25 years or more can join QCWA. Contact W4JWO for info. Cerebral Palsy 20-km Walk had comms furnished by Savannah hams. If you hear of a Silent Key please send me info, & possibly obituary out of newspaper. Congrats to W4PIM & W4WXA on making BPL. Traffic handlers please send me your tfc counts by the 6th of each month. This info is important to the League. Six meter & slow & fast scan activity on the increase in the section. Please keep me and the section informed of such operations. New ARC of Savannah officers are: WD4AFY, pres.; N4EMN, v.p.; KA4HHE, sec; KA4CQY, treas.; WA4GFC, act. mgr. Gwinnett ARS: WB4GKI, pres.; KM4Z, v.p.; KA4BNG, sec.; N4CUJ, treas.; KA4HEN, act. mgr; WA4BXA, ed. From info from club bulletins received during '81 all clubs in the section had FB year. Let's hope it continues during '82. Some of our newer hams are looking for answers to some of their technical problems. I wonder if we couldn't establish a net and have some of our highly technically versed hams answer some of their questions? Traffic: W4WXA 542, WB4NTW 410, W4PIM 333, W4GH 252, K4EV 180, K5TF 180, K4NM 116, W4ELO 104, WB4ZVX 92, K4JNL 72, KA4RBN 38, W4DGN 34, W4HON 34, KA4ATM 26, N4UZ 23, WB4LBM 18, KC4WL 18, W4BIA 15, K4PIK 14, N4BIM 11, K4BAI 7.

NORTHERN FLORIDA: SCM, Billy Williams, N4UF — The Tallahassee ARS "Ham of the Year" is W4MLE. Also honored were KA4DBZ KA4DCD KD4XK NS4V. Congrats! The DBARA communications trailer has been renovated. Feb. program features the new IBM personal computer. KF4U has his original ORS appt dated 1924 and reports Gator Net had a busy month. All of the FL nets did an outstanding job with a record amount of traffic passed during the 1981 holiday season. Thanks to the many who made things move smoothly. An elderly lady from a convalescent home was located by members of the Playground ARC after the hams were called out to assist at 3 A.M. The lady was found by KD4NW with WB4PGQ WD4KKC K4IVD N4EZU W4MMW KD4NV & WD4HIF assisting. The lady was found safe & was returned to her home. The OARC 5/11 repeater is expected on soon and will have an open autopatch. AK1M has a new rptr on 147.795/.195 in Spring Hill. The Panama City ARC a beginners class underway. The Beaches ARS has new rptr going on 147.78/.18. W4AND

WD4FHD N4CNG W6JGL WA3UBA WD4MSR KH6FMD & WA4KKY are on the rptr committee. Jax clubs NOFARS & RANGE to provide comms for Goodwill Good Turn Day on March 6th. Contact WA4UZF to volunteer. New officers of the Ancient City ARC are N4EZZ, pres.; WB4WXW, v.p.; KE4HP, secy.; KD4IA, treas.; W4GI, trustee. WD4MJS is newsletter editor. HB-129, being considered by the FL legislature, would ban the possession of certain receivers even in residences. Write me for more details. BPL: N4PL WD4IIO AA4FG N4EDH W4MGO WB4TZR WD4GUZ W4SIZ WD4HIF all qualified. PSHR: N4EDH AA4FG WD4HIF WA4EYU N4PL N4BZH KC4MM WA4QXT KF4U WB4TZR. Traffic: N4PL 1411, WD4IIO 1002, W4SIZ 853, WD4HIF 738, AA4FG 676, N4EDH 658, W4MGO 541, WB4GHU 440, WB4TZR 400, WD4GUZ 312, WA4QXT 288, WA4EYU 325, W4JL 227, KF4U 207, KC4MM 180, WD4MLQ 179, W4KIX 175, WB4FJY 142, N4EC 135, N4BZH 120, K4DHX 108, N4AXN 70, N4UF 58, W4GUJ 46, KA4MGQ 43, WA4ZTS 37, WA4STZ 36, K4EVA 28, W3IDO 4, N4EVS 20. (Nov.) K4DHX 30. (Oct.) N4AXN 28.

SOUTHERN FLORIDA: SCM, Woodrow Huddleston, K4SOL. ASCM: W4KGJ. SEC: AA4WJ. STM: WA4PFK. December produced some rather fantastic traffic handling in our section. Total count was 17,926. However, this failed to top the 22,000 and 23,000 of some previous Decembers. There were 15 BPLs earned, probably the most ever for one month. You can check their totals elsewhere, but here are their calls: W3CUL WB4FVV KY4U K4TH WA4PFK K4SCL WD4AWN W3VR WA4HXU K4ZK WA4EIC WD4COL WB4PIB W4SME. Congrats, all! Also, we had an unusally large group, 12, on the Public Service Honor Roll: WA4PFK WD4COL WB4FVV K4SCL WD4AWN WA4EIC WB4AID KY4U KA4ASZ N2WX KA4LNA KA4BBA. Congrats again. We had 43 Station Activity Reports submitted, up 3 from last month, but still disappointingly low, about 0.3% of the licensed hams in the section. W1NJM, wintering in Bonita Springs, reports he will be available to help until April. Thanks, George. You were a great help with Christmas traffic. It must be that all the active hams in our and neighboring Sections are performing well within FCC regs and good operating practices, as I received no report from any of our Official Observers to indicate any cooperative reports had been issued. Or could it be that the OOs, as well as many other Official Appointees, are not doing their job and not paying any attention to the requirement of reporting to the SCM monthly? With 22 ECs, 49 ORSs, 25 OESs, 10 OBSs, 5 OOs and 1 OVS, how can we end up with only 43 SARs? Oh, well, it will give us something to talk about at the several upcoming hamfests. Traffic: W3CUL 3641, WB4FVV 1341, KY4U 1213, K4TH 1185, WA4PFK 1076, K4SCL 927, WD4AWN 828, W3VR 822, WA4HXU 627, K4ZK 597, WA4EIC 532, K4EUK 450, WD4COL 422, VE3BSY 379, WB4PIB 288, N4ET 280, N2WX 261, KA4ASZ 260, KE4O 260, W3TLV 237, W4GPL 233, W4SME 220, WB4AID 209, KA4FZI 196, WB4WYG 193, W1NJM 184, W4UIO 150, KE4DA 123, W4DVO 109, W4IYT 86, KA4LNA 79, W4IRA 78, NJ4O 73, W4ESH 72, WA4GYR 62, WB4FVN 49, WB4GCK 44, WB4SNX 41, W4WYR 31, KA4BBA 30, AA4WJ 22, W1DLP 12, W4JM 4.

WEST INDIES: SCM, Julio Negroni, KP4CV — STM NP4D is now ready to launch a new 2-meter repeater, primarily for NTS and ARES service. The new repeater will operate on 146.31/91 MHz from Puerto Rico's highest peak, Cerro Punta de Jayuya. Permission to locate equipment at PREPA facilities was obtained. We are sorry to lose one of the most enterprising traffic operators, KP4FBT. He recently graduated with an E.E. degree, and is leaving for the mainland. KP4FBT is the recipient of a Certificate of Merit for his outstanding work with the WI section. PSHR: WP4AOH WP4BCV. BPL: WP4BDS again. Traffic: WP4BDS 445, WP4AOH 112, KP4DJ 79, KP4BPT 12.

SOUTHWESTERN DIVISION

ARIZONA: SCM, Erich J. Holzer, N7EH — STM: W7EP. NMs: WA7FDN WA7KQE. The month of December brought the seasonal surge of holiday traffic. WA7KQE reports that ATEN set an all time high for traffic during Dec. WB7QOM has qualified for the Worked All Arizona award. Many Phoenix amateurs participated in providing communications for the Fiesta Bowl Parade. This was a real fine showing on behalf of Amateur Radio. Don't forget to report your club or groups participation in public service events. W7LUX reports working 16 JAs on 6 meters while putting up his Christmas tree. W7YS and WA7NXL report working the Straight Key Night. New officers for OPRC: N7BXX, pres.; WB7DTX, v.p.; WAØNNC, secy.; KA7IZC, treas.; K7OMR KA7DLX WB7DJT WB7DGP WØYOY, BOD. TRA officers: WB7TWM, pres.; WA7JCK, v.p.; K7SEC, sec; KN7F, treas.; W7BPR K7CRN, BOD. SWN: QNI 312, QTC 354, ATEN: QNI 970, QTC 639, Cactus (Nov): QNI 945, QTC 208. PSHR: W7EP K7NTG. Traffic: W7EP 488, K7NTG 242, W7AMM 170, K7NMQ 125, WA7KQE 119, W7LVB 114, K7UXB 95, W7OIF 63, N7EH 56, K7JKM 28, W7LBW 25, WB7QOM 20, WA7YUL 15, K7GLA 8, WA7NXL 6, WB7QON 3, W7DQS 2.

LOS ANGELES: SCM, Stan Brokl, N2YQ — SEC: N6UK. STM: K5DY. Congrats to WB6MKA for his promotion to DEC of San Gabrial District. Also, welcome and congrats to WA6GEV, EC, for Area 5 in the South Bay District. Ex-KD6IT recently upgraded and is now NF6D. W6SYQ has organized a dedicated group of 60+ hams in West Covina/Covina to provide emergency communications to the OES at the West Covina Police Dept. He did a great job including drawing up the emergency plan for West Covina/Covina cities. Anyone in this area interested should call him at 213-337-2219. Amateurs in ARES groups in the San Fernando District are helping the LAPD with surveillance and supplimental communications to help fight crime. Especially active is the Hollywood Division where Captain Keith Bushey KA6KJS has encouraged amateur participation. N6ZH, past DEC, has been instrumental in helping this group. Eighty nine amateurs in the San Fernando District helped with the Hollywood Parade. Also, in the Chatsworth area, AA6K K6IYK WB6DBK W6RPS WA6LAU WA6MRY KD6ZZ WA6AQQ WA4TGQ N6JZ and AI8A provided communications for the 1981 Holiday Parade on Dec. 6. One of the largest public service participations in Los Angeles section occured with over 109 amateurs providing communications for the Rose Parade. Included were RACES, ARES and even the Southern Cal ATV Club. The Associated Radio Amateurs of Long Beach have new officers: KE6EF, pres.; AK6Y, v.p.; WA6UBU, secy; W6TXX, treas. Tri-County ARC has new officers: KF6E, pres.; N6GA, v.p.; Kim, secy; WB6GNR, treas; WD6CLT, program; WB6UFX, publicity; KA6PVL, training; WB6EYL, hospitality. Pasadena ARC has new officers: N6LL, pres.; N6MJ, v.p.; WD6CKW,

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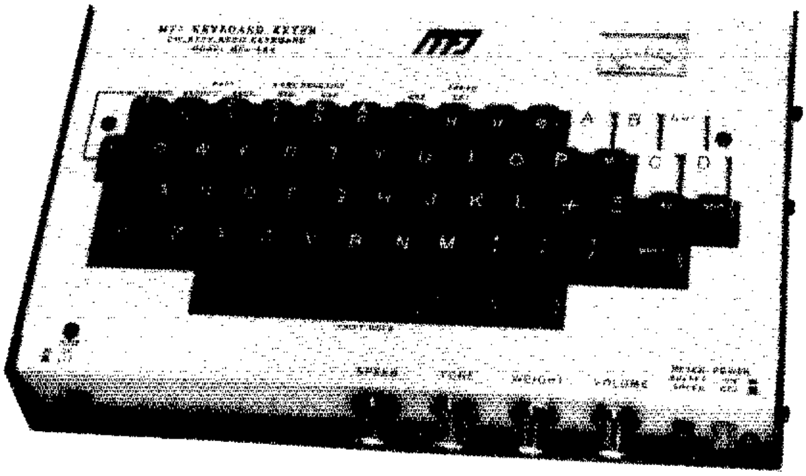

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Box 494, Mississippi State, MS 39762

secy; WB6HRD, treas. Congrats to all the new officers in the clubs above and have a good year. The LA Council of Radio Clubs has a new chairman, W6ABW; K6YQ, v.c.; Rosemary Willis, secy/treas. LACARC plans to support a booth at the LA Co. Fair this year so all clubs interested in participating contact W6ABW. W6HCS, solar powered OES, has been checking into Riverside ARES Net, San Diego ARES Net, and has joined the Western Public Service System. N6HE is now active on RTTY and would like to handle traffic in this mode. OO reports this month: K6KA, 60; WB6YID, 5. Traffic: WA6OCM 266, KT6D 199, W6INH 196, K6INK 179, WA6LVO 88, K6CL 87, K5DY 63, K6DZO 46, ADØA 41, N6DWW 27, KA6ALH 26, W6NKE 23, W6BWG 14, AI8A 12, N6HE 3, K6UYK 3.

ORANGE: SCM, Fried Heyn, WA6WZO — ASCM: WA6WZN. SEC: W6UBQ. STM: KA6A. NMs: WB6AKR, cw; W6CPB, ssb; K6JT, RTTY; WA6QCA, fm; WA6WZO, ASCII. Many clubs were active in bringing Santa Claus to the hospital children while NTS relayed record traffic for the holiday season. WA6RNA reported much OO activity. New club officers: Morongo Basin ARC — W6NMR, pres.; WB6GXO, v.p.; WD6FMP, secy; K6MFE, treas. Victor Valley ARC: WD6ADH, pres.; WD6FZT, v.p.; WA6ARI, secy; KA6OAS, treas. Western Public Service System (3952 kHz 0200Z daily): WD6EWP, pres.; KB6ZO, v.p./NM; K6RAU, secy/treas. So Calif ATV Club — WB6LQP, pres.; N6AZV, v.p.; WD6BZN, secy/treas; WA6MVD, publisher/editor; Inland Empire RTTY Network: WB6ZIR, pres.; WB6GWT, v.p.; WA6FUO, secy/treas. Desert RATS: KA6IYS, pres.; KA6GXQ, v.p.; N6FCP, treas. Bishop ARC: WD6EBN, pres.; KA6RCT, v.p.; KA6HII, secy/treas. Needles ARC: WB7EDM, pres.; N6EB, v.p.; WØPZD, secy/treas. Lake Elsinore Valley ARC: KA6IXY, pres.; K6SVR, v.p.; WB6QHI, treas. Anza Valley RC: N6CFN, pres.; WB6NSX, v.p.; N6ETC, secy/treas. So Counties Amateur Teleprinter Society (SCATS): WA6LNH, pres.; WB6FFW, v.p.; KA6HJK, secy.; WB6INV, treas. Coachella ARC: WA6QGH, pres.; W6PNM, v.p.; WD6FEM, secy; KA6GBJ, treas. Rio Hondo ARC: W6CBA, pres.; KA6NXV, v.p.; WA6GCV, secy.; WB6ISR, treas. WA6LVO awarded the following certificates for RN6/D to WB6QBZ N6BCY W6CPB KA6BNW W6JGS N6ANL for NCS, and to KB6AI for liaison; the Region Six Net/Daytime meets 10:45 A.M., 1:45 P.M. & 3:30 P.M. 7275 kHz with a newsletter edited by WA6OCM. First SCM of Orange section W6DEY voted in as v.p. of Palomar ARC and is now residing in San Marcos. New NCS for SCN/V are W6TKV KB6AI. The first Orange Co. Hamfest (sponsored by the Catalina RA, with chairman WB7EVC) will be held March 6 & 7 at the Orange Co. Fairgrounds in Costa Mesa. For more information contact me (SCM). Traffic: WB6EIG 1307, KA6BNW 532, KN6C 416, WB6QBZ 395, WB6BZZ 226, WB6QCA 136, W6CPB 116, KA6A 114, W6RE 97, WB6YZY 84, K6ZCE 69, N6AED 48, K6XI 35, WB6LGL 20, KA6HJK 18, WB6FRB 16, KA6DZU 14, W6TKC 14, W6XD 8. (Nov.) KS6T 647, KN6C 242.

SAN DIEGO: SCM, Arthur R. Smith, W6INI — STM: N6GW. SEC: W6INI. Mark your calendar for the Southwestern Division Convention, June 4-6 at the Town & Country in San Diego. For info contact W6RHI, 714-698-6481. ARES members in San Diego (city) are encouraged to join the Civil Defense auxiliary. Call W6INI, 273-1120, for info. The North County Tfc Net set a record with 230 msgs handled in 30 sessions. The net operates daily at 2000 on Palomar ARC's 146.13/73 repeater. Best net for beginners! KT6A and W6HUJ made BPL. W6HUJ's total of 595 was highest in his 42 yrs of amateur activity. Club officers: Palomar ARC — WA6WQI, pres.; W6DEY, v.p.; WB6TBQ, sec.; K6SLA, treas. ARC of El Cajon — WA6COE, pres.; WA6SJX, v.p.; WA6MHZ, sec.; WB6POW, treas. North Shores ARC — N6ART, pres.; WD6EDP, v.p.; WA6FOJ, sec.; W6ZBE, treas. Escondido ARS — KN6I, pres.; N6CLO, v.p.; N6DOI, sec.; N6ATQ, treas. Upgraded: N6DPX to Extra; WD6AJV to Advanced; KA6RMJ to Tech. K6QCW and WB6HMY take rainfall reports daily at 1100 for preceding 24-hour period. Traffic: KT6A 893, W6HUJ 595, N6GW 476, KM6I 366, K6HAP 240, KB6AI 176, WA6DNT 150, N6AT 103, KU6D 62, WA6UFY 3. (Nov.) WA6UFY 7.

SANTA BARBARA: SCM, Robert N. Dyruff, W6POU — Flurry of Publ. Svc. activities highlighted year end: N6CJL rep to Pasadena Rose Parade comms, joins 7 ops for Eastside Merchants Parade SBAR; 37 band review & Xmas parade used 16 ops under WD6EBY Camarillo; heavy holidays NTS TFC helped by WA6ZQJ, KA6JWK KA6BPH & more on new Sctn Tfc Net nightly 145.18 WB6RDV/R 9 P.M. SILENT KEY W6KPS eulogized by WB6HJW. 2nd Annual Digital Data Conf. sparked sctn intertie with N6MA/WA6UEO wkg on data rptr, W6ZRR/W1UUQ open HAL bulletin boards across Sctn, packet radio efforts increase. KA6BPH reelected pres. Poinsettia ARC. Satellite ARC revives "THE ORBIT" paper! Rick Ahlman concludes many-year struggle with CP to land KA6RDY with assist by KB6NA. Congrats! W6GAW concludes 8 yrs personalized calendars for SBARC, New Pres: WD6ELE — Lompoc ARC, WA6DJS — VCARC with plans for mini-convention in Oxnard on Mar. 20. W6WBY tracked, silenced S9 radiolocation spur on 160 mtrs. Cable TV QRM hits all 3 counties. Action taken by WB6GVO with FCC against cable firms. Rptr changes: WB6IYW to KE6KI/R, WR6AOX to WA6ZTT/R; WB6FMC/R from 22/82 to 146.205/805. W6JGS certificated by RN6/D, WDØDEX now N6FTQ. Traffic: N6FTQ 1000, N6WP 600, K6YD 327, W6JGS 317, W6ZRR 99, WA6ZQJ 32, N6MA 8.

WEST GULF DIVISION

NORTHERN TEXAS: SCM, Phil Clements, K5PC — ASCM: WA5QFD. SEC: W5GPO. STM: W5VMP. NMs: AA5J AE5I WD5JYI KA5MAY KC5FX. New NM of D/FW Tfc. Net is KA5MAY. This is one of the largest nets in our Division, and it is a *2-meter* net!! Congrats to WB5IZH, the Panhandle ARC "Ham of the Year". The "North Texas Section ARES Net" had its first meeting, with a great QNI. The net meets on the first and third Wed. on 3961 kHz, right after the TTN is QNF at about 1900L. All DEC's ECs and interested parties are welcome to check in, with W5GPO as Master of Ceremonies. The following is the list of my appointees, as they stand on 1/1/82. DECs ECs and ORSs will appear in later columns. OBSs: K5OKM K5KQG N5WB WA5KHE K5IID W5OXK KK5B W5GN W5PBN WB5LAT W5YK W5GPO. OOs: W5TI K9MX K5PC WA5QPW K5IID K2SCU WA5UBK W5ARV. OVSs: K5IS WB5LAT KA5JRZ. OESs: K5HGX WD5JYI. Appointments are made to all applicants who meet the qualifications, and are automatically renewed every two years if monthly reports are received. Let me know your area of interest and if you desire an appointment. Typical heavy activity on NTS — looks like a lot of Yuletide Cheer has been relayed via our hobby again

this year! Tornado season is upon us again! All ARES units should be prepared to "head up and move out." Be sure to get a message thru to W5GPO or myself re the situation ASAP. What seems to be a small emergency in your local area can be blown out of proportion by the media and "word of mouth" causing overreaction. Or, in a worse case, where real communications emergency exists, and word does not get to your SEC in time to get the needed aid into the affected area in time to be effective. Let us know by any means available of any abnormalities. In this way, the proper action and response can be immediately made at the section level. PSHR: KA5IWF KA5AZK KA5MAY AJ5F KC5FX KA5MSP N5BT WB5CIC WD5JYI KB5UL K5HGX N5DKW KC5NN W5TI W5VMP. Traffic: W5TI 590, WB5CIC 534, N5BT 411, KA5AZK 380, KC5FX 265, KK5B 248, WB5OXE 179, WD5JYI 165, N5DKW 140, W9OYL 132, KC5NN 121, AJ5F 82, KB5UL 82, K5HGX 78, N5DYI 68, KA5MAY 64, W5ERT 44, WB5VTZ 41, W5VMP 37, KA5MSP 33, WA5QFD 32, K5PC 27, WB5WDL 8.

OKLAHOMA: SCM, Leonard Hollar, WA5FSN — KB5EK has brand new 5BWAC certificate. FB. W5REC and K5CXP made BPL in December, first from Oklahoma in some time. Traffic for December was up and handled very well. My thanks to all of you. Many of you are missing the chance for some more "wall paper" by not reporting your PSHR activities. OO reports still reflecting many out-of-band signals. Are you sure where you are operating? W5AS most active OBS. WD5GLD is new pres. of Wheat Straw Club. KU5B is new pres. of SCARS. KC5HD is new pres. of MORI. W5VCJ is working up a silver anniversary party for the old Oklahoma Central 6 Meter Net. He is hunting for a number of people who participated at that time. Contact W5VCJ or myself. Exact date of reunion to be announced later. Next big event for Oklahoma is Lawton Hamfest, March 27-28. CU there. In fact I hope to be out and around better this year than last. STORM SEASON IS HERE!!! ARE YOU READY??? Traffic: W5REC 637, W5RB 410, K5CXP 268, WB5ELG 257, WA5RKU 157, WB5NKC 150, KB5EK 114, KA5CXW 108, KA5KPJ 90, W5AS 84, WA5OUV 83, W5UYH 83, WB5EAY 62, WA5JGU 61, WA5FSN 54, NØIN 53, WD5IFB 43, W5VXU 42, K5CAY 35, WA5ZOO 32, W5VOR 28, W5VLW 26, W5JJ 22, W5SUG 17, KC5OU 16, WB5LSW 2.

SOUTHERN TEXAS: SCM, Art Ross, W5KR — ASCM/RM: N5TC, SEC: WA5RVT. OVS reports this month: N5AF & WA4QCP. Heavy traffic for December. Eleven stations made BPL: W5SHN WB4YDD W5KLV N5AMH W5CTZ KV5N/(KA5GYJ) K5PE KB5NX WA4AOG KA5DQP N5CDN. (Five stns had more than 100 orginations.) Sam Houston AR Klub of Cleveland (TX), with special permission from Texas Dept of Corrections, handled several hundred ARL Chrismas messages from Texas prison inmates to their families; NTS traffic nets, 7290 traffic net and SW Traffic Nets were heavily used. K5GM spent a week of November in Kansas and says still getting occasional DX goodies. EC K5BY busy as a bee. He reports Bay Area Central Information Center nearly completed, having been paid for by local council of cities, the county, and public spirited corporations and citizens. More later in QST article. EC N5DZT (WD5KBK) reports Tidelands ARS officers for 1982 are: WB4LBJ, pres.; WB5QYQ, v.p.; N5ASR, secy.; W5VXV, treas. ORS K5RG reports great conditions on 80 cw. SEC WA5RVT has new MX80 printer/computer system. EC N5DZT (WD5KBK) reports Univ of Texas Medical Branch ARC had Operation Santa Claus in which children of U of T Med Branch in Galveston talked to Santa via 2 meters. Tidelands ARS had highly enjoyable Christmas party. N5FN has installed electronics workbench and is now prowling flee markets and auctions for new test equipment. Traffic: W5SHN 1891, WB5YDD 1098, W5KLV 892, N5AMH 870, W5CTZ 746, KV5N 562, K5PE 436, KB5NX 404, N5CDN 366, WA4AOG 360, N5CRU 261, KA5DQP 254, WD5HOC 218, WB5EFJ 213, KB5TC 190, N5TC 186, WB5MMI 172, K5GDX 126, N5DAA 105, W5BGE 95, WA5RVT 86, N5DZT 85, W5KR 69, K5ZC 51, WD5GKH 50, AB5X 30, AK5M 26, N5FN 10. (Nov.) K5PE 82, K5GM 70, N5DZT 27, K5RG 12.

DONS CORNER?

Spring is about to spring. With the thaw, things begin to grow . . . like trees, flowers, and antennas. It is time to clean up, fix up, and repair the distress caused by old man winter. We are ready for you, with a full line of Amphenol connectors, Belden cable, hardware, towers and antennas. Added to that, we distribute AP products, Adel Nibblers, B&K test equipment, Bud Cabinets, boxes and chassis, Bussman, CDE capacitors, GE and Raytheon tubes, Ersin solder, Telex headsets, Triplett, H.H. Smith, Ungar, Vaco, and Waber. In other words, get busy. That project over there collecting dust is ripe for finishing.

Advice is also a product we offer. Our staff is made up of hams, and they just love to give advice on what we sell, or even what we don't sell. Call with your questions and we will answer them if we can. If we can't, we'll direct you to someone who can.

This past Christmas season set a new record of sorts. Fewer pieces of equipment were returned to us defective than ever before. The quality has improved a lot, and does that ever make my life easier. You can buy with confidence and if the unmentionable does happen, we are ready to satisfy you.

Last note: Buy a Blitz Bug from us while they are available. It's a few dollars worth of a bunch of protection, and they start moving fast when the spring thunderstorms start threatening. When you need it most is the wrong time to find out they're back ordered.

'til next time, Don

OMNI-C has what it takes to filter the crowds. To narrow the Amateur Radio world right down to the particular signal you want. The selectivity, sensitivity, dynamic range and operational features you need to cut any crowd down to size.

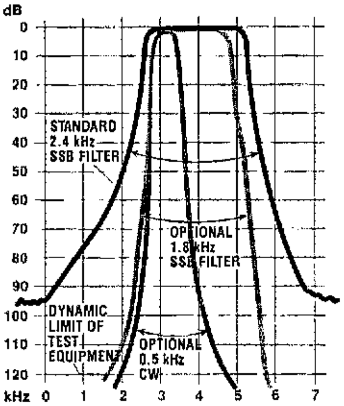
Tailored i-f response. OMNI is equipped with the potential for ***seven*** response curves to handle any listening situation.

Standard filters include an excellent 8-pole 2.4 kHz crystal ladder filter and, in addition, a 150 Hz active audio cw filter with three ranges (450, 300, 150 Hz).

Optional filters include 1.8 kHz 8-pole crystal ladder ssb filter, 500 Hz 8-pole cw filter, and 250 Hz 6-pole cw filter.

Front panel switches put any optional filter in series with the standard filter for up to ***16 poles of filtering*** for near ultimate skirt selectivity.

Four i-f response curves for ssb and three for cw. That's response tailoring, that's crowd control.



OMNI/SERIES C I-F RESPONSES WITH STANDARD AND OPTIONAL FILTERS.

The Rig That Filters The Crowd

Optimized sensitivity and dynamic range. The OMNI sensitivity range of 0.3 μV typical (slightly less on 160 & 80M) combines with a 90 dB dynamic range to provide an ideal balance that will handle any situation from copying a weak signal half way 'round the world to keeping the next-door kilowatt from muscling in. And a PIN diode switched 18 dB attenuator is included for extra insurance against overload.

More crowd-handling features—and all standard equipment.

Built-in notch filter. To drop out unwanted signals or carriers. Tunable from 200 Hz to 3.5 kHz, with a 50 dB notch depth.

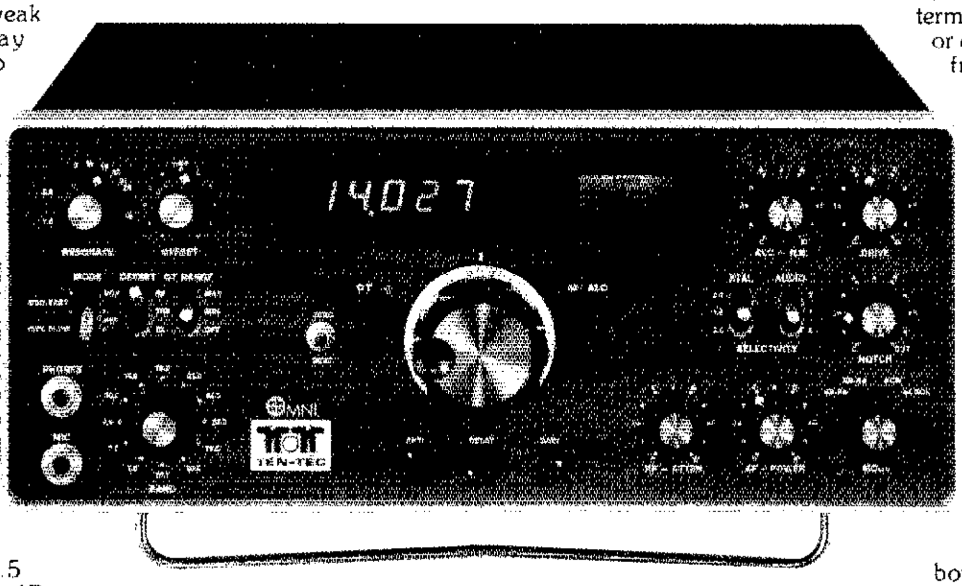
3-mode, 2-range offset tuning. To put you where the others aren't and where the elusive DX is. Move just the OMNI receiver, or just the transmitter section, or the entire transceiver, ±500 Hz or ±4 kHz. For complete freedom of frequency movement to get away from the crowds.

Built-in noise blanker for those times when your noise-generating neighbor is crowding your receiver. Filtered to handle the big signals easily.

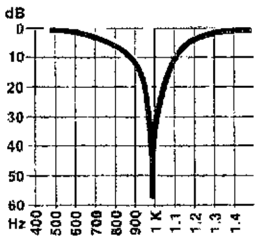
2-speed break-in. When QRM or QRN is heavy, switch to "Slow." Use "Fast" for instant, full break-in for enjoyable rag-chews or stalking DX.

OMNI-C features stand out in any crowd.

All solid-state—from the pioneer, Ten-Tec.



TEN-TEC OMNI-C



NOTCH FILTER PERFORMANCE ADJUSTED TO 1 kHz POINT.

All 9 hf bands—only crystals are needed for 18 and 24.5 MHz bands.

Broadband design for instant band change without tune-up or danger of damage to the final amplifier. Another Ten-Tec *original.*

"Hang" AGC for smoother action.

WWV reception on the 10 MHz band.

Digital readout in two colors, red for the 5 significant places, green for the 6th digit (100 Hz). Instant recognition.

Separate receiving antenna capability. Switch receiver to a common antenna for transceive or separate receive-only antenna; the system also acts as receiving antenna by-pass with an instant break-in linear amplifier or transverter.

"S"/SWR meter, electronically switched.

200 watts input, all bands, with 50-ohm load. 5 year pro-rata warranty.

100% duty cycle on all bands up to 20 minutes. Full RTTY and SSTV power.

Built-in VOX and PTT with front panel controls.

Built-in phone patch jacks for easy interface.

Built-in zero-beat switch for spotting the exact frequency of a DX station.

Built-in adjustable sidetone volume and pitch.

Adjustable threshold ALC, optimum power for driving a linear. Provides means of working into a high SWR.

Front panel control of linear or antenna. The rear panel bandswitch terminals control relays or circuits in step with front panel bandswitch.

Automatic sideband selection plus reverse.

Low distortion audio, less than 2%; a Ten-Tec trademark.

Clean signal, exceeding FCC requirements.

High stability over wide temperature and voltage excursions.

Built-in speaker, compression-loaded; in bottom of cabinet.

Plug-in circuit boards for fast easy service.

12-14V dc power for easy mobile use.

Full complement of accessories: Model 280 Dual Primary AC Power Supply, $169; Model 255 Deluxe Power Supply/Speaker Combo, $199; Model 243 Remote VFO, $189, Model 215 PC Microphone, $34.50; Model 214/234 Microphone/Speech processor, $39/$139; Model 645 Dual Paddle Keyer, $85; Model 670 Single Paddle Keyer, $39. Model 227 Antenna Tuner, $79; Filters $55 ea.

Made in the U.S.A.

Model 546 OMNI-C transceiver $1289

Get out of the crowds with OMNI-C. See your TEN-TEC dealer or write for details.

TEN-TEC, INC.
SEVIERVILLE, TENNESSEE 37862

Ham-Ads

(1) Advertising must pertain to products and services which are related to Amateur Radio.

(2) The Ham-Ad rate is 85 cents per word. A special rate of 25 cents per word applies to hamfest and convention announcements, to individuals seeking to dispose of or acquire personal equipment, and to other advertising which, in our opinion, obviously qualifies for the individual rate.

(3) Remittance in full must accompany copy since Ham-Ads are not carried on our books. Each word, abbreviation, model number, and group of numbers counts as one word. Entire telephone numbers count as one word. No charge for postal Zip code. No cash or contract discounts or agency commission will be allowed. Tear sheets or proofs of Ham Ads cannot be supplied. Submitted ads should be typed or clearly printed on an 8-1/2" × 11" sheet of paper.

(4) Closing date for Ham-Ads is the 20th of the second month preceding publication date. No cancellations or changes will be accepted after this closing date. Example: Ads received August 21 through September 20 will appear in November *QST*.

(5) No Ham-Ad may use more than 100 words. No advertiser may use more than two ads in one issue. A last name or call must appear in each ad. Mention of lotteries, prize drawings, games of chance, etc. is not permitted in *QST* advertising.

(6) New "commercial" advertisers must submit a production sample of their product (which will be returned) and furnish a statement in writing that they will respond appropriately to customer complaints and will stand by and support all claims and specifications mentioned in their advertising before their ad can appear.

The publisher of *QST* will vouch for the integrity of advertisers who are obviously commercial in character, and for the grade or character of their products and services. Individual advertisers are not subject to scrutiny.

Clubs/Hamfests

QCWA Quarter Century Wireless Association is an international nonprofit organization founded in 1947. You are eligible for membership if licensed 25 or more years ago, and presently licensed. It is not necessary to have been licensed the entire 25 years. Members receive QCWA publications and participate in QCWA activities. Come grow with us! Write QCWA, Inc., 1409 Cooper Drive, Irving, TX 75061.

PROFESSIONAL CW operators, retired or active, commercial, military, gov't., police etc. invited to join Society of Wireless Pioneers — W7GAQ/6 Box 530, Santa Rosa CA 95402.

CERTIFICATE for proven two-way radio contacts with amateurs in all ten USA areas. Award suitable for framing and proven achievments added upon request. SASE brings TAD data sheet. W6LS 2814 Empire, Burbank, CA 91504.

YAESU OWNERS — join your International Fox-Tango Club — now in its eleventh year. Calendar year dues still only $8 US, $9 Canada, $12 airmail elsewhere. Don't miss out — get 1982 top-rated FT Newsletters packed with modifications monthly, catalog of past modifications, free advertisements, technical consultation, FT Net (Saturdays, 1700Z, 14.325MHz), more. Go Fox-Tango! To join, send dues to FT Club, Box 15944, W. Palm Beach, FL 33406.

IMRA-International Mission Radio Association Helps missionaries by supplying equipment and running a net for them daily except Sunday, 14.280 MHz, 1900-2000 GMT. Br. Bernard Frey, 1 Pryer Manor Rd., Larchmont, NY 10538.

THE Veteran Wireless Operators Association, a non-profit organization of communications people founded in 1925, invites your inquiries and application for membership. Write V.W.O.A., 118 River Drive — Bay Ridge, Annapolis, MD 21403.

PLAYBOY Club — Plan ahead now to attend the ARRL Hudson Division Convention October 30-31, 1982, at the Playboy Club, Great Gorge, McAfee, NJ. For info send s.a.s.e. to HARC, Box 528, Englewood, NJ 07631.

INTERESTED in QRP? Full information for large s.a.s.e. QRP/ARCI, Box 12072, Capitol Station, Austin, TX 78711.

WARREN Amateur Radio Association Inc. will host their 25th annual Hamfest Sunday August 15, 1982, at Kent State University (Trumbull Campus). Beginning at 6:00 A.M., including Forums, Programs, Dealers Exhibits inside, Giant Flea Market, XYL Suite, 5 acres of space. For further information QSL: Warren Hamfest P.O. Box 809 Warren, OH 44482.

OVERPRINTED — 1981 Fox-Tango Club Newsletters. Sixty loose-leaf pages packed with modifications and information on Yaesu rigs — only $6 while they last. Also a few 1980 sets at $5. (Overseas add $3 each, airmail.) N4ML, Box 15944, W. Palm Beach, FL 33406.

HAMFEST May 23rd, LIMARC, Long Island Mobile Amateur Radio Club sponsors the 27th ARRL Hamfair '82 at the Islip Speedway, Islip, NY. Located on Islip Ave. (Rte. 111) just South of Exit 43, Southern State Parkway or South at exit 56 of the L.I. Expressway. No reservations needed, over 350 exhibitors. Information call at night Sid Wolin, K2LJH 516-379-2861 or Hank Wener, WB2ALW 516-484-4322. Talkin on 146.85, a 4Z PL will extend your range if you have one. Many awards will be made during the Hamfest 9AM to 4PM General admission $2., exhibitors $5 per car space.

EIGHTH Annual Northwestern Pennsylvania Hamfest May 1, 1982, Crawford County Fairgrounds, Meadville, PA. Gates open 8 AM. Bring your own tables. $5 per table to display inside, $2 per car space outside. $3 admission, children under 12 free. Refreshments. Commercial displays welcome. Talk in 04/64, 81/21, 63/03. Details C.A.R.S., P.O. Box 653, Meadville, PA 16335. Attn: Hamfest Committee.

NEW JERSEY: The Irvington RAC hamfest is Sunday, March 21, 1982, from 9-4 at the P.A.L. Bldg., 285 Union Ave., Irvington, N.J., 07111. Take the Garden State Pky to exit 143 North or 143 B southbound. Talk-in on 34/94 and 52. Refreshments. Admission $1. Tables $3. For information call Ed. WA2MYZ, tel., 201-687-3240 or write IRAC at PAL address.

SECOND Annual Spring Hamfest will be held by Civil Air Patrol at Lake County Fair Grounds, US 45 & IL 120 Grayslake, IL. Donation $2. tables $3. Reservations & info SASE Captain Rehm, 637 Emerald St. Mundelein, IL 60060 Note new date Saturday, March 20.

ATTENTION Dealers! Wheeling WV Hamfest July 25, 1982 (White Palace, Wheeling Park) — Attendance from 3 states, 1000 car parking. Reserve space, CONTACT: TSRAC, Box 240, RD 2, Adena, OH 43901.

NJ Computer Show/Fleamarket (third year). Sat. May 22 -Holiday Inn (North) - Newark - Exit 14 NJ Turnpike. Buyers $3. Sellers $6. (advance), $7. (door). In case of rain - held indoors (150 tables). W2TGH, 201-297-2526, Kengore, 3001 Route 27, Franklin Park, NJ 08823. (Fall Show - Sept. 11-12.)

THE 13th annual B*A*S*H will be held on the Friday night of the Dayton Hamvention, April 23, 1982 at the Convention Center, Main and Fifth Streets. Parking in adjacent City Garage. Admission is free to all. Sandwiches, snacks and C.O.D. bar available. Live entertainment provided for a super social evening. Don't miss it . . . Awards include a new synthesized HT and a synthesized pocket scanner. For further information contact the Miami Valley FM Assn., P.O. Box 263, Dayton, OH 45401.

THE Oak Ridge ARC invites you to attend the Fourth Annual Oak Ridge Hamfest at the Civic Center in Oak Ridge, Tennessee, April 3rd & 4th. Doors open 9-5. Large indoor dealer display, forums, awards and concessions. Enjoy a free cup of coffee while you eyeball old friends in our QSO Room, or take advantage of the Tennessee Springtime while browsing through the ample outdoor flea market. Talk-in on 146.28-.88 repeater (147.72-.12 backup) and 146.52 simplex. Admission $mation, send SASE to: ORARC Hamfest, P.O. Box 291, Oak Ridge, TN 37830. (Attn: Jim McNair N4EXG).

ANNUAL Flemington, NJ. Hamfest Saturday April 3 from 8:30 to 3:30 at the Hunterdon Central High School Field House. 20,000 square feet of heated area. Gigantic flea market, 200 tables, major manufacturers and more. Bring the XYL, kids and friends. Flemington is located between NYC and Philadelphia at the intersection of Routes 202 and 31 just 10 miles south of I-78, and is a tourist area. Talk-in 146.52, 147.375, 147.015, 224.12 and 224.54 MHz . . . Admission $3 donation. For reservations or information call 201-788-4080 or write Cherryville Repeater Association c/o W2FCW Box 76, Farview Dr. Annandale, NJ 08801.

SEE WORLD'S FAIR while attending 1982 Knoxville Hamfest and ARRL Delta Division Convention, Memorial Day Weekend (May 22-23). DX, computer and technical forums; air-conditioned exhibit area; and large indoor/outdoor flea market make this Tennessee's largest hamfest. More information? (dealers, tickets, reservations) N4BAQ, 5833 Clinton Hwy., Suite 203, Knoxville, TN 37912.

QSL Cards/Rubber Stamps/Engraving

TRAVEL-PAK QSL Kit — Converts Post Cards, Photos to QSLs. Stamp brings circular. Samco, Box 203, Wynantskill NY 12198.

DELUXE QSLs, Samples 25c. Petty, W2HAZ, P. O. Box 5237, Trenton NJ 08638.

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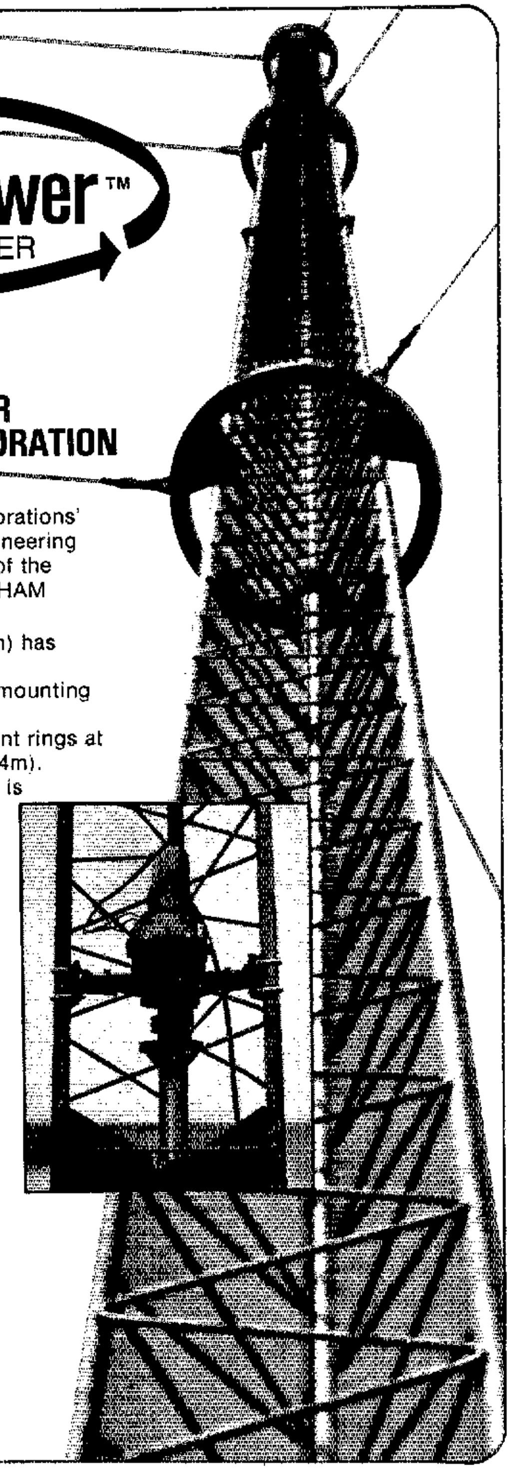

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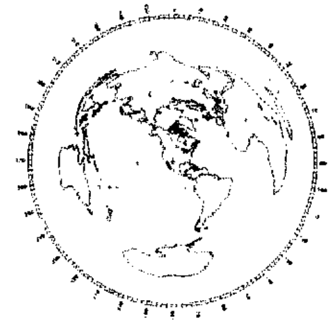

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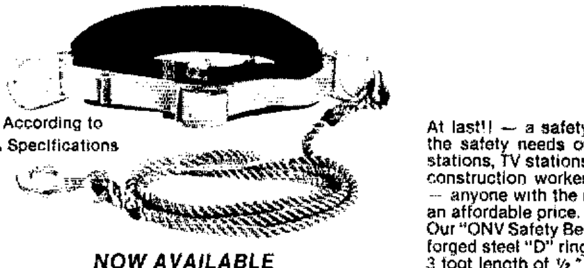

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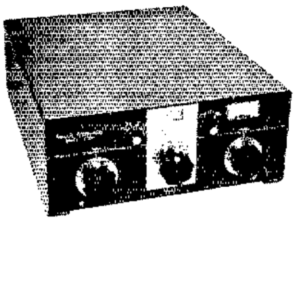

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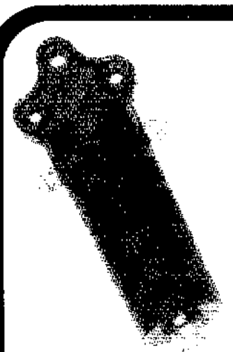

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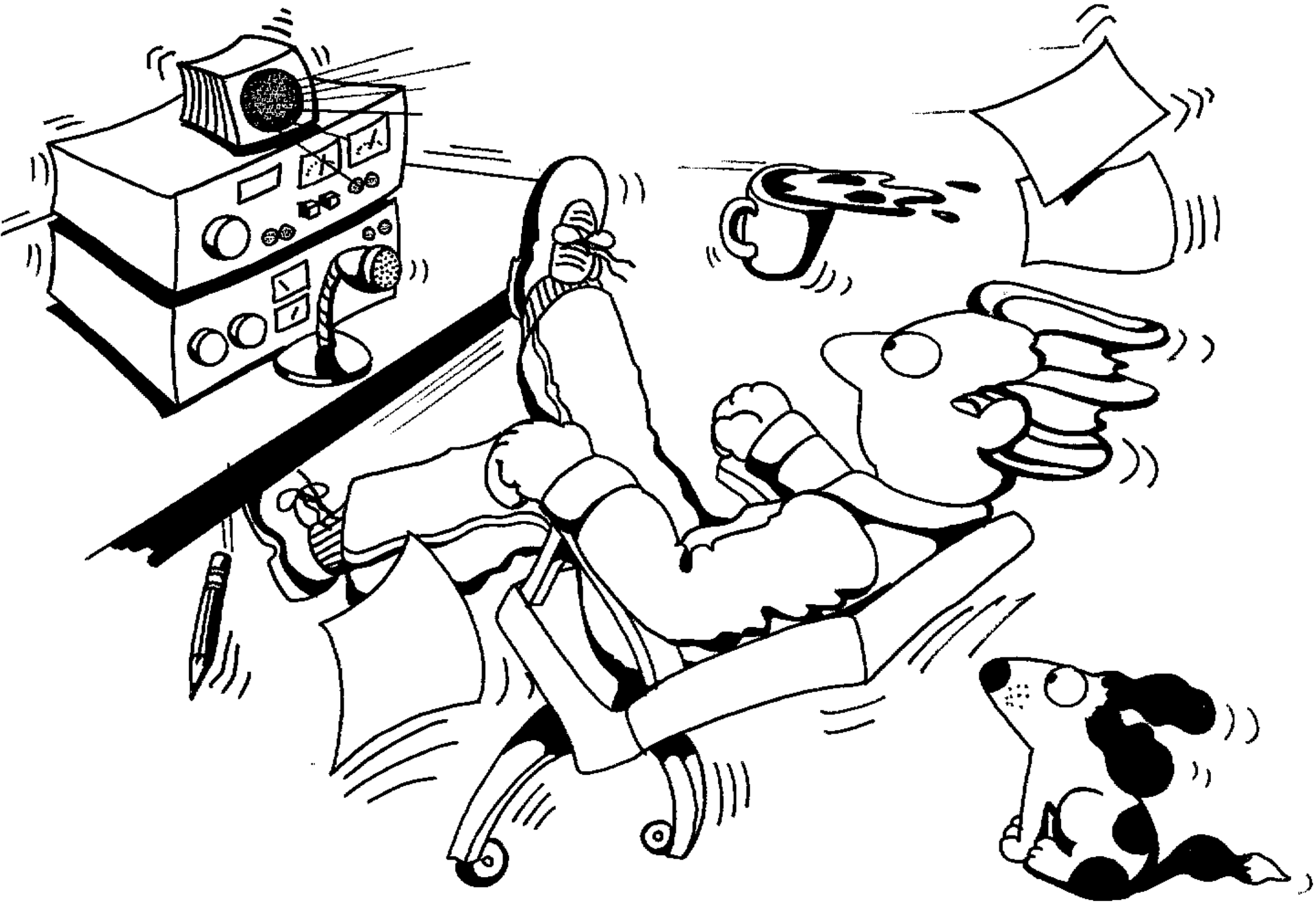
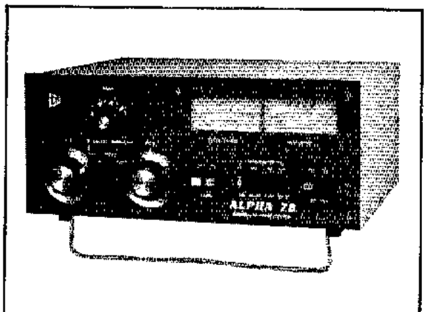
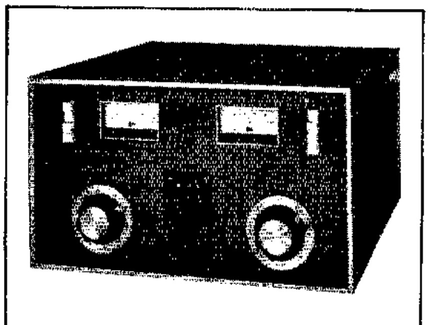




ALPHA 78



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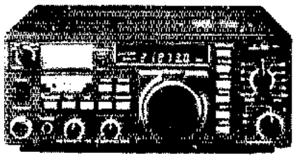

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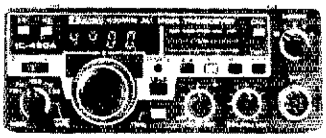

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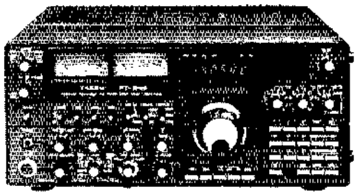

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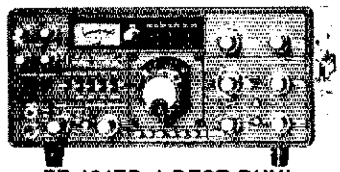

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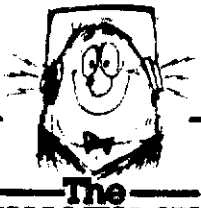

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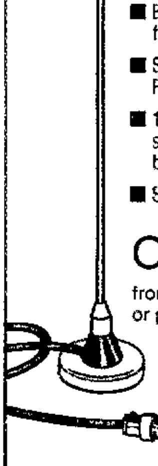

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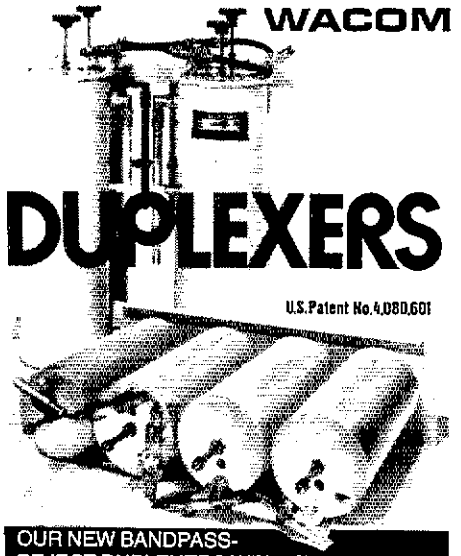

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COLLINS KWM-380/HF-380 service, modifications and consultation backed by factory training and complete inventory of spare boards and parts. K1MAN, 207-495-2215.

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DATABOOKS, IC, TTL, electronics & engineering magazines from eng. library. Exc. current material. Also some ham mag's and service manuals. S.A.S.E. for 2-pg list. J. Cohen, 200 Woodside, Winthrop, MA 02152.

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NEED schematic and service manual for DuMont 304A oscilloscope and Hallicrafters Model S85 receiver. I will xerox & return. David, WB5DSO, 1438 Ashwood DR., Sugarland, TX 77478. 713-494-1854.

KEYERS - $39.95 SASE for information, Webco, Box 740211, Houston, TX 77247.

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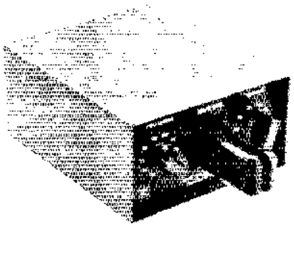

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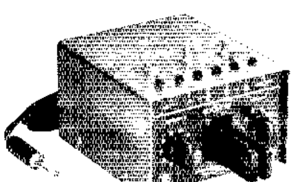

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WANTED; Nostalgic collector wants your old AM gear, receivers, transmitters, especially AM amplifiers either commercial or homebrew. Check your basements and garages for these tube monsters and drop me a line and a reasonable price Please. Ed WA7DAX, 3509 Muriel Way, Ganger, UT 84119. 801-966-5077.

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MECHANICAL filters, new 455 I.F. 2.1 kHz. $8 each. Wanted; late model (re mcn) KWM-2A. K6TVN, 213-845-6131.

FOR SALE: Collins 75S-1/312B-3 $325; Drake TR4/34NB/RV4/AC4/MS4 $625; Drake 2NT with 30 xtals $99; Galaxy FM210 2mtr with power booster $99; Elco 717 keyer $49. All in excellent condition, very clean, manuals. First MO/Cashier check takes. Will ship UPS. Paul C. Tamas, WB6ZJM, 843 1/2 North Alfred St., Los Angeles, CA 90069. 213-653-6993.

MUST SELL radios, assembled boards, parts from pilot line build of the high quality Amtech 225A synthesized 2m fm transceiver. Business size S.A.S.E., (40 cents postage) for list. Very low prices! Bill Weaverling, 3060 27th Ave., Marion, IA 52302. 319-377-7927.

DRAKE R4C, late serial, $375; TS120S $495; Collins KWM2A noise blanker, brand new, $75; Collins 351R2 rack, new, $35. W9ZR, 1-414-434-2938.

SALE: Kenwood TS520S w/cw filter, AT-200 Antenna Tuner, MC-50 Microphone, Headphones and Heathkit dummy load. Complete station $825. Used less than 5 hours. WD4DAU, 27 Chapelwood, Northport, AL 35476. 205-339-3713.

KENWOOD TS530S digital, nine bands, near new $600 K4JK 205-743-4575.

ANTENNAS: Hy-Gain 18AVT/WB vertical used 1 year $60 and Dentron Trim-Tenna 20-meter beam never used $100, K4JOP, 12804 North 52nd Street, Tampa, FL 33617.

VFO for HW-16, DX-60, etc. want GRC-106, TR-1, RS-1. W8MFL 219-233-8631.

HRO-60 coils complete set including bandspread for 160 meters $25. each. Lally W1HDC, Garland, Maine 04939.

COLLECTORS: National receiver 5TA1 with four coils; Hallicrafters HT40 transmitter; BC-348 P receiver; all operating. Best offer; you ship. K9HOI 414-345-6454.

GALAXY V, fixed mobile pls, $250 Galaxy 2000+ amplifier, p/s $250. Both $450. UPS. KB9BE, Bob 217-489-3411.

HW-101, HP-23B, HM-102, D104, Viking p/p $360. HW-2036A $175. All excellent condition. WA7WVB, 960 North Orange #A, Mesa, AZ 85201.

GONSET G-66B receiver with 12Vdc and ac ps $65, G-77 transmitter with 12Vdc ps and modulator $60. W8IFN, 4813 St. Charles Rd., Columbia, MO. 65201 314-474-2017.

WANTED: Collins 310B-1 or 310B-3 in good condition and National TV-7. Sam Thompson, W6HDU, 1133 Polk St., San Francisco, CA 94109. 415-441-3247 until 6 P.M., 415-521-1429 evenings.

ROSS'S used equipment specials: Icom IC-701 s-ac mike $695, Kenwood TS-120 S $500, TS-700 A $380. Nationwide sales, huge stock, low prices, free expert advice. All prices cash plus shipping. For updated list of used equipment and current specials, send $1 and self addressed envelope. $2 credit given if ordered within 30 days. Closed Monday at 2:00. Ross Distributing Co., Preston, ID 83263. 208-852-0830.

SALE - flat muffin fans $9.50 ppd - W2SSC.

HAVE an interesting item you think would make a good Stray? Submit it to ARRL Hq. by the 10th of the second month preceding desired publication. If photos are included, use good quality, black-and-white ones. Above all, the material should be of interest to most *QST* readers!


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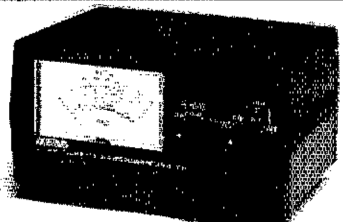

AUTOMATIC SWR & PEAK READING POWER METERS FOR HF/VHF.

HF BAND MODEL APM-1H .... $85.

Professional peak reading wattmeter with fully automatic VSWR measurement function.

Specifications:
Frequency Coverage 50-150MHz
Power Measuring Mode .... AVE & PEP 2 modes
RF Power Range .. 0-200, 1,000, 2,000W, 3 ranges ± 10%
Power Source .... AC 117V, 60 Hz
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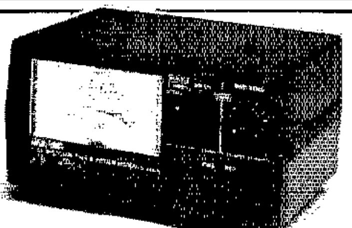
Net Weight .... 3.3 lbs. (1.5 kgs)

VHF BAND APM-1V .... $85.

Professional peak reading wattmeter with fully automatic VSWR measurement function.

Specifications:
Frequency Coverage 50-150MHz
Power Measuring Mode .... AVG & PEP 2 modes
RF Power Range .... 0-200W, 2 ranges with ± 10%



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HF BAND MODEL PM.2H .... $50.

Excellent precision through-line SWR/Watt meter specially designed to have flat frequency response

Specifications:
Frequency Coverage 1.8-60MHz
RF Power Range .. 0-200, 1,000, 2,000W, 3 ranges ± 10%
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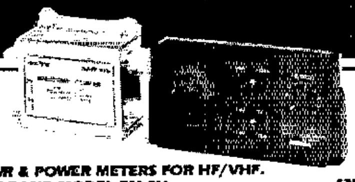
Net Weight .... 2.2 lbs. (1 kg)

VHF BAND PM-2V .... $50.

Excellent position through-line SWR/Watt meter specially designed to have flat frequency response.

Specifications:
Frequency Coverage 50-150MHz
RF Power Range ..... 0-200W, 2 ranges ± 10% accuracy
Dimensions .... 8"(W) x 4"(H) x 5½"(D)
Net Weight .... 2.2 lbs. (1 kg)



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HF BAND MODEL PM-5H .... $35.

The PM-5H is especially designed for mobile installation of which directional coupler unit and meter unit are separated.

Specifications:
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RF Power Range .... 0-20, 200W ± 10% accuracy
Power Requirements ...... 12V DC (for meter illumination)
Accessory Included .... 6ft. long connector cable and velcro for mobile mounting.
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3¼"(W) x 2½"(H) x 1¾"(D): Coupler
Net Weight .... 0.45 lbs. (200 grams): Meter
0.67 lbs. (300 grams): Coupler

VHF MODEL PM-5V .... $35.

Designed to cover VHF band. Illuminated meter is convenient to the use in mobile operation. A complete set to be in display carton.

Specifications:
Frequency Coverage 50-150MHz
RF Power Range .... 0-20, 200W ± 10% accuracy
Power Requirements ...... 12V DC (for meter illumination)
Accessory Included .... 6ft. long connector cable and velcro for mobile mounting
Dimensions .... 5⅛"(W) x 2¾"(H) x 1½"(D): Meter
3¼"(W) x 2½"(H) x 1¾"(D): Coupler
Net Weight .... 0.45 lbs. (200 grams): Meter
0.67 lbs. (300 grams): Coupler

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WANTED: CD45 or HD73 rotator. Must work OK. Dave, N2BZK. 516-269-3888.

FOR SALE: QST's 40 years. 1941-1981 $100. Bob Falk, 7744 Western, Omaha, NE 68114 402-391-9089.

DRAKE TR7/DR7 transceiver, PS7 power supply, 2-FA7 fans, SL500 cw filter, SP75 speech processor, 7077 mike, MS7 speaker, service manual-positively mint condition-sacrafice $1300. Jeff, K2OD, 609-397-3255 evenings/weekends.

SELL Heathkit, Microprocessor ET-3400 $175., and Digital Trainer ET-3200A $75., both assembled, complete with books except components for experiments, mint conditions. Leif K. Karlsen, AK4D, P.O. Box 723, Palm Coast, FL 32037.

COMPLETE Yaeseau HF station. FT707 80-10 xcvr, FP707 ac supply, FV707 ext. VFO/memory, MR7 rack, YM34 mike. Less than 10 hrs use! Bought MARS station, need to sell, Only $1050. Rich Landsman WA1KJX, 175 Pierce Rd., Weymouth, MA 02188.

COLLECTORS: 250TH in original carton $100 W5HD 505-293-5735.

BIRD wattmeter elements. Series B and C, VHF/UHF, $30 each. Will trade for HF types. Also many tubes and parts. Send for list. R. Bonkowski, W3HWJ. 23 Hampshire, Greensburg, PA 15601.

BARGAINS-must sell station and miscellaneous equipment to pay veterinary school tuition. Send SASE for complete list of items to John B. Dennigan, 30 Woodside Ave., West Warwick, RI 02893.

OMNI "A/B" $650., Drake MN4 matching network $70., Trak TE144 keyer $40. Please S.A.S.E. for reply. Kenet, 5 Sunnyslope Drive, Middletown, CT 06457.

KENWOOD TS-520S in original carton with manual, excellent condition, and SP-520, $525. Write James Panero 100 Greenwich Ave., N.Y., NY 10011.

HW-16 and HG-10B VFO $150. WB2EUF P.O. 708, East Hampton, NY 11937. Tel. 516-324-4066.

WANTED: ARRL Handbooks, QSLs from the 20s, 210 tubes, CR-18, SW 3. W3HWT, 329 Evergreen, North Wales, PA 19454.

WANTED - HR2B Regency - KA8CSJ.

TELETYPE Model 32's in Minneapolis and New York areas. Good condition. $250 each. Cargill, Mc. 612-475-7775.

OLD Timers — I need Vibroplex, McElroy, Logan and Bunnell speed keys for my collection. Also need junkers for spare parts. K5RW, 1128 Midway, Richardson, TX 785081. 1-214-235-8636.

COLLINS: Round label, mint 75S3B 500 and 200 Hz filters 32 S3 with DX processor 312B4 wattmeter and phone patch 30L1 linear. Bill, WB6VAD, 213-682-3881, 213-416-0732.

"SWAP cash and my HW-16 and VFO for your Yaesu FRG-7700 receiver. L. Daniels, WA3LKV, 22 Ridge, Lansford, PA 18232.

COLLINS: Mint unmodified KWM-2 with 516F-2 power supply only $549; 312B-4 control console, $195; special price on three Collins units at only $600! Magnum Six speech processor for KWM-2, 32S, only $99; Spectronics DD-1C digital display for KWM-2 or 32-S $125; Heath HO-10 monitor scope, $99. All units clean and in good condition. W3NV, 8258 Brittany Place, Pittsburgh, PA 15237.

SELL: Heath SB-220 mint with 10M $500, cw filter for Kenwood TS-820 $30, Hallicrafters SX-111 $130, Heath DX-100 $100, Dave Krick, K8FJ, 1707 Hamlet Dr., Ypsilanti, MI 48197, 313-485-0715.

TWO outstanding DX forum colour slide shows available for hamfests, conventions, and club meetings: "27 Great DX-peditions" and "Three Clippertons Revisited". See February Ham-Ads for additional information. WA4WME, 2308 Zinnia Court, Killeen, TX 76541.

CODE practice cassettes and code course. 25 QSOs like FCC exam. Order #C7 for 15 wpm or #C8 for 22.5 wpm. $5.95 each postpaid. Computer generated, 90-minute cassettes. MC and Visa welcome. SASE for catalog. K5SMG, John C. Tarvin, 14480 Shadowlane Ct., Morgan Hill, CA 95037. 408-683-0287.

WANTED: One each 814 and 4E27/8001 transmitting tubes unused W3AJH.

CX7B - Cunningham's Personal Radio, one of the nicest CX7B around, special mods including plug in IC's and transistors, dual heat sinks, amber LED's, cw filter, $1000. K9LWT 414-554-3700 days, 554-9170 nights.

CRYSTALS: Build something! Good starter, QRP oscillator, we'll supply the crystals and sockets. FT-243's General, Novice, any frequency .01%, 7000-8700 kilocycles $1.75, minimum five $1.50 each. 3500-4000 $2.95, five $2.50. 160M $3.45, five $2.95. Sockets 50¢. Postage-Airmail 25¢ per crystal. "Crystals since 1933". WØLPS. Stamp for 1700 to 60000 kilocycles listings - circuits. C-W Crystals, Marshfield, MO 65706.

NEW Repeater Site? Intermod studies done by computer. Specify maximum on-site receiver bandwidth, receiver I.F. frequencies (if known), all on-site transmit and receive frequencies, and specify maximum harmonic multiplier of interest. Charges: $1.50/frequency plus $5./harmonic multiplier. Lee Barrett, K7NM, Box 488, Havre, MT 59501.

KENWOOD VFO520S, original packing excellent will ship $100 or best offer. KP4DGT 809-755-8804.

TI59 Symbolic Network Analysis. Program $25. Information $1. W1HDO.

DX-60 - relay with extra crystals, $60. 212-898-9666. Ben Botvenek.

MFJ 484 keyer $85., Slinky Antenna $35., Sony ICF-5900 W receiver $90. Dr M. Hayes N2OD, 425 Neptune Ave., Brooklyn, NY 11224. 212-373-4906.

RCA TacTec wanted, uhf/vhf. Schaaf, 807 Sunbeam, Oneida, WI 54155.

KENWOOD TS-180S/DFC, PS-30 mint $950. Ovca, Overbrook Road, Louisville, KY 40207. 502-893-6114.

AUTEK QF-1A wanted W4KXC 703-243-6576.

75S-3A Tubesters, 200 Hz cw, WARC, SWL xtals, 32S-3, 516F-2, 312B-4, SM-1, manuals, dust covers, $1100 or best offer. Gene Simon, W2KOY, 850 Richmond Road, East Meadow, NY 11554.

IC245SB Multimode, excellent, $275. KM5Y, 214-475-1341.

MADISON guaranteed goodies: Icom IC730 $699.; IC720A $1149.; Kenwood TS130S/AT130 $759.; TS130S/PS30AC $759.; TS830S/filter/microphone $949.; New HyGain TH7DX $349.; Yaesu FT1 $2395.; FT101ZD/Mark 3 $749.; FRG7700 $449.; FT208R/FT708R $289. each; New Kenwood R600-call; R1000-call; New Drake TR5 $995.; TR7A $1495.; R7A $1450.; Santec HT1200 $269.; ST144UP $299.; new Sprague 1000pF/30kV doorknob $16.; antique, rare tubes - call. Amphenol silverplate PL259 $1.; IC3AT/IC4AT $269. each; Belden coax; KLM KT34XA $469.; KT34A $309.; Ham4 $165.; HamX $235. All items personal guarantee, prices fob Houston. Include sufficient postage. Madison Electronics, 1508 McKinney, Houston, TX 77010. Day 1-713-658-0268, night 1-800-232-3057 7-10CT MWF.

HEATH HW-2036A, Micoder-II and power supply, mint $175 K8CV 313-549-1846.

HW-101, cw filter, power supply, microphone, keyer, SWR/wattmeter, manuals; $300, TV camera $100, Dan Lewis, 1337 Vine St., Paso Robles, CA 93446.

SELL: Collins KW-1 transmitter. Will ship. Paul KB8Q 313-428-9569.

FOR SALE: Icom HM-10 and HM-7 mikes, $30 both. B&W 370-10 vacation antenna $25 - KE4FM 703-289-9801.

TELONIC SPI-64 sweep generator, Heath TC-1 manuals/schematics needed. Ornitz WA4VZQ, 4740 Edens View, Kingsport, TN 37664.

ICOM IC245SSB-$275. TR22C w/11 xtals-$130. Drake SSR-1 rcvr-$175. Heath H8/H9 32K RAM, software. Basic Programming Course & HUG books. H9 needs repair. $500. John Black KB5AG, 425 Harvard St., Raleigh, NC 27609. 919-851-3753. Negotiable.

AWARDS awards awards: Information on over 400 different worldwide awards. All for $12.95, KBØZP, 736 -39th Street, West Des Moines, IA 50265.

ICOM IC-720 with power supply, $1050, One owner, Ron, AKØN, Phone, day 712-246-5270 or nite 712-246-3542.

DX for sale: Yaesu FL-2100B linear, 80-10 meters. KB2MB, 26 Edgecomb Road, Binghamton, NY 13905. $449.

SELL: Amplifier, 160-10M + WARC bands, all solidstate 1 kW — no tune up, Ten-Tec Hercules Model 6 months old $1,200. including UPS. Rich Brock, N8RB, 15806 Fernway Road, Shaker Heights, OH 44120 216-752-0355.

WANTED: National AGS series receiver; National NTX-30 transmitter. State condition and best price. Will pay shipping. All replies answered. William Fizette, K3ZJW, RD 1, Henryville, PA 18332 717-629-0637, 717-421-6380.

WANTED: Phone patch. Sell: MFJ speech processor Model LSP-520-BX - $30. Ken Gordon, WA1KUL, 613 Salem End Rd., Framingham, MA 01701.

HW-16 cw transceiver with speaker, 10 novice xtals 80, 40, 15 meters, manual, extra final, mint condition $100. Certified check and you pay shipping cost. Contact KA9DIH, Al Viduka, 518 30th St., South Bend, IN 46615.

DRAKE L-4B with ten meters $675 or trade for solid state transceiver. WA3LEU 3269 Oak Ave., Scranton, PA 18505.

HW-101 $275., SB614 $125., Trionics counter TR1000, Yaesu FP4 supply, Midland 13509 220 MHz, IC245 with SSB and computer controller, Tempo S1, Kenwood TR2400, Heath 2306, Azden PC2000, Azden PCS3000, Bearcat 210, ZX80 Sinclair. Make offers. Bob DuVal, WB2DHK, 201-628-1298, 145 Beechwood Dr., Wayne, NJ 07470.

TEMPO S4-12T with Rapid-2 charger and accessories. $300. WA9IVB. 317-643-0479.

WILSON WE800-mint with fresh nicads, custom TTP, 600/1 MHz splits manual, charger. $299 + shipping. WB2FIG, Michael Berlin, 915 James Street-Apt.E18, Syracuse, NY 13203. 315-432-6632.

QSTs - wanted, all issues between 1965 and 1980. 617-227-2152 eves. N1BJO.

COLLECTORS - for sale RME-43 $100, or best offer. KC7DW, Rt. 3 Box 194-C-1, Milton-Freewater, OR 97862. 503-938-6750.

RTTY program for the Northstar Computer. S.A.S.E. for details. Jim KK7A, 10140 Canterbury, Boise, ID 83704. 208-377-2041.

COLLINS 30L-1, round, excellent condition, $750. Keith Furgalus, 216-333-7882.

WANTED-Gordon Roto Beam rotator and Syncro-Antennacator unit or reuseable parts. 1948-52 vintage. W9CVW 815-468-8155.

DRAKE R-4C with 500 crystal filter, mint condition $350, firm WA2BLY pickup only. 518-399-0755.

SAVE your mobile radio from theft. Protect car. 5 simple and effective Auto Protection Schematics. Send $3. to Stealer Stopper P.O. Box 592, North Bend, OR 97459.

TWO small, simple linear transverters made by National (Japan), 10-12 watts output on 2 and 15 meters respectively, work with 6 meter QRP rigs such as IC-502D, 212-662-1707.

HAL DS2000KSR video terminal. Sends and receives RTTY, Baudot and ASCII plus MR2000 option for sending and receiving cw. Asking $450. Call Howard, WA2IBZ after 6 PM. 609-728-1956.

SB-104A/filter/n.b., HP-144/SB604 $400. SB-644A $70. SB-614 $120, or offers. KM4F 804-374-2969.

WANTED: Heath HW22, HA 14 linear or other lower power amp, Microcraft Code Reader. WBØVGX. 612-364-5224.

PANASONIC RF-2900, $150, Yaesu FRG-7 $175, both mint. D. Filka 6324 Mandalay Dr., Parma Heights, OH 44130.

KENWOOD TS700S with subband kit, Janel preamp, SP70 speaker, manuals $500. Kenwood TR7400A $295. Icom IC2at with sp/mic $235. Yaesu FT227R $245. Mirage B1016 amplifier with supply $310. All mint KB5MR. 918-299-9645.

SELL Collins S-line 75S-3B with 500Hz filter $345. 32S-3 with 516F-2 $525, 312B-4 $135 all round emblem excellent condition. K5XA 504-261-4660.

WANTED: Robot Model 70 SSTV monitor, regardless of condition. KA4JRE 305-822-9250.

KENWOOD VFO-820, $175. Yaesu FRG-7700 and MU-7700, $550. Sylvania color picture tube MV25VCZP22, like new, $35. NLS 3.5A DMM, mint, $45. Two 1000-pF Johnson variables, 4 kV or more, mint, $50 each. RG-17/U, 50 ft, new, $30. Buyer pays shipping. SASE inquiries. N1FB 4 Roberts Rd., Enfield, CT 06082.

FOR SALE - Collins 75S-1, 32S-1, Heathkit HP23B, $475. K3KSS 301-876-1183.

(ROHN TOWERS) wholesale direct to users all products available — write or call for price list, also we are wholesale distributors for Antenna Specialists and Regency fm radios — Hill Radio P.O Box 1405-2503 G E Rd., Bloomington, IL 61701 309-663-2141.

REALISTIC DX-302 digital receiver, 10kHz-30MHz. Good as new. $230. I ship. KA7LWH 801-292-4910.

KENWOOD TS120S $500, PS30 $100, MC-50 $40 used less than 2 hours. CDE Ham IV rotor $150, Cushcraft A3 beam $140, Swan SWR-1A power meter $45, Nye Viking Phone Patch $45-never used. 200' RG8U $40, 100' 8-conductor rotor cable $15. Sell individually or package deal. Arnie KA2JPW, 602-795-6509 3/1-3/10, after 3/21 516-938-6975 3/11-3/21.

DEAR HAMS: Junior High school 22 needs your help. Please contact WB2JKJ at Callbook address for details.

UNUSED Maxi-Tuner with balun, meter - $225, Wilson 1402SM talkie with TouchTone - $150, Heath IM-1210 digital multi-meter - $70, Swan MMBX mobile impedance matchbox - $20, Heath HA-201 2-meter 10-watt amplifier -$30, MFJ 40-T QRP Transmitter - $20. Larry Campbell, KB5RB, 9004 W.H. Burges Dr., El Paso, TX 79925.

AZDEN PCS-3000 or PCS 300 $283. KDK $255. "Metal detectors, send for free catalog." UPS. Free cont. USA. Chuck's Amateur Radio Supply, Box 44, Madera, CA 93639 209-674-1435.

WANTED: Collins VFO console (312B-5). WA7YDP 7816 Buckthorn Dr., Bremerton, WA 98310. 206-692-5142.

HW-8, ps, headset, $75. HP-524D counter, manual, $25. WD6CPN, 5928 Sandwood St., Lakewood, CA 90713.

COLLINS 75A-4 455J21 filter $69. Heath keyers: HD-10, excellent, $18. HD-1410, unassembled, complete, $46. Icom SM-5 (new) $26, MMB (new) $13. Yaesu FT-901 DM, mint, guaranteed, $799. K2OB - 516-681-3152.

WANTED - Vibroplex super deluxe Presentation model pre-1970. W6RNC, P.O. Box 478, Nevada City, CA 95959.

RTTY software for Digital Group computers. 26K memory, 2.5 MHz CPU, and TVC-64 required. Baudot and 110 bps ASCII. Audio cassette and documentation $15; documentation only, $3. Jerry Dijak, W9JD/2, 215 Tareyton Drive, Ithaca, NY 14850.

YAESU FRG-7, 9 months old, $175. MFJ-980 3kW antenna tuner $125. Yaesu YH-77 headphones $10. Prices include UPS. Rick K7GM, 1914 West Cortez Cricle, Chandler, AZ 85224. 602-831-1078.

MFJ-949 deluxe antenna tuner, 300 W., SWR/wattmeter, dummy load, mint, $75. K8LSB, 203-233-7348.

WANTED: Wilson WR-1000 or other heavy duty rotor. Also ten or more conductor heavy duty rotor cable. For wedding present. Charlotte Richardson, KA1GHR, 11 Michigan Dr., Hudson, MA 01749. Work: 617-467-7376. Home: 617-562-5819.

450 MHz repeater with 2 mtr synthesized remote base; includes: Spectrum SCR450 rcvr SCT410 30 watt tx *Wacom WP678 duplexer Icom 22S tone mute and more* $1700. K5NI, 4120 Kipling Dr., Beaumont, TX 77706 713-892-0993.

TEKTONIX 661 scope 4S1 dual trace sampling p-i, 5T1 timebase, dc-1GHz. $250. 1L60 spectrum analyzer plug-in, with manual, "as-is" condition, $125. AP. Towbin, 436 Orange St., New Haven, CT 06511.

DRAKE R7/DR7 - noise blanker - MS7 - 6, 2.3, 1.8, .3 filters - TR7 interface cable manual - I ship UPS - $1100. Excellent condition. KA8DOD - 419-483-6657, 602 Northwest, Bellevue, OH 44811.

WANTED - Unassembled Johnson Viking kits, N8NN, 513-878-7559.

CENTURY 21 analog, calibrator, keyer, $260. Heath IM-18 VTVM, 2 probes, $25. WAC quad kit, unused, $15. All clean, plus shipping. Jim Stephens, Rt. 1 Box 69-LL, Estill Springs, TN 37330.

KENWOOD TR-7730 two meter rig, two months old. Trade even for general coverage receiver like FRG7 or R-1000. N8DGC 419-874-5701.

SPRING shack cleanup - Drake R4A, T4X with processor, AC4, MS4, $475; TR4 factory serviced December 81 to specs, $275; DX processor, $60; Yaesu FL-2100, $250; SP401P patch, $40. All good with manuals. W7RA 503-593-1161.

MOTOROLA HT-220 450 MHz, 2 freq, 12 button TTP, charger, battery, converted to hamband $250. K5NI 4120 Kipling Dr., Beaumont, TX 77706. 713-892-0993.

ST. Petersburg, Florida home - Just bring yourself and your rig. 50' Rohn fold-over tower, tri-band beam, antennas for 160-2 meters, 2bdr, family room, garage. Home only 7 yrs old, pool, fenced yard. $55,000. WD4OEB, 813-544-3955.

WANTED: E-Z Way RBX-60 or RBX-70 tower, also SM-220/BS-8 WB2CHW 516-621-8362.

TUBES. Retired repairman's stock. SASE for details. Jesse Reed, 506 LaPaloma Lane, Roswell, NM 88201.

AZDEN PCS-3000 and PCS-300, KDK FM-2025. Larsen antennas. Kem-Tron power supplies. Com-Spec PL equipment, AOR pocket receivers. Everything in stock for immediate shipment and we'll beat any price in this issue!!! LCC Engineering, 116 Country Farms Road, Box 140, Marlton, NJ 08053-0140. 609-983-8844 daily 6PM till midnight.

FOR SALE - Prototype of Heath 2031, touchtone, nicads, charger, HA-201 amplifier, extra crystals, all very good. Power supply 2200 volts one ampere. Used 100TH's, new 4-125A's and sockets, 811's 812's and more. Want keyer, metal detector, cw filter, VFO, SM220 for TS520. Make offer. W8HYQ 906-884-4946.

TS520SE/cw filter. Only 20 hours. Just like new with accessories. $450. Also Hallicrafters S108, Heath DX-40, VF-1, QF-1, make offer. 714-279-9430 days/298-6542 nights/we. Rick, KE6DO.

CONTESTERS, DX'ers, investors: Want to own the Midwest's largest antenna farm? For sale: three bedroom all brick custom contemporary house on 20 acres overlooking a 3 acre stocked lake. Six towers including four 150'ers with 7el Yagi band crushers. Would you believe a 7el 10m on 42', 7el 15 m on 57', 7el 20m on 88' and a 4el 40m on a 100'boom! Includes tractor, mower, machine shop, welders and all periphals. A lifetime opportunity. Contact ABØI, Rt. 1 Box 587, Holt, MO 64048. 816-635-6906.

CLIPPERTON-L converted to 10M mint condition $400 U-ship. KB4FW 813-689-2924.

CAPACITORS 4lufd - 3.8kV., continuous voltage rating, tested & guaranteed $58. Heath HW104 with cw filter, portable Ni-Cad battery, card extender, cables, manuals $325. I pay shipping. Chris Wartes, K7II, 706 Harvest Rd., Bothell, WA 98011. 206-481-8090.

ICOM IC-202 $150 Yaesu FTV650 $150 Regency HR2B w/GLB 300 Channelizer and Heath Micoder $225. All in very good condition. WBØNPM.

VHF SHOP - March Sale - call or write for super deals on: Lunar's Mast-Mounted or standard GaAsFET Preamps, 6M10-120P 6 meter 120W amplifier/preamp (export), TAMA 19el 432MHz Yagis. Microwave-Modules Transverters: MMT144-28 $207. MMT220-28 $260. MMT432/435-28S $285. MMT1296-144 $384. Astron supplies: RS35metered $148.75. RS35amp $133., RS20metered $103.75. RS20amp $88. RS12amp $68.50. Compare and save! For all your VHF/UHF needs: HT amps, kW amps to EME arrays, shop - "The VHF Shop" Call (M-F after 6:00 PM eastern, weekends anytime) K3MKZ Box 349, RD 4 Mountaintop, PA 18707. 717-868-6565 Two stamps for catalog.

HEATH HW-101, w/cw filer, HP-23B ps, HM-15 SWR bridge. Excellent condition. Built by Extra Class. $325. You pay shipping. W2LO, P.O. Box 831, Mattituck, NY 11952. 516-298-4789.

SELL: Cast Iron Wouff Hong $27.50 75A2 Collin reciever with speaker cabinet $90. HT-37 Hallicrafters $85. TR44 CDE rotor $37.50 W6BIH.

MINT 2kW station - Swan270B, $299. 14A dc, $39. VX-2 VOX, $29. Swan/Shure 444 mike, $29. MFJ cw filter, $29. Xcvr package, $375. Dentron MLA-2500 with 10 meters, $659. CM-2 tuned input, $39. Amplifier package, $650. Complete station, $950. Roger Scaggs, W5EBC, 214-596-5452.

HAVING a technical problem? Get in touch with the League's technical department at Hq. for help. Be sure to include your membership expiration date and an s.a.s.e. with your question.

WANTED, top prices paid: Ten-Tec 405 linear w/251 ac supply, $210 plus shipping; 206 calibrators, $25; Vibroplex "Blue Racer," $75. Must be excellent condition. K4MSG, 204 S. Harrison Rd., Sterling, VA., 22170, 703-435-2994.

KENWOOD TR-9000 $345. PS-20, $45., Argonaut 509 and power supply, $250., Standard C806MA 2 meter rig, $60., Drake TV5200 filter, $22., MFJ-810 w meter wattmeter $22., used 2 meter vertical/horizontal beam, $30. Edu-kit, $15. Some items negotiable. Mario Filippi, RD2, Box 141, Belvidere, NJ 07823. 201-475-3586.

TEN TEC Omni D, series C 9 bands all filters 255 pwr supply & speaker $890. Hal DS-3000 KSR with cw. Electrohome 14" monitor HAL ST 5000 complete $850. AG1L 401-822-4170 401-397-5442.

ICOM 22S. No modifications, very clean. $150. (and I will gladly ship UPS). Two meter amplifier, appox. 20-30 watts out (12 Vdc) $25. Keith Arnold, N8AQR, 1273 Erickson Rd., Columbus, OH 43227.

TWO METER Headquarters!!! Azden, KDK, Larsen, Kem-Tron, Com-Spec and AOR. We'll beat any price in this issue!!! LCC Engineering, 116 Country Farms Road, Box 140, Marlton, NJ 08053-0140. 609-983-8844 daily 6 PM till midnight.

FOR SALE: Tempo One and AC/One power supply, black, fan and mic. $325. Yaesu FT207R $175. MFJ943 antenna tuner $45. Micronta SWR, power and modulation meters $20. B + W 425 low pass filter $25. HW202 $35. Halicrafters SX99 receiver $35. Will ship COD. Carl WA2HDU-leave message 914-238-8753.

WANTED Central Electronics 600L mint. Also 3-1000Z and 2000T tube. Bill Smitherman KD4AF, Rt 4 Box 37, East Bend, NC 27018.

SELL: Yaesu FT224-2 meter crystal control xcvr. 145.27/.67, 145.62/.52, 146.61/.01, 146.67/.07, 146.76/.16 146.88/.28, 146.94/.34, 147.00/.60, 147.09/.69, 147.36/.96, 147.525/.525 - Weak finals $65 KK9A/KB9OF John 312-729-1458.

HEATHKIT SB220 linear amplifier 80 thru 10 meters, professionally built, zero hours, original carton and manual $750. Glenn 2400B custom 10 meter linear amplifier, am, fm, ssb, cw, six 4CX250R's less than 10 hours, original carton, mint condition $2100. Nease, Box 9132, Montgomery, AL 36108 205-272-2256.

10 PROGRAMS for TRS-80 LII $35. Send for list. KK9A John Bayne 3912 Rugen Rd., Glenview, IL 60025.

AZDEN owners! PCS-2000 remote extension cables are available agian! in three lengths: 6 feet, $44.95; 10 feet, $49.94; 15 feet, $58.95. Add $2.50 for shipping. Contemporary Electronic Products, P. O. Box 570549, Miami, FL 33157.

AMATEUR REPAIR — Professional service, reasonable rates, all brands, USA KDK repair center. Amateur Radio Repair -Salem, NC 27101 919-725-7500.

SB-303 RCVR, very good condition. Filters for cw, ssb, am. 10 to 10.5 MHz instead of 15 to 15.5 MHz, $250. Fred, KB2FS, 5 Park Drive, Woodstock, NY 12498.

FOR SALE: Heathkit HD-1410 keyer plus manual. $35, I ship Colvin, AJ2I. 83 Main St, 8A. Newington, CT 06111.

1982 CALLBOOKS! $17.50 each. Both $32. postpaid. K4CLA, 562F Oak, Lexington, SC 29072

THE ARRL has publications covering many facets of Amateur Radio. See the ARRL Publications/Supply Order Form in *QST*.

WHEN changing your address or call sign, don't forget to notify the Circulation Department at ARRL Hq. Enclose a recent address label from a *QST* wrapper, if at all possible. Please allow six weeks for the change to take effect.

Jobs for Hams

HAM RADIO specialists — Coed camps located in Milford, PA, approximately 80 miles from New York City. Excellent salary and working conditions. June 18 -August 20. Contact Steve Brownstein, NJ YMHA Camps, 21 Plymouth Street, Fairfield, New Jersey 07006, 201-575-3333.

HAM RADIO counselor, 21 years or older, for summer sleepaway camp near Pittsfield, Massachusetts. Camp Emerson, 5 Brassie Road, Eastchester, NY 10707 914-779-9406.

WANTED for summer of 1982: Instructors in electronics and ham radio. Small boys science camp in Pennsylvania. Apply: Donald Wacker, P. O. Box 356, Paupack, PA 18451.

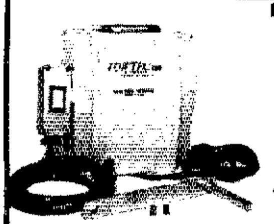
SUMMER CAMP counselor, General or better to teach Novice program and DXing to boys at private New Hampshire summer camp. Top equipment, triple beam tower, established program plus AM station. June 20th-August 21st. Winter office Camp Cody, 5 Lockwood Circle, Westport, CT 06880, Dr. Stolz 203-226-4389.

CONNECTICUT summer camp seeks counselors (21 +) to work with teenagers in its ham radio program during July and August. Apply: K1PGQ, Buck's Rock, 140 Riverside Drive, NY, NY 10024, 212-362-2702.

COUNSELOR: Operator with general license to teach Ham Radio at Pennsylvania co-ed camp. Have completely equipped Ham station. Write Trail's End Camp, 215 Adams Street, Brooklyn, NY 110201.

TECHNICAL WRITER for interesting free lance work. Some experience required. Ameco Publishing, 275 Hillside, Williston Park, NY 11596.

COUNSELORS . . . Maine Boys' Camp. Ham Radio, electronics, code, general license, may bring own equipment. Write: Richard Krasker, 95 Woodchester Dr., Chestnut Hill, MA 02167.



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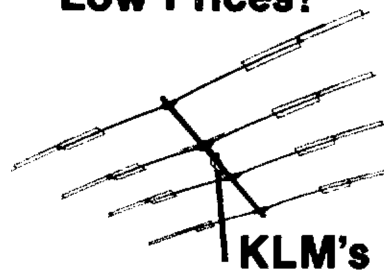
ANTENNA SYSTEMS/TOWER HARDWARE

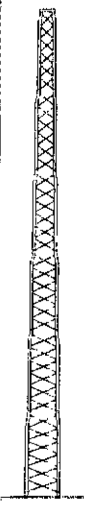
KLM - In Stock at Terrific Low Prices!



KLM's KT-34A

The new concept in triband antenna design. Gain and band width all in one compact package. VSWR curves.

List Price ~~389~~[95] SALE PRICE $319



UNARCO-ROHN Self Supporting Towers — On Sale!

During February and March these rugged beauties are being offered at Big Discounts and — we are shipping them freight prepaid! Look over the specifications and pick the unit most suited for your needs, then — Call us to place your order with Master card/Visa or write and include your check for quick shipment — Freight Prepaid!

And — Save even more — include antenna and rotor of your choice with the order and we will ship them along freight prepaid also! Hows that for good old fashioned savings?

Tower Model	Tower Ht.	Load Rating	Ship Weight	Tower Base	Tower Price	Base Price	Total Price
HBX40	40 ft	10 sq ft	164	BXB6	269	24	293
HBX48	48 ft	10 sq ft	303	BXB7	349	26	375
HBX56	56 ft	10 sq ft	385	BXB8	419	30	449
HDBX40	40 ft	18 sq ft	281	BXB7	313	26	339
HDBX48	48 ft	18 sq ft	363	BXB8	399	30	429

BUTTERNUT

HF6V	80-10 mtr. Vertical	$109
TBR160	160-mtr. Coil Kit	$ 33
RM KIT	Roof Mount w/Stub Tuned Radials	$ 33
STR KIT	Stub Tuned Radial Kit	$ 20
2MCV	2 mtr. Trombone Vertical	$ 29

CUSHCRAFT

A3	3-El. Triband Beam	$169
A4	4-El. Triband Beam	$209
A743	40 mtr. Add-on Kit for A3 Antenna	$ 59
A744	40 mtr. Add-on Kit for A4 Antenna	$ 59
R3	New Motor Tuned 20/15/10 mtr. Vertical	$229
AV5	80-10 mtr. Trap Vertical	$ 89
20-3CD	3-El. 20 mtr. Beam	$169
20-4CD	4-El. 20 mtr. Beam	$239
15-3CD	3-El. 15 mtr. Beam	$ 89
15-4CD	4-El. 15 mtr. Beam	$ 99
10-3CD	3-El. 10 mtr. Beam	$ 69
10-4CD	4-El. 10 mtr. Beam	$ 89
A50-5	5-El. 6 mtr. Beam	$ 59
617-6B	6-El. 6 mtr. "Boomer"	$169
214B	14-El. 2 mtr. "Boomer"	$ 66
214FB	14-El. 2 mtr. FM "Boomer"	$ 66
228FB	28-El. 2 mtr. FM "Power Pack"	$189
32-19	19-El. 2 mtr. "Super Boomer"	$ 79
220B	17-El. 220 MHz "Boomer"	$ 69
ARX2B	2 mtr. "Ringo Ranger II"	$ 36
ARX450B	450 Mhz "Ringo Ranger II"	$ 38
A147-20T	2 mtr. Vert. & Horiz. 10-El. Beam	$ 59
A144-10T	10-El. 2 mtr. Satellite Antenna	$ 45
A144-20T	20-El. 2 mtr. Satellite Antenna	$ 66
A432-20T	20-El. 432 MHz. Satellite Antenna	$ 45
A14T-MB	Dual Antenna Mounting Assembly	$ 24

MANY OTHER CUSHCRAFT ANTENNAS IN STOCK — CALL!

HYGAIN

V2	New 2 mtr. Base Vertical	$ 36
TH5DX	5-El. Triband Beam	$209
TH6DXX	6-El. Triband Beam	$239
TH3MK3	3-El. Triband Beam	$179
TH3JR	3-El. Triband Beam	$139
TH2MK3	2-El. Triband Beam	$119
HY-QUAD	2-El. Triband Quad	$209
402BA	2-El. 40 mtr. Beam	$179
205BA	5-El. 20 mtr. "Long John"	$239
155BA	5-El. 15 mtr. "Long John"	$149
105BA	5-El. 10 mtr. "Long John"	$ 99
204BA	4-El. 20 mtr. Beam	$189
203BA	3-El. 20 mtr. Beam	$119
153BA	3-El. 15 mtr. Beam	$ 69
103BA	3-El. 10 mtr. Beam	$ 59
DB1015A	3-El. 10/15 mtr. Beam	$129
64B	4-El. 6 mtr. Beam	$ 49
66B	6-El. 6 mtr. "Long John"	$ 89
18HT	80-10 mtr. Hy-Tower Vertical	$279
18AVT/WB	80-10 mtr. Trap Vertical	$ 85
214	14-El. 2 mtr. Beam	$ 33
2BDQ	80/40 mtr. Trap Dipole	$ 49
5BDQ	80-10 mtr. Trap Dipole	$ 89
BN86	80-10 mtr. KW Balun	$ 14

HUSTLER

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4BTV	40-10 mtr. Vertical	$ 79
5BTV	80-10 mtr. Vertical	$ 99
G6-144B	2 mtr. Base Vertical	$ 69
G7-144	2 mtr. Base Vertical	$ 99

HF Mobile Resonators (STD 400 Watt)		Super 2 KW)
10 & 15 mtrs.	$10	$15
20 mtrs.	$12	$18
40 mtrs.	$15	$21
75 mtrs.	$17	$32

BUMPER MOUNTS, SPRINGS, FOLDING MASTS IN STOCK CALL!

KLM

KT34XA	6-El. Tribander	$479
7.2-1	2-El. 40 mtr. Beam	$299
7.2-2	2-El. 40 mtr. Beam	$299
7.2-3	3-El. 40 mtr. Beam	$449
7.0-7.3-4A	4-El. 40 mtr. Beam	$629
144-148-13LB	13-El. 2 mtr. Long Boomer	$ 79
432-16LB	16-El. 432 Mhz. Long Boomer	$ 69
144-150-16C	16-El. 2 mtr. Circular Pol. Beam	$ 99
420-450-18C	18-El. 435 MHz. Circular Pol. Beam	$ 59

CALL FOR OUR LOW PRICES ON OTHER KLM PRODUCTS!

MINI PRODUCTS

HQ-1	Mini-Quad Compact 20/15/10 mtr. Antenna	$139

ROTORS & CABLES

Alliance HD73 (10.7 sq. ft. Rating)	$ 99
Alliance U100 (For small beams & Oscar Elev. Rotor)	$ 45
CDE Ham 4 (15 sq. ft. Rating)	$169
CDE Tailtwister (30 sq. ft. rating)	$239
HYGAIN HDR-300 (Most H.D. Rotor for BIG Arrays)	$399
KENPRO KR 500 (Heavy Duty Elevation Rotor)	$179
8 COND (2-#22GA./6-#18GA.) Rotor Cable	$0.19/ft.
H.D. 8 COND (2-#16GA./6-#18GA.) Rotor Cable	$0.36/ft.

COAXIAL CABLE & CONNECTORS

RG213/U (95% shield - non-contaminating jacket)	$0.29/ft.
RG8X (95% shield-non contaminating jacket)	$0.18/ft.
RG11/U (75 OHM - 95% shield)	$0.35/ft.
½" Aluminum Hardline w/poly jacket	$0.69/ft.
½" Copper Hardline w/poly jacket	$1.10/ft.
½" Alum. H.L. Conn (UHF or N - Male or Female)	$15.00
½" Copper H.L. Conn (UHF or N - Male or Female)	$22.00
Amphenol Silver Plate PL259	$ 1.25
Amphenol Nickel Plate PL259	$ 0.90
Amphenol N Type Male Conn For RG213/U	$ 2.95

HYGAIN CRANKUPS

HG37SS	37 ft. Self Supporting	$589
HG52SS	52 ft. Self Supporting	$829
HG54HD	Heavy Duty 54 Ft. Self Supporting	$1379
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ALL HYGAIN TOWERS FREIGHT PAID! CALL FOR PACKAGE QUOTE ON TOWER, ANTENNA & ROTOR—FREIGHT PAID.

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20G — $32.50 25G — $38.50 45G — $87.50

HBX32	32 ft. Free Standing (rated 10 sq. ft.)	$169
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HDBX40	40 ft. Free Standing (rated 18 sq. ft.)	$259
HBX48	48 ft. Free Standing (rated 10 sq. ft.)	$289
HDBX48	48 ft. Free Standing (rated 18 sq. ft.)	$319
HBX56	56 ft. Free Standing (rated 10 sq. ft.)	$349
FK2548	48 ft. 25G Foldover Tower	$719
FK2558	58 ft. 25G Foldover Tower	$799
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FK4554	54 ft. 45G Foldover Tower	$1119
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Foldover Towers Freight Paid-10% Higher West of Rockies.
ALL ROHN ACCESSORIES IN STOCK — CALL!

GALVANIZED STEEL TWR. HARDWARE

3/16" EHS Guywire (3990 lbs.)	$12/100 ft.	$111/1000 ft.
1/4" EHS Guywire (6000 lbs.)	$15/100 ft.	$139/1000 ft.

5/32" 7 x 7 Aircraft Cable (2700 lbs.)	$11/100 ft.
3/16" CCM Cable Clamp (3/16" or 5/32" Cable)	$0.30
1/4" CCM Cable Clamp (1/4" Cable)	$0.40
1/4" TH Thimble (fits all sizes)	$0.25
3/8 EE (3/8" Eye & Eye Turnbuckle)	$5.50
3/8 EJ (3/8" Eye & Jaw Turnbuckle)	$6.50
1/2 EE (1/2" Eye & Eye Turnbuckle)	$8.50
1/2 EJ (1/2" Eye & Jaw Turnbuckle)	$9.50
3/16" Preformed Guy Grip	$1.65
1/4" Preformed Guy Grip	$1.85
6" Diam - 4 ft. Long Earth Screw Anchor	$12.50
2" Diam - 10 ft. Long Heavy Duty Steel Mast	$39.00
500D Guy Insulator (5/32" or 3/16" Cable)	$0.95
502 Guy Insulator (1/4" Cable)	$1.95
5/8" Diam - 8 ft. Copper Clad Ground Rod w/clamp	$11.00

ANTENNA WIRE & ACCESSORIES

12 Ga. Solid Copperweld (Multiples of 50 ft.)	$6/50 ft.
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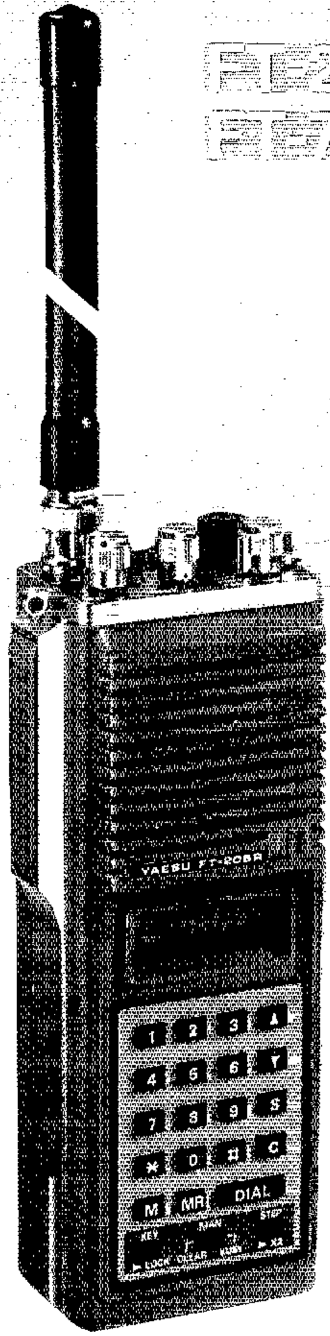

FT-208R — 2 Meters
FT-708R — 70 CM

LIQUID CRYSTAL DISPLAY
The LCD frequency readout provides high readability night and day, along with very low current drain.

KEYBOARD FREQUENCY ENTRY
All operating frequencies are entered from the front panel keyboard. Unusual repeater splits, scanning, and memory programming are all controlled via the keyboard.

UP/DOWN MANUAL SCAN
The FT-208R scans in either 5 kHz or 10 kHz steps, while the FT-708R steps are 25 kHz and 50 kHz. Automatic halting on a busy or clear channel is provided, with automatic pause and restart feature. Scan either the band or the memories.

LIMITED BAND SCAN
You can program upper and lower frequency limits, then command the transceiver to scan that segment or exclude that segment.

TEN MEMORY CHANNELS
The memories may be used for either simplex or repeater operation. No need to throw a "5 UP" switch for those 15 kHz channels, either!

LONG-LIFE MEMORY BACKUP
A Lithium cell provides the memory backup function. Now you won't dump memory when switching battery packs.

LOW CURRENT DRAIN
Typical standby current drain is 20 mA, for long battery life.

450 mAH BATTERY PACK
With more capacity than competing packs, the FNB-2 battery pack gives you those precious extra minutes of operating time that might prove critical in an emergency!

HI/LOW POWER SWITCH
In the high power position, the FT-208R packs a wallop at 2.5 watts output, while the Ft-708R output is 1 watt. Switch to low power for 1 watt output on the FT-208R, 200 mW on the FT-708R, for even greater battery life.

PRIORITY CHANNEL
A priority channel may be programmed from the keyboard, allowing you to check a favorite channel while operating on another.

AUTOMATIC BAND AND MEMORY SCAN WITH PAUSE/RESTART
Automatic scanning of the band or memories (or a segment of the band) with pause and restart feature.

16 BUTTON DTMF PAD
For autopatch operation, a 16 button dual tone pad is built into every FT-208R and FT-708R.

PROGRAMMABLE SPLITS
The popular ±600 kHz shift is standard (±5 MHz on the FT-708R) on the FT-208R. Odd splits of up to 4 MHz may easily be programmed from the keyboard. Additionally, a split memory/dial mode provides a third method of operating on unusual splits.

OPTIONAL 32 TONE CTCSS
Easy interface is provided to the synthesized SSY-32 CTCSS Encoder, providing all 32 common subaudible tones for repeater operation.

LOCK SWITCH
The keyboard lock switch allows you to disable entry from the keyboard, thus preventing inadvertent frequency change.

FULL LINE OF ACCESSORIES
A Yaesu tradition, a full line of accessories is available to maximize your enjoyment of the FT-208R and FT-708R.

For more than a quarter of a century, Yaesu has produced reliable, high-performance communications equipment for the Amateur and Land Mobile services. Contact us today for full information on our cost-effective line of HF, VHF and UHF transceivers — at Yaesu we want you to get your message across!

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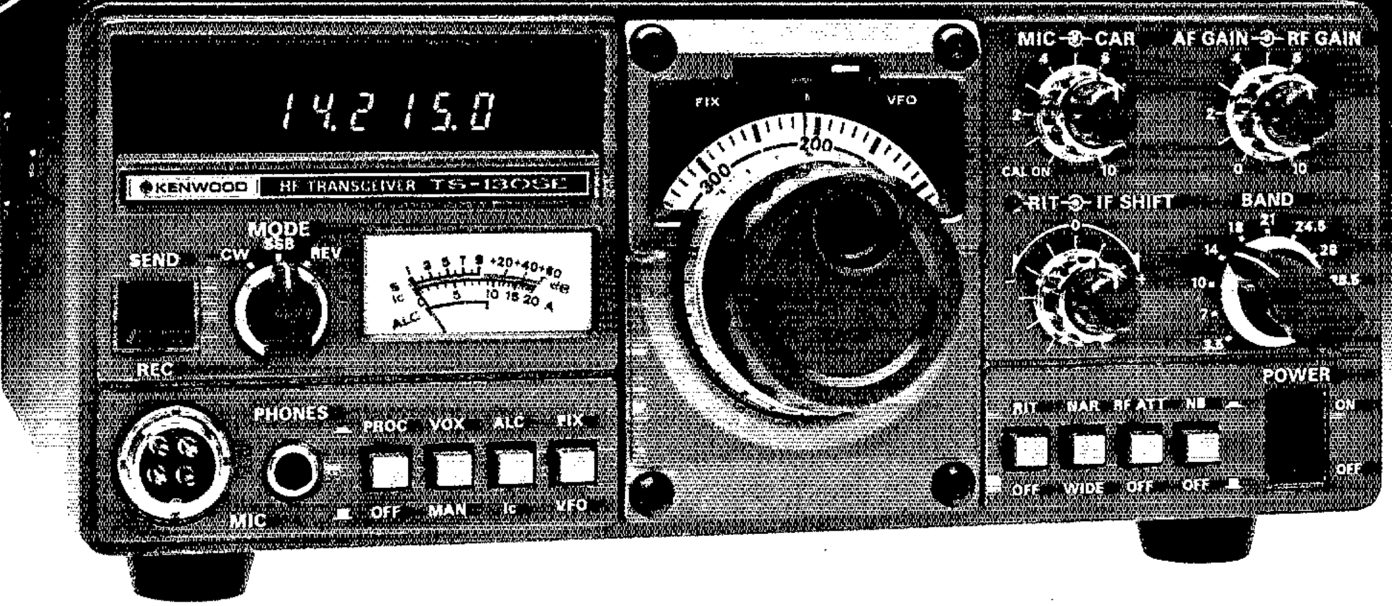
NEW

Small talk.



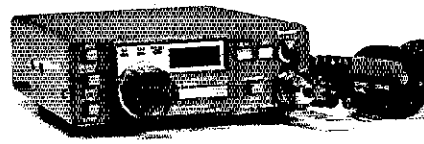
Processor, IF shift, N/W switch, affordable

TS-130SE

An incredibly compact, full-featured, reasonably priced, all solid-state HF SSB/CW transceiver for both mobile and fixed operation. It covers 3.5 to 29.7 MHz (including the three new Amateur bands) and features digital display, IF shift, speech processor, and narrow/wide filter selection on both SSB and CW.

TS-130SE FEATURES:

- **80-10 meters, including three new bands**
  Covers all Amateur bands from 3.5 to 29.7 MHz, including the new 10, 18, and 24-MHz bands. Receives WWV on 10 MHz. VFO covers more than 50 kHz above and below each 500-kHz band.
- **Two power versions...easy operation**
  TS-130SE runs 200 W PEP/160 W DC on 80-15 meters, and 160 W PEP/140 W DC on 12 and 10 meters. TS-130V runs 25 W PEP/20 W DC input on all bands. Solid-state, wideband final amplifier eliminates transmitter tuning; receiver wideband RF amplifiers eliminate preselector peaking.
- **Digital display built-in**
  Six-digit green fluorescent tube display indicates operating frequency to 100 Hz, external VFO or fixed-channel frequency, RIT shift, and CW transmit-receive shifts. Analog subdial back-up.
- **Built-in Speech Processor**
  Increases audio punch and average SSB output power.
- **IF shift circuit**
  Very effective in eliminating interfering signals, by placing them outside the IF passband.
- **CW narrow/wide selection**
  "N-W" switch allows selection of wide or narrow bandwidths. Wide CW and SSB bandwidths are the same. Optional YK-88C (500 Hz) or YK-88CN (270 Hz) filter may be installed for narrow CW.
- **SSB narrow selection**
  "N-W" switch allows selection of narrow SSB bandwidth to eliminate QRM, when optional YK-88SN (1.8 kHz) filter is installed. (CW filter may still be selected in CW mode.)
- **Sideband mode selected automatically**
  LSB on 40 meters and below; USB on 30 meters and above. SSB REVERSE position on MODE switch.
- **RF Attenuator, built-in**
  Allows optimum rejection of IM distortion.
- **Single conversion PLL system**
  Provides improved stability and spurious characteristics.
- **Protection circuit for final amplifier.**
  For maximum reliability, the final amplifier is protected by circuitry that monitors VSWR and temperature. (TS-130V, VSWR only.) Output power is reduced when abnormal operating conditions occur. If especially severe operation is anticipated, optional cooling fan, model FA-4, may be added. Model TS-130S, with FA-4 installed, is also available.
- **Effective noise blanker**
  Eliminates pulse-type noise.
- **Compact and lightweight**
  Only 3-3/4 H x 9-1/2 W x 11-9/16 D (inche weight 12.3 lbs.
- **Other important features include:**
  VOX for SSB, CW semi break-in with sidetone, one fixed channel, and 25 kHz marker.



Optional DFC-230 Digital Frequency Controller
Allows frequency control in 20-Hz steps with UP/DOWN microphone (supplied with DFC-230). Includes four memories (handy for split-frequency operation) and digital display. Covers 100 kHz above and below each 500-kHz band. Very compact.

More information on the TS-130 Series is available from all authorized dealers of
Trio-Kenwood Communicatio
1111 West Walnut Street
Compton, California 90220.

KENWOOD
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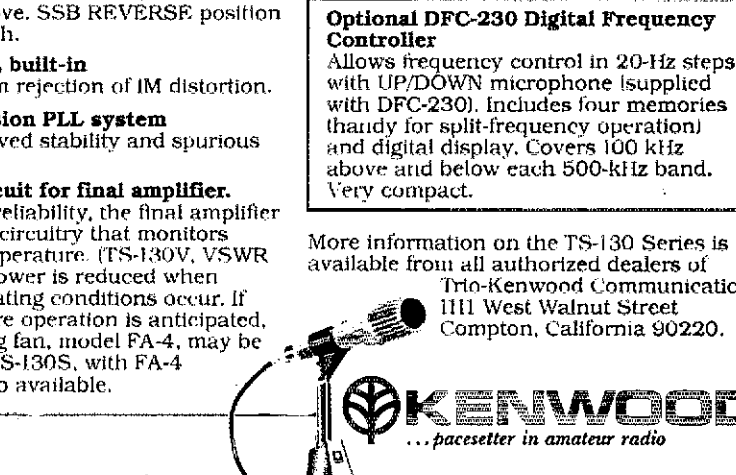
Matching accessories for fixed station operation:

- PS-30 base station power supply (remotely switchable ON or OFF with TS-130SE power switch).
- SP-120 external speaker
- VFO-120 remote VFO
- MC-50 50kΩ/500Ω desk microphone

Other accessories not shown:

- FA-4 fan unit for TS-130SE
- YK-88C (500 Hz) and YK-88CN (270 Hz) CW filters
- YK-88SN (1.8 kHz) narrow SSB filter
- AT-130 compact antenna tuner (80-10 meters, including 3 new bands)
- MB-100 mobile mounting brackets
- KPS-21 base station power supply (also for TS-130SE)
- TL-922A linear amplifier
- PS-20 base-station power supply for TS-130V
- PC-1 phone patch
- HC-10 world digital clock
- MC-30S and MC-35S noise cancelling hand microphones
- MC-60 deluxe desk microphone
- SP-40 compact mobile speaker
- HS-4, HS-5, and HS-6 headphones



Specifications and prices are subject to change without notice or obligati