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Amateur Radio

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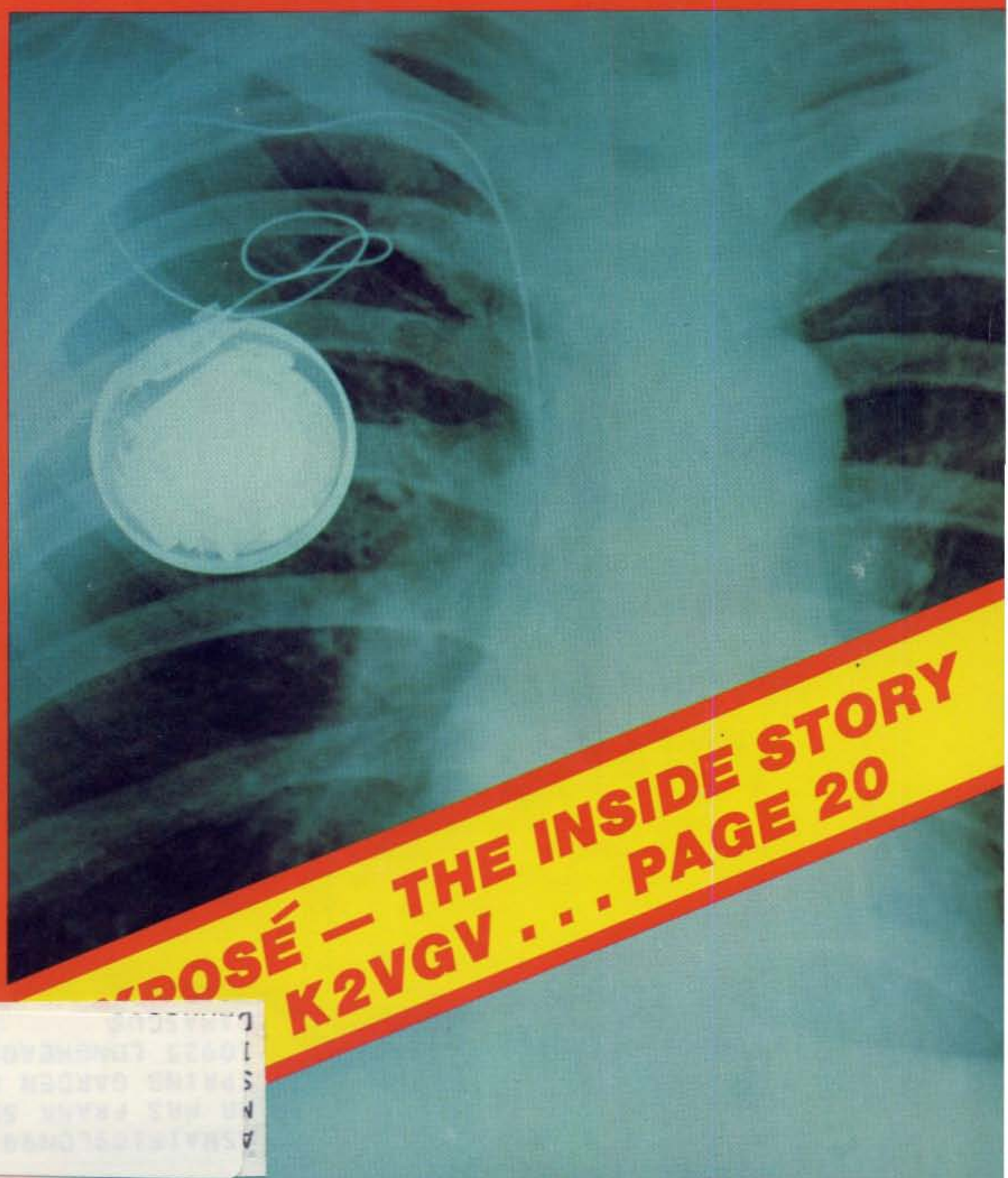
CQ Reviews: The Electronic Research SL-55 Audio Active Filter . . . p.40



EXPOSÉ — THE INSIDE STORY K2VGV . . . PAGE 20

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THE RADIO AMATEUR'S JOURNAL

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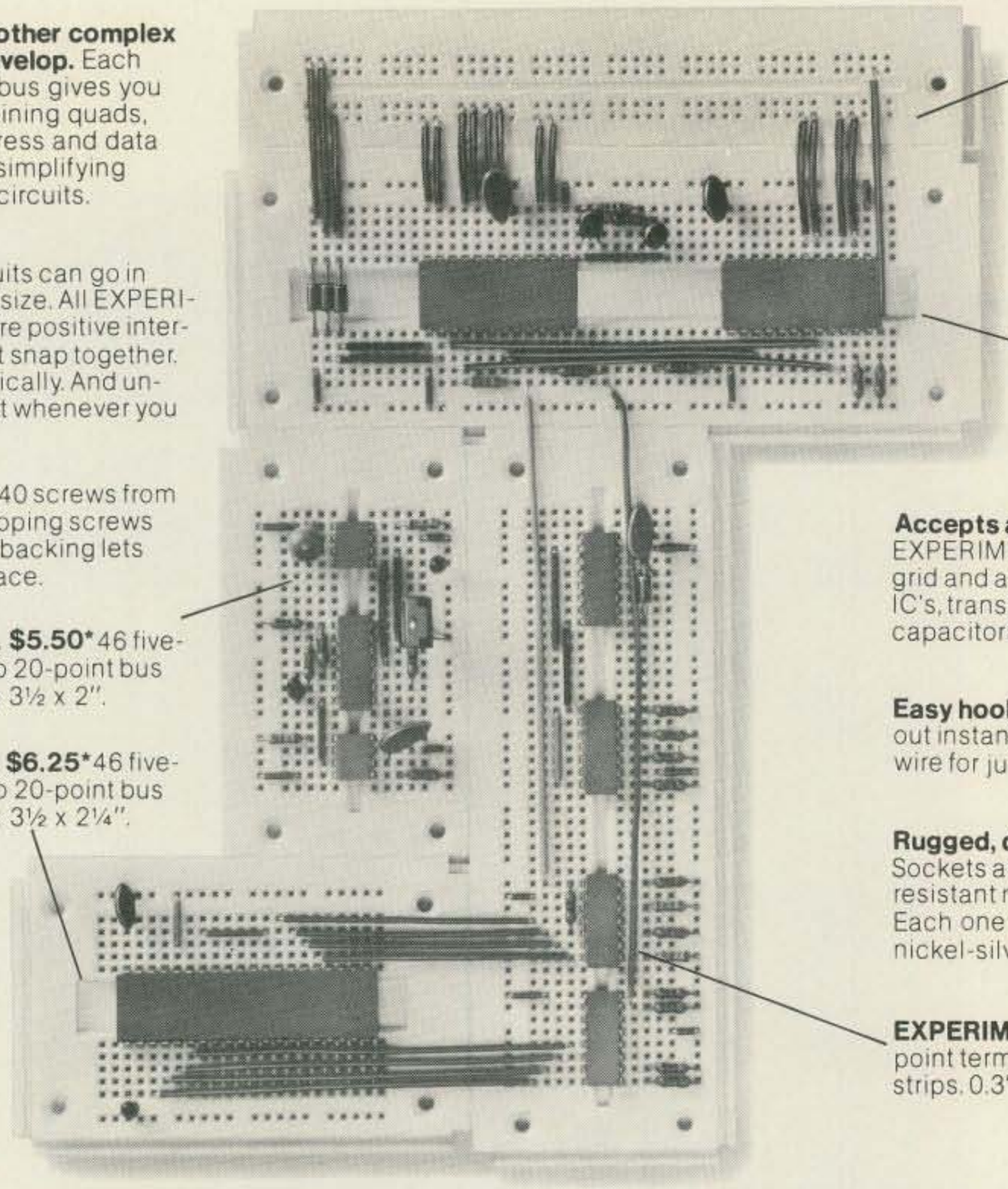
Mix and match. Use large and small chips in the same circuit without problems. There are two sizes of EXPERIMENTOR sockets with 0.3" and 0.6" centers.



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Designated tie-points. Simplify translation from breadboard to PC-boards or wiring tables.

EXPERIMENTOR 600. $10.95* 94 five-point terminals plus two 40-point bus strips. 0.6" centers; ⅜ x 6 x 2¼".

Accepts all standard components. EXPERIMENTOR sockets conform to an 0.1" grid and are DIP compatible. Also accept IC's, transistors, diodes, LED's, resistors, capacitors, transformers, pots, etc.

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WHAT ARE YOU WAITING FOR?

Discover today how solderless breadboarding can save time and money on every circuit you build. Get acquainted with EXPERIMENTOR™ sockets† and how they simplify circuit design, assembly and testing. Eliminate the hassles and component damage of soldering. No special hardware or jumper cables required, either. And the price is so low, it's hard to believe.

"Order today. Call 203-624-3103 (East Coast) or 415-421-8872 (West Coast): 9 a.m.-5 p.m. local time. Major credit cards accepted. Or see your CSC dealer. Prices slightly higher outside USA."

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†U.S. Patent No. D235,554

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CIRCLE 9 ON READER SERVICE CARD

This NEW MFJ Versa Tuner II . . .

has SWR and dual range wattmeter, antenna switch, efficient airwound inductor, built in balun. Up to 300 watts RF output. Matches everything from 1.8 thru 30 MHz: dipoles, inverted vees, random wires, verticals, mobile whips, beams, balanced lines, coax lines.

NEW, IMPROVED MFJ-941B HAS . . .
- More inductance for wider matching range
- More flexible antenna switch
- More sensitive meter for SWR measurements down to 5 watts output

$89.95

Transmitter matching capacitor. 208 pf. 1000 volt spacing.

Sets power range, 300 and 30 watts. Pull for SWR.

Meter reads SWR and RF watts in 2 ranges.

Efficient airwound inductor gives more watts out and less losses.

Antenna matching capacitor. 208 pf. 1000 volt spacing.

Only MFJ gives you this MFJ-941B Versa Tuner II with all these features at this price:

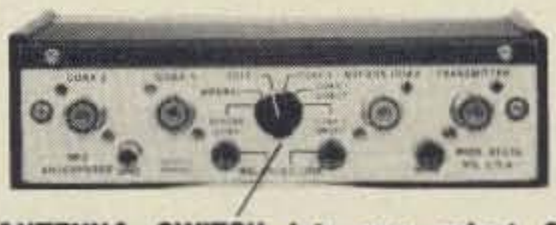
A SWR and dual range wattmeter (300 and 30 watts full scale) lets you measure RF power output for simplified tuning.

An antenna switch lets you select 2 coax lines direct or thru tuner, random wire/balanced line, and tuner bypass for dummy load.

A new efficient airwound inductor (12 positions) gives you less losses than a tapped toroid for more watts out.

A 1:4 balun for balanced lines. 1000 volt capacitor spacing. Mounting brackets for mobile installations (not shown).

With the NEW MFJ Versa Tuner II you can run your full transceiver power output — up to 300 watts RF power output — and match your transmitter to **any** feedline from 160 thru 10 Meters whether you have coax cable, balanced line, or random wire.



ANTENNA SWITCH lets you select 2 coax lines direct or thru tuner, wire/balanced line, dummy load.

You can tune out the SWR on your dipole, inverted vee, random wire, vertical, mobile whip, beam, quad, or whatever you have.

You can even operate all bands with just one existing antenna. No need to put up separate antennas for each band.

Increase the usable bandwidth of your mobile whip by tuning out the SWR **from inside your car.** Works great with all solid state rigs (like the Atlas) and with all tube type rigs.

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This beautiful little tuner is housed in a deluxe eggshell white Ten-Tec enclosure with walnut grain sides.

SO-239 coax connectors are provided for transmitter input and coax fed antennas. Quality five way binding posts are used for the balanced line inputs (2), random wire input (1), and ground (1).

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Same as MFJ-941B but less 6 position antenna switch.

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Efficient 12 position air inductor for more watts out. Matches dipoles, vees, random wires, verticals, mobile whips, beams, balanced lines, coax. 200 watts RF, 1:4 balun, 5x2x6 in.

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1.8 thru 30 MHz. Up to 200 watts RF output. Matches high and low impedances. 12 position inductor. SO-239 connectors. 2x3x4 inches. Matches 25 to 200 ohms at 1.8 MHz. Does not tune coax lines.

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CIRCLE 34 ON READER SERVICE CARD

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The Radio Amateur's Journal

FEATURES

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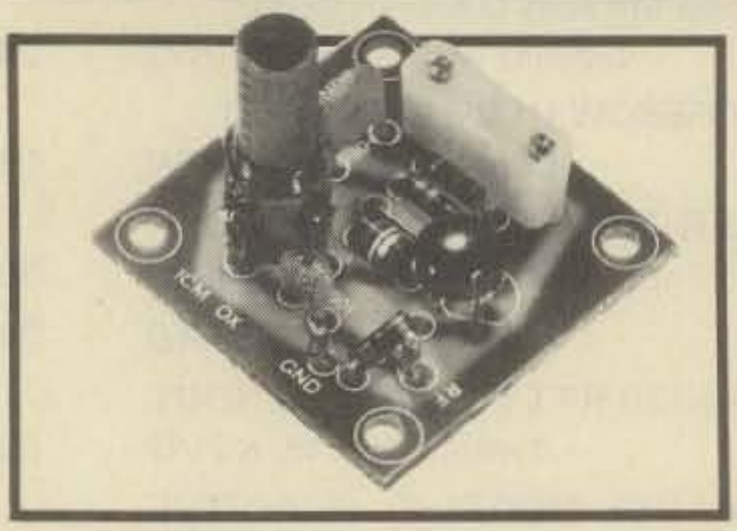
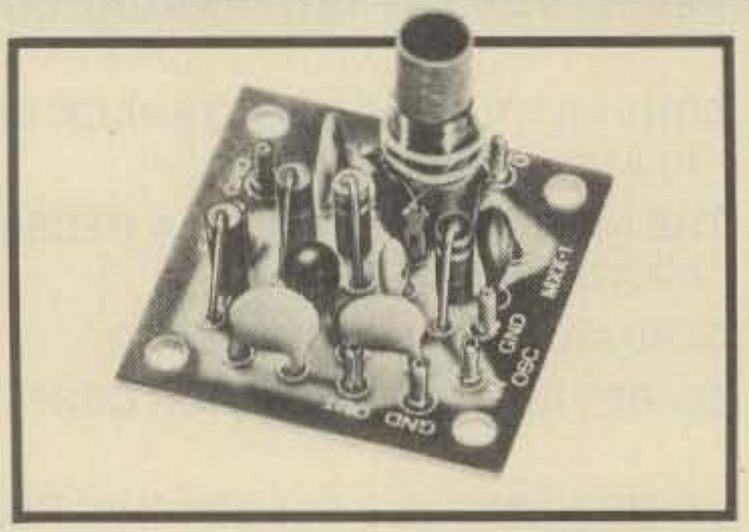


OX OSCILLATOR

Crystal controlled transistor type. 3 to 20 MHz, OX-Lo, Cat. No. 035100. 20 to 60 MHz, OX-Hi, Cat. No. 035101.
Specify when ordering.

$4.95 ea.



MXX-1 TRANSISTOR RF MIXER

A single tuned circuit intended for signal conversion in the 30 to 170 MHz range. Harmonics of the OX or OF-1 oscillator are used for injection in the 60 to 179 MHz range. 3 to 20 MHz, Lo Kit, Cat. No. 035105. 20 to 170 MHz, Hi Kit, Cat. No. 035106.
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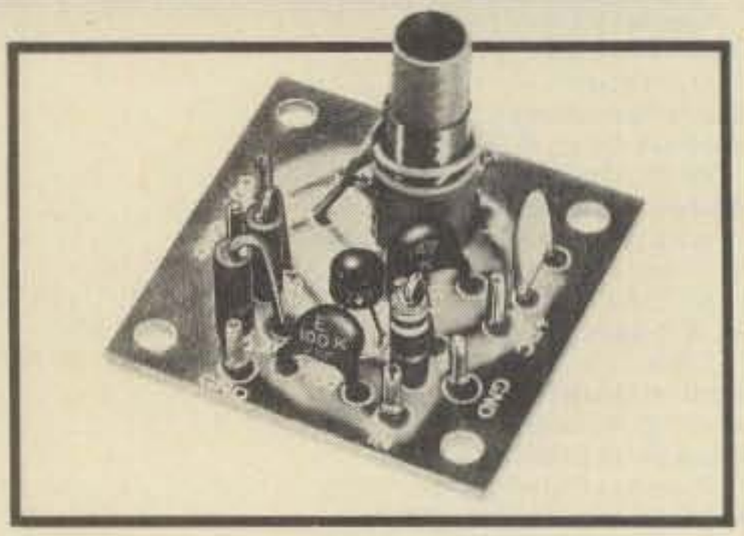

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A single tuned output amplifier designed to follow the OX or OF-1 oscillator. Outputs up to 200 mw, depending on frequency and voltage. Amplifier can be amplitude modulated 3 to 30 MHz, Cat. No. 035104.
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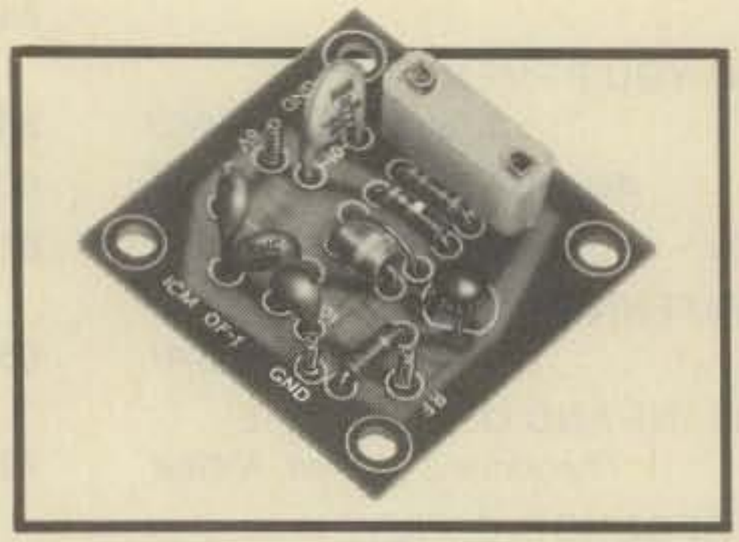

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Resistor/capacitor circuit provides osc over a range of freq with the desired crystal. 2 to 22 MHz, OF-1 LO, Cat. No. 035108. 18 to 60 MHz, OF-1 HI, Cat. No. 035109.
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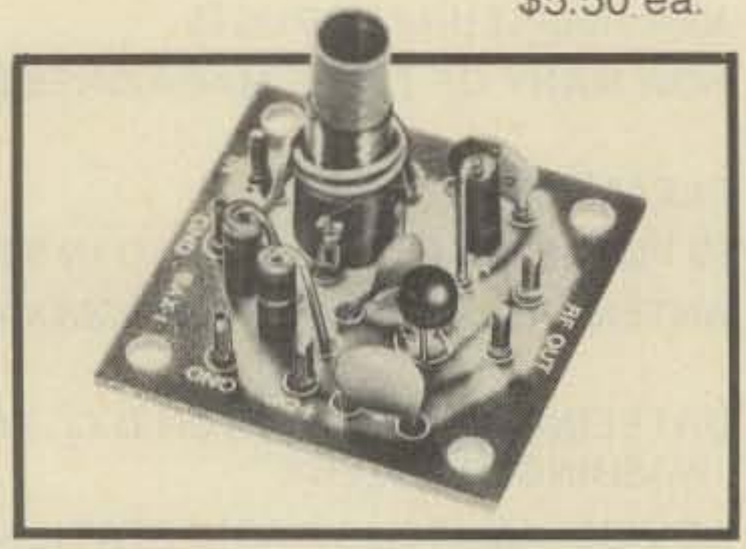

SAX-1 TRANSISTOR RF AMP

A small signal amplifier to drive the MXX-1 Mixer. Single tuned input and link output. 3 to 20 MHz, Lo Kit, Cat. No. 035102. 20 to 170 MHz, Hi Kit, Cat. No. 035103.
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BAX-1 BROADBAND AMP

General purpose amplifier which may be used as a tuned or untuned unit in RF and audio applications. 20 Hz to 150 MHz with 6 to 30 db gain. Cat. No. 035107.
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031080	3 to 20 MHz — for use in OX OSC Lo	
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031300	3 to 20 MHz — For use in OF-1L OSC	
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CIRCLE 27 ON READER SERVICE CARD

Zero Bias

an editorial

I've received several letters stating that the title "Zero Bias" is actually a misnomer. Readers have pointed out that I do exhibit Bias especially when, in their words, I "knock" the League. I take it to mean that these readers feel that I am prejudiced against the goings-on in Newington. This same sentiment is not voiced when I point out failings within the Government and the FCC in particular. So I must take it then to mean that these same people tolerate or accept government inefficiency and non-representational leadership as a way of life that in no way concerns them. The activities of the League, however, are a different matter. Pointing out what is wrong with the government is OK but it's definitely not OK when it comes to the League. That's prejudice.

On the other hand I'd like to point out something good that happened for amateur radio through the League. At the RFI hearings held in Washington this summer, Harry Dannals, W3TUK, President of the League, made an excellent case for amateur radio in his presentation. You can read all about it in Dr. Ted Cohen's new column "dateline . . . Washington D.C." which starts this month in the pages of *CQ*. I'm prejudiced *in favor* of this type of activity from the League and would be more than happy to report on it.

As a follow up to my comments in the July *Zero Bias* on the First Amendment, the Supreme court voted against WBAI and for (upheld) the FCC. This simply means that there is in the eyes of the Supreme Court a power vested in the FCC, a power that can and should be exercised on how the frequency spectrum is to be used and managed. However vague the wording of Section 1464, the FCC was within its right to sanction WBAI for its choice of program material. It is empowered to do so and did so.

However, should you begin to relax and reason that some teeth have finally been put into the FCC, forget it. This monumental decision actually pertains only to WBAI, and as one Judge put it, "Not to two-way radio users such a cab companies." Each case that arises therefore will have to be taken one at a time. The FCC *is* empowered to respond to violations in Section 1464 *only* in regard to indecent language involving sex and excretion. How that will be interpreted and inforced is anybody's guess.

It looks like the FCC is also trying to get its own act together with regard to an employees union. Both professional and non-professional employees voted in favor of union representation as a means of dealing with their employers. Perhaps they've just realized how difficult it is to get what you want from the Government on your own.

The union idea could also have come about as a form of job security. Part of the revision planned for the Communications Act of 1934 is the abolishment of the FCC itself. Their function in part would be done by a new *Communications Regulatory Commission* and frequency allocations would be the responsibility of the *National Telecommunications Agency*. This change would not really effect us but certainly effect them. Maybe they're worried about what might happen.

While I'm picking on the FCC I might as well add my disappointment in their overall lack of support for Senator Goldwater's RFI Bill last June at hearings held in Washington. It seems as though the Safety and Special Services, the Office of Plans and Policy, and the General Council of the FCC opposed the Bill, while the Field Operations Bureau and Chief Engineer's Office of the FCC were in favor of the Bill. They were apparently concerned with the cost of administration and enforcement. This was not really a concern when they set up the CB Service or they arbitrarily banned ten-meter linears for amateurs. They seem to see what they want to see and enforce what they want to enforce in a capriciously cavalier manner with utter disregard for their purpose in being.

Commissioner Ferris appears to be applying a delaying tactic by the use of another NOI and study to be done this year. It is apparently obvious that the FCC does not want to put the responsibility where it belongs. For whatever reason the FCC sees fit, it has basically ignored or looked away from the problem for a long time. In my April Editorial I reprinted a 1946 Editorial from the pages of *CQ* dealing with the same problem. It would seem logical that the FCC should be well under way to make up their minds on a fundamental issue after 32 years. So for at least 32 years the problem still exists. It has existed through countless Commissioners who all seem to have had the same philosophy of "leave industry alone." Why?

If industry (the consumer electronic industry) were put in the position of being responsible for their products as to what signals they emit or receive then perhaps the cost of their bill of materials would go up. This increase has been shown to be negligible at the point of manufacture but significantly higher as an addition or improvement. Industry could argue that this would cut into their profit picture, affect gross sales adversely and consequently penalize both the consumer and the stockholder. If anything, an improved RFI-free product would benefit the consumer's enjoyment of the product and make it more desireable even if the price had to increase slightly. In other words, the consumer would be getting more for his money. The stockholder might initially share in slightly lower dividends but that should even out eventually.

Speaking of stockholders, I have an anonomous reader who sends in periodic letters containing information on the FCC purporting to reveal conflicts of interest and other misdoings within the Commission.

As part of each letter, the writer lists a particular key individual within the FCC and the amount of stock that person has in various companies. Several companies that in some way are regulated by the FCC and are keenly involved with the consumer industry. I would assume that these individuals are ethical,

(Continued on page 94)

KENWOOD
...pacesetter in amateur radio

THE KENWOOD NAME HAS GROWN TO REPRESENT THE FINEST AMATEUR RADIO EQUIPMENT AVAILABLE. THE TL-922A LINEAR AMPLIFIER CARRIES ON THAT TRADITION. AS A LINEAR IT GETS YOUR SIGNAL THROUGH TODAY'S CROWDED BANDS AND PROVIDES THE POWER TO REACH THOSE FAR AWAY PLACES WITH EASE. AND BECAUSE IT'S KENWOOD YOU CAN COUNT ON ITS DEPENDABILITY. THE TL-922A IS FCC TYPE ACCEPTED. IT RUNS THE FULL LEGAL LIMIT ON ALL HAM BANDS FROM 160-15 METERS AND IS COMPATIBLE WITH MOST AMATEUR EXCITERS. CONTACT YOUR NEAREST AUTHORIZED KENWOOD DEALER FOR COMPLETE SPECIFICATIONS AND THE BEST DEAL.

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Instant heating filaments — The 3-500Z tubes require no warm up period. Just turn it on and go!

Time delay fan circuit — Even after you turn the TL-922 off, the super quiet fan continues to work for approximately 2 minutes to greatly extend tube life.

Adjustable ALC output voltage — Lets you tailor the ALC voltage to your exciter.

Standby position — Provides amplifier bypassing without having to turn the AC power off.

Two independent safety interlocks — One disconnects AC line voltage and the second shorts B+ to ground when tripped.

Vernier plate control — For smooth, easy tune-up.

Diecast side panels — Includes functional carrying handles for easy transportation.

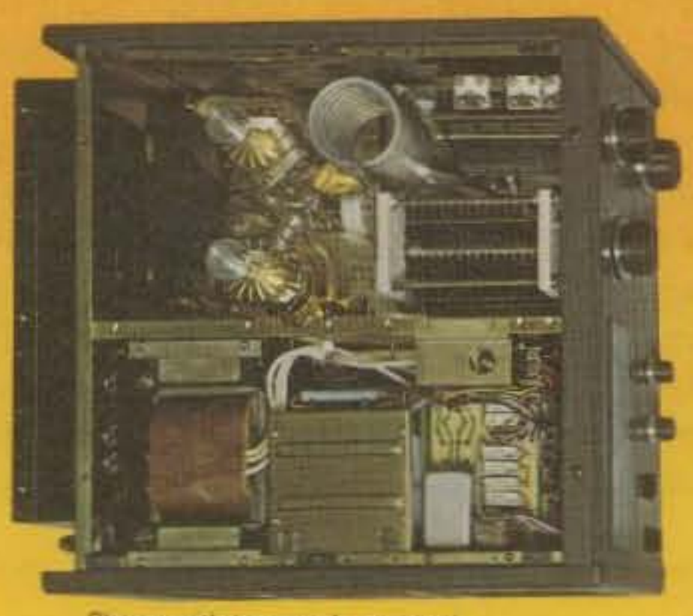
Thermal protection of power transformer — Amplifier automatically switches to standby if power transformer temperature exceeds 145°F.

Tuned Input Circuit — Means improved spurious characteristics.

Line voltage selector — Easily switched between 120 and 240 VAC.

Multimeter — Reads high voltage, relative output or grid current (selectable)

Plate Current Meter — Separate meter allows continuous monitoring of plate current.



Shown with top panels removed

Frequency Range: Amateur bands 160-15 meters
Drive Power Required: 80 W nom, 120 W max
Mode and Duty Cycle: SSB, cont for 30 min CW and RTTY, key-down cont for 10 min
RF Input Power: SSB: 2,000 watts PEP; CW, RTTY: 1,000 watts DC
Plate Voltage: **(at idle)** 3.1 kV SSB, 2.2 kV CW, RTTY
Circuit Type: Class AB_2 grounded grid linear amplifier
Input Impedance: 50 Ω, unbalanced at better than 1.5:1 SWR
Output Impedance: 50 to 75 Ω, unbalanced
Harmonic Suppression: min 40 dB, depending on exciter used
Fan Motor Delay Time: 140±30 seconds (at room temperature)

ALC: Negative going, adjustable threshold −8 VDC max output (typ)
Tubes: Two Eimac 3-500Z
Semiconductors: 18 diodes, 1 Zener diode
Power Requirements: 120 V, 28 A; 220/240 V, 14 A; 50/60 Hz; for maximum SSB input
Dimensions: 390 mm (15⅜") x 190 mm (7½") x 407 mm (16")
Weight: Net 31 kg (68 lbs); Shipping 38 kg (83 lbs)

The above specifications are subject to change without notice due to developments in technology

The TS-520S transceiver provides full transmit and receive coverage of all Amateur bands from 160 through 10 meters. It also receives 15.0 (WWV) to 15.5 MHz and another 500-kHz range of your choice in the auxiliary band position. With the optional DG-5, you have a large digital frequency readout when transmitting and receiving, and the DG-5 also doubles as a 40-MHz frequency counter. The TS-520S includes a built-in AC power supply, and, with the addition of the optional DS-1A DC-DC converter, it can function as a mobile rig. It features a very effective noise blanker, RIT, eight-pole crystal filter, 25-kHz calibrator, front-panel carrier level control, semi-break-in CW with sidetone, built-in speaker, heater switch, 20-dB RF attenuator and easy phone-patch connection. RF input power is 200 W PEP on SSB and 160 W DC on CW. Carrier suppression is better than —40 dB and sideband suppression is better than —50 dB. Spurious radiation is less than —40 dB. Receiver sensitivity is 0.25 μV for 10 dB (S+N)/N. Selectivity is 2.4 kHz at —6 dB/4.4 kHz at —60 dB and, with the optional CW-520 CW filter, is 0.5 kHz at —6dB/1.5 kHz at —60 dB.

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Announcing

• **Ontario, Canada** — The 10th Annual R.S.O. Convention will be held on October 13, 14, and 15, 1978. Registration for RSO members is $8, for non-members, registration is $9. Talk-in station call VE3RSO on 75 meters at 3.755 (ontars); as well as VE3LCA in 146.46 out 147.06; VE3TTT, in 147.78 out 147.18; VE3TTT in 449.4 out 444.4, or simplex 146.52. For more information, contact: The London Amateur Radio Club Inc., P.O. Box 82, Station B, London, Ontario, Canada N6A 4V3. For advance tickets, write to the same address and include "Attention: Convention Tickets" in the address.

• **Kansas City, MO** — The Mo-Kan Council of Amateur Radio Clubs is pleased to announce the ARRL Midwest Division Convention on October 13, 14, and 15, 1978, at the Kansas City Hilton. Make your reservations directly with the hotel and mention ARRL discounted rates. There will be exhibits, ladies programs, ham sessions, etc. For more information, write to: The Mo-kan Council of Amateur Radio Clubs, PO Box 704, Kansas City, MO 64141.

• **Boxborough, MA** — The 1978 New England ARRL Convention will be held on October 14 and 15, 1978, at the Sheraton Boxborough. There will be a giant exhibit area, free parking for everyone. For more information, write: Eugene H. Hastings, W1VRK, Chairman, 28 Forest Ave., Swampscott, MA 01907 or phone (617) 593-7700.

• **Taylor, MI** — The Repeater Association of Downriver Amateur Radio, (R.A.D.A.R.), will be holding their 2nd Annual Swap and Shop on Sunday, October 22, 1978, at the Kennedy High School in Taylor. Located on Northline Road East of Telegraph Road, (U.S. 24). Admission will be $2. Talk-in on 93-33, 52-52, and 94-94. For more info write: R.A.D.A.R., Inc., P.O. Box 1023, Southgate, Michigan 48195.

• **West Ghent, NY** — The Northeastern State 160 Meter Amateur Radio Association will hold its Annual Banquet on Sunday, October 8, 1978, at Kozel's Restaurant in West Ghent. A roast beef dinner will be served at 6 p.m. Cost is $8.00 per person. From 1 p.m. to 4 p.m. there will be a flea market. Cocktail hour is from 4 p.m. till dinner time. XYLs are welcome.

• **Warrington, PA** — The Mt. Airy VHF Radio Club (the Packrats) are holding 'Hamarama 78' at the Bucks Co. Drive-In Theater, Route 611 (Easton Rd.) in Warrington on Sunday October 1st, 1978, from 8 a.m. to 4 p.m., rain or shine. Talk in via W3CCX/3 on 146.52 MHz. Advance registration to the Mid-Atlantic States VHF Conference on Saturday, September 30, 1978) includes admission to "Hamarama 78". For more info, contact: WA3AXV, Ron Whitsel, Chairman, P.O. Box 353, Southampton, PA 18966, (215) 355-5370.

• **Gaithersburg, MD** — The Foundation for Amateur Radio will hold its Annual Hamfest at the Gaithersburg Fairgrounds, on Sunday, October 8, 1978. Featured will be a large flea market, food services, exhibits, ladies events and many prizes. Participation fee is $2, sales space for flea market is $5, and space for commerical exhibitors is $15 each with pre-registration required prior to October 4th. For more information, write or call: Ron Levin, W3GBU, 802 Greenview Court, Reisterstown, MD 21136, telephone (301) 833-1816.

• **Biloxi, MS** — The Mississippi Gulf Coast Ham/Swap Fest will be held on Sunday, October 22, 1978, at the International Plaza located at the west end of the Biloxi/Ocean Springs bridge on Highway 90. Tickets are a $1 donation, tables are $2. Talk-in on 146.52 and 146.13/73. For more information, advance tickets, and table reservations, contact: Irvin L. Kelly, K5YIN, 116 Wiltshire Blvd., Biloxi, MS 39531, or phone (601) 374-3340.

• **East Rutherford, NJ** — The Knight Raiders VHF Club present its Auction and flea market on Saturday, October 14, 1978, at St. Joseph's Church. There will be free admission and free parking. Talk-in on 146.52 and 144.65/145.25. For further information, call: Bob Kovaleski, (201) 473-7113 or Bob Czyzewski, (201) 791-5651.

• **Geneva, Switzerland** — The 21st Jamboree-on-the-air will be held over the week-end of October 21st-22nd, 1978. Suggested starting time is 00.01 hours local time on Saturday, the 21st, to terminate 48 hours later, i.e. at 23.59 hours local time, Sunday, October 22nd, 1978. These are suggested times only; many stations find it more convenient to operate on the Friday evening and each station is completely free to select its own times and periods for operation. However, they suggest that there is a better chance of finding overseas stations if the suggested times are followed. Local regulations must be strictly adhered to. It is suggested that you look for stations around the offical World Scout frequencies: Phone: 80m band-3,740:3,940 kHz; 40m-7,090; 20m-14,290; 15m-21,360; and 10m-28,990. For CW: 80m-3,590; 40m-7,030; 20m-14,070; 15m-21,140; and 10m-28,190 kHz. Listen before you call "CQ Jamboree" to ensure that the frequency is not already in use.

• **League City, TX** — The Tidelands Amateur Radio Society (TARS) would like to announce their Annual Hamfest to be held on October 8, 1978, at the Galveston County Park at League City, TX. Time: from 09:00 to 16:00 CDT. There will be prizes, large and small, a flea market, an auction, games, etc. Registration is $1.00 which includes a ticket for the main prize. For more information, contact: The Tidelands Amateur Radio Society, (TARS), P.O. Box 73, Texas City, TX 77590.

• **Kalamazoo, MI** — The Western University would like to announce its 24th VHF Conference on Saturday, October 7, 1978, from 1:30 p.m. to 5:00 p.m. with a 6:30 p.m. dinner scheduled. Papers are invited from a wide range of topics applicable to the VHF frequency bands of 50, 144, 220, 420 and 1215 MHz. Inquiries with s.a.s.e., should be sent to: Dr. Glade Wilcox, W9UHF/8, Program Chairman, VHF

(Continued on page 95)

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Sold complete, with base mic and AC power/speaker, as shown.

IC-701 meets FCC Part 97.73.

All ICOM radios significantly exceed FCC specifications limiting spurious emissons.

Specifications: ☐ Frequency Coverage: 1.8 MHz — 2.0 MHz; 3.5 MHz — 4.0 MHz; 7.0 MHz — 7.5 MHz; 14.0 MHz — 15.2 MHz; 21.0 MHz — 21.5 MHz; 28.0 MHz — 30.0 MHz ☐ Frequency Control: LSI based 100 Hz step Digital PLL synthesizer. Independent Transmit-Receive duplex on same band, standard with every radio. ☐ Frequency Readout: 6 digit LED 100 Hz readout ☐ Power Supply Requirements: DC 13.6 V± 15% Negative ground current drain, 18 A max at 100 W output; AC power supply, speaker console for AC operation ☐ Antenna Impedance: 50 ohms unbalanced, VSWR 2.0:1 ☐ Weight: 7.3 Kg ☐ Size: (transceiver unit only) 111mm (h) × 241mm (w) × 311mm (d) ☐ RF Power Output: CW (A1), RTTY (F1), 100 W; SSB (A3J), 100 W PEP; Continuously adjustable 0-100W ☐ Emission Modes: A1, CW; A3J, SSB; F1, RTTY ☐ Harmonic and Spurious Output: more than 60 dB below peak power (meets FCC 97.73) ☐ Carrier Suppression: more than 40 dB down ☐ Unwanted Sideband: more than 40 dB down at 1000 Hz AF input ☐ Microphone Impedance: 600 ohms ☐ Receiving System: triple conversion, super heterdyne, with continuous bandwidth control (100 Hz — 2.4 KHz) ☐ Receiving Modes: A1, A3J (USB/LSB), F1 ☐ IF Frequencies: 1st & 3rd, 9.0115 MHz; 2nd, 10.7015 MHz; with continuous bandwidth control ☐ Sensitivity: better than 0.25 microvolts for 10 dB S+N/N ☐ Selectivity: SSB, RTTY, ± 1.1 KHz at −6 dB (adjustable to ± 0.5 KHz min), ± 2.0 KHz at −60 dB; CW, ± 250 Hz at −6 dB ± 700 Hz at −60 dB; CN-N, ± 100 Hz at −6 dB, ± 500 Hz at −60 dB (with Audio Filter) ☐ Spurious Response Rejection Ratio: better than 60 dB

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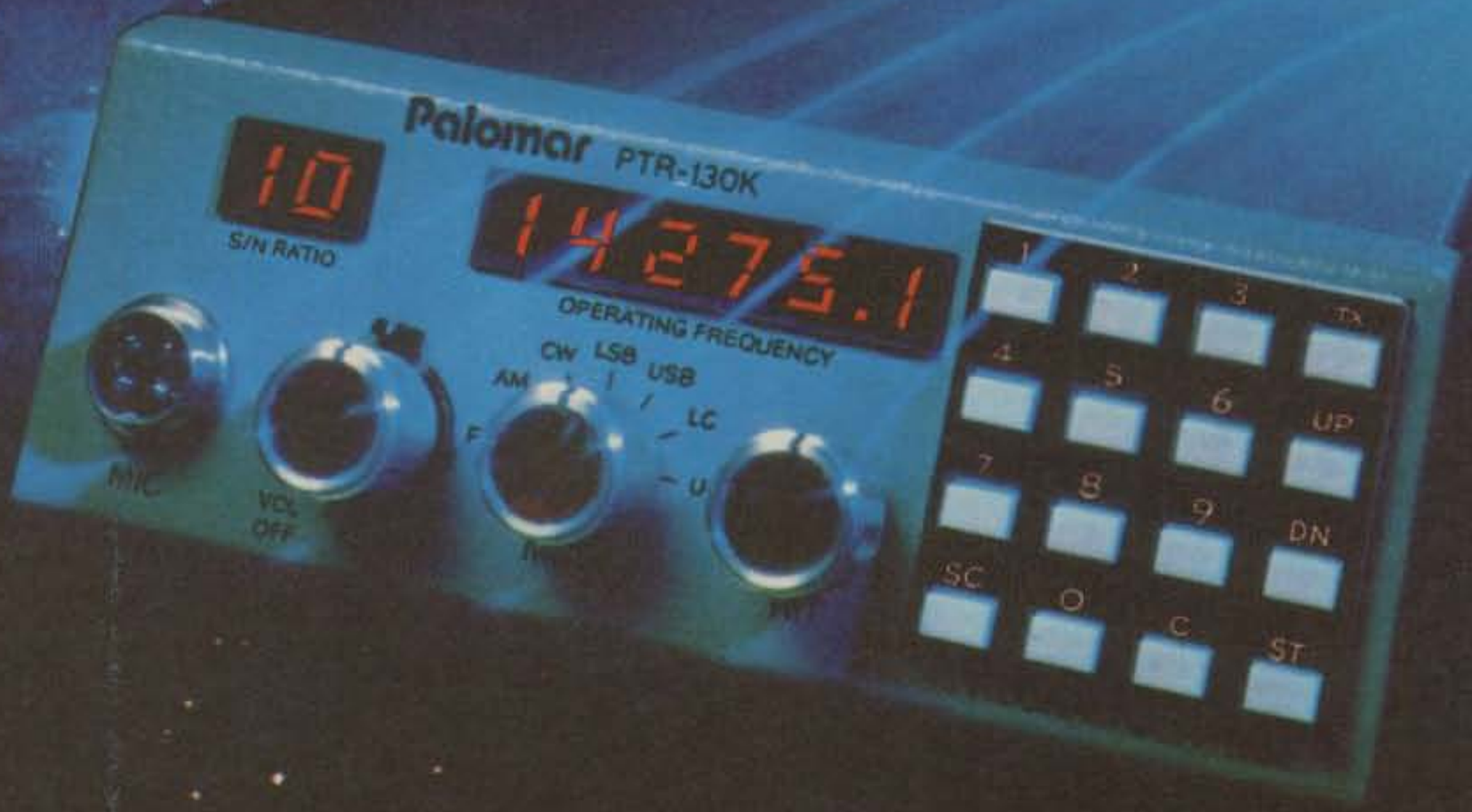

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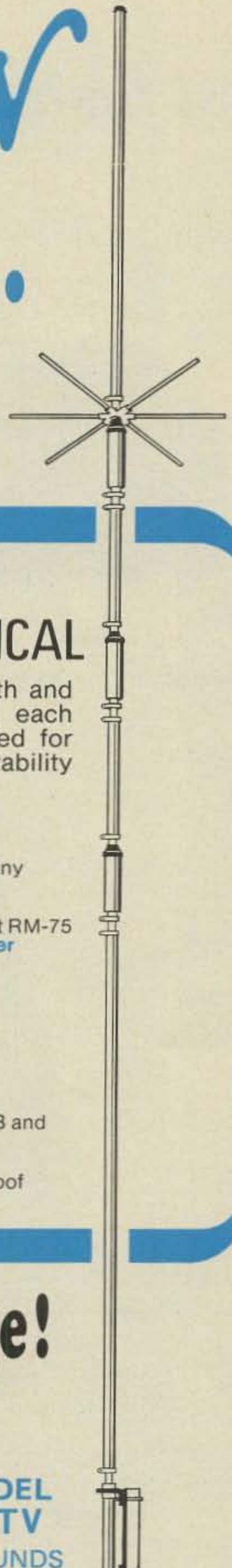

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3550W	50HZ-550MHZ	TCXO 1PPM 65° to 85°F	25MV	25MV	75MV	8	.5 inch	115VAC or 8.2-14.5VDC	2⅞"H x 8"W x 5"D
3240HH	2MHZ-250MHZ	3PPM 65° to 85°F	100MV	100MV	NA	7	.4 inch	4AA Batt.	5"H x 3"W x 2"D

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In 1977 Norm North, WA1D3R, was assigned to Thule, Greenland. With him went his Heath HW-7, a dipole antenna, and a goal...work all 50 states!

Norm failed! But what he did accomplish in three months' time, with his HW-7 and the call OX5AB, is nothing short of amazing! Worked: 41 states, 30 countries, including a PY4 in Belo Horizonte, Brazil, and First Place, High-Band CW Greenland, in the '77 ARRL International DX Competition! Quite a record!

In Norm's words: "I honestly believe that I could have worked all states and perhaps DXCC if I had stayed in the Arctic a bit longer. This is quite a tribute to that little rig..."

We'd agree, and we bet Norm would have done even better had he been using a new Heath HW-8! Why? Because our engineers felt they could give you a much finer QRP rig than the HW-7. One with better sensitivity, lower hum and noise figures, an RF gain control, sharper preselector, switchable selectivity, more bands to operate, and even a bit more power!

They succeeded in a big way! And the result of their efforts is a truly superb CW transceiver for the QRP operator that costs just $129.95*...the Heathkit HW-8!

Why don't you take up the challenge? Build an HW-8 kit, then join the growing ranks of outstanding QRP operators, like Norm, who are proving you really can work the World on a couple of watts!

*Price is mail order, F.O.B. Benton Harbor, MI. Prices and specifications subject to change without notice.

Catalogs also available at the 50 Heathkit Electronic Centers coast-to-coast (units of Schlumberger Products Corp.) where Heathkit products are displayed, sold, and serviced. Retail prices on some products may be slightly higher. See your phone book white pages.

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Pages 17-18 - Missing

There are many amateurs who are using heart pacers. In this informative article K2VGV talks about his and his hobby.

INSIDE K2VGV

The Amateur and His Pacemaker

BY JOSEPH SCHWARTZ*, K2VGV

I have personally been through the discomfort of following my father through his pacer implantation. It is no easy task for a son to experience the torment of having his Dad's chest opened up.

Today's medical and electronic technology have made pacer implantations almost as commonplace and simple as tonsil removal. There is little to fear. Unnecessary worry taught me that lesson.

I speak from direct experience. You see, K2VGV is my father. — K2VG

*43-34 Union St., Flushing NY 11355

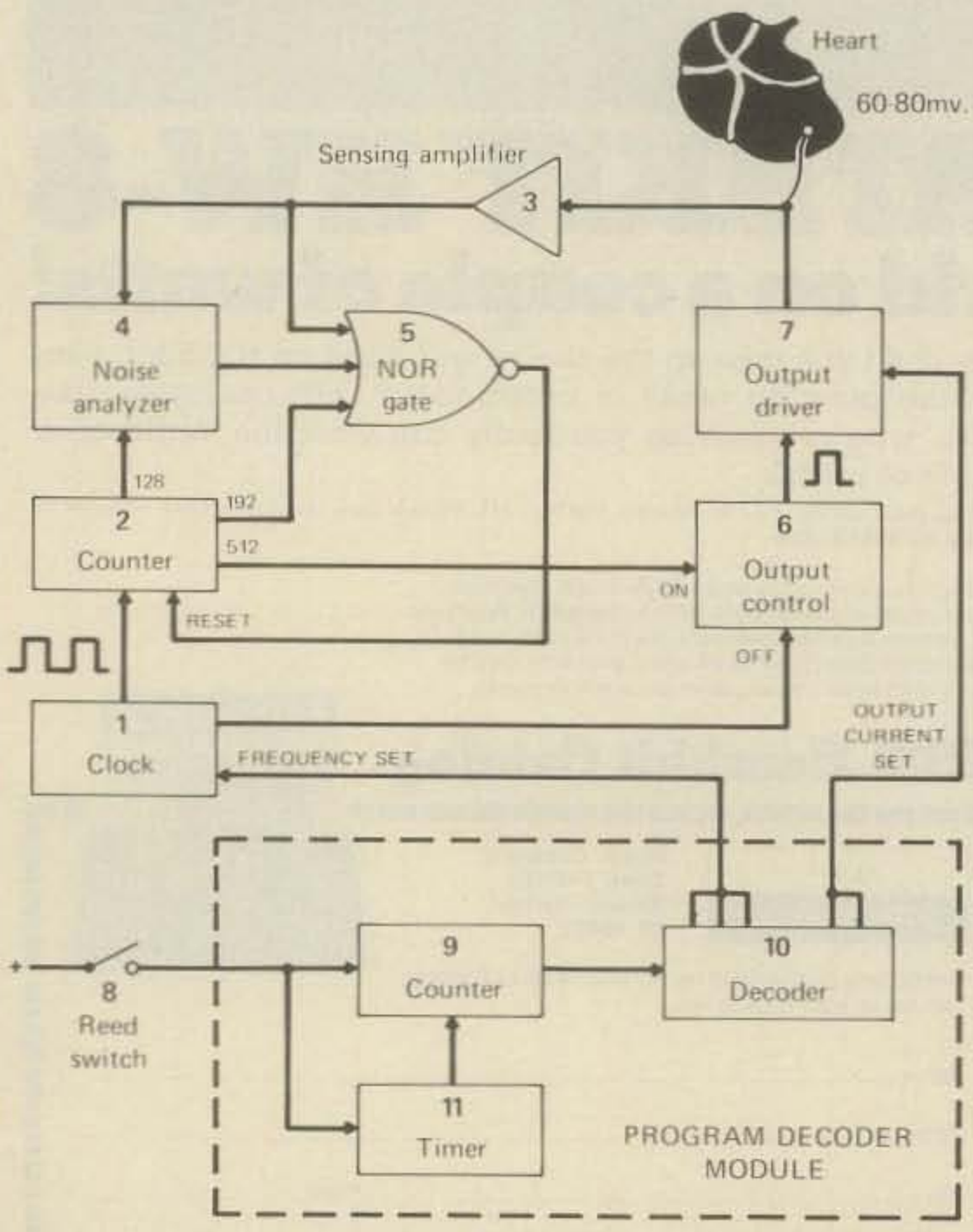


Fig. 1 — Block diagram of the Cordis Corp. Omnicor *pacer.*

What could be more shocking (pardon the pun!) than having a cardiologist tell you that you have to have a pacemaker installed in your human chassis?

Strange as it may seem, my first thought was: How will the pacemaker be affected by the r.f. of my transmitter?

I'm no hero, but I agreed to have the procedure done. While recuperating from the surgery, I was filled with curiosity about the action and the benefit of the pacer. I did some research and discovered some facts that I was not aware of. I would like to share those with you.

Not all pacemakers perform the same functions. Some pacers are constantly working to keep the heartbeat at the normal rate of about 70 beats per minute. Mine was the **demand type.** When the heartbeat slows down below the normal rate, the pacemaker is activated and a voltage is supplied to the timer of the heart. This boosts the rate to the normal one. When the timer of the heart assumes its own rhythm, the pacer ceases to operate. The pacer supplies pulses which stimulate the heart if it doesn't operate directly off the heart's timer.

The mechnaical pacemaker has three main parts. These are the **pulse generator,** the **leads** and the **electrodes.** It also contains lithium batteries or mercury/zinc cells.

Most electrical devices will not interfere with the pacemaker. Naturally, avoid electric shocks. Make sure that the devices you use are grounded. Electric shavers are not likely to cause interference, although such interference is not unknown to happen. Battery operated shavers will probably cause no interference at all. The ignition system of a spark-ignited internal combustion engine is very rarely a problem. However, don't get too close to the spark plugs when the engine is running. The arcing of the gaps in the plugs may trigger the pacemaker. All small household appliances are comparatively safe. Electric drills can produce electric radiation when operated in a rapid on/off cycle. Most pacers are well shielded from micro-ovens. The concensus of opinion of pacemaker manufacturers is to stay away from the immediate vicinity of radar transmitter towers and transmitting antennas.

I also found out what makes the heart tick. I knew the heart was a pump. But what is the source of energy? The heart generates a voltage of about 3 to 4 mV. It also has a timer which is made of special cells. They are located in the upper part of the heart. The heart's timer can be regulated by an outside source of power. The pacer, however, doesn't affect the heart's timer directly. It "takes over" for it when the pulse rate drops.

Now that I know something about the heart itself, I looked

into the composition and the operation of a pacemaker.

The pacemaker's fixed rate is established by a **programmed clock oscillator** (1 in fig. 1). This circuit produces a train of pulses at a rate of 512 times the desired pacing rate. These pulses are counted by a **binary counter** (2). In the absence of suitable input signals, the counter produces an output count at 512 which initiates the **counter spike.** At the same time the pacer spike begins the count again at (1). Thus the fixed rate is the clock frequency divided by 512.

The **refractory period, noise sampling period** and **alert period** are timed in proportion to the fixed rate by counting the appropriate number of clock pulses. The NOR gate (5) controls the boundary between the refractory and alert periods. It is disabled until clock pulse 192 is counted and thus it blocks any output from the **sensing amplifier** (3) during that time. If any sensing amplifier detects a suitable signal after count 192 and before count 512, the NOR gate will reset the counter to begin a new timing cycle without initiating a pacer spike. Of course, if a suitable signal is not sensed, the counter will continue to 512 and then initiate a pacer spike, simultaneously beginning a new timing cycle.

The sensing amplifier is a monolithic integrated amplifier/detector that provides a logic-level output to indicate the presence of cardiac activity or noise. If the amplifier receives an input that exceeds the sensitivity threshold in either the

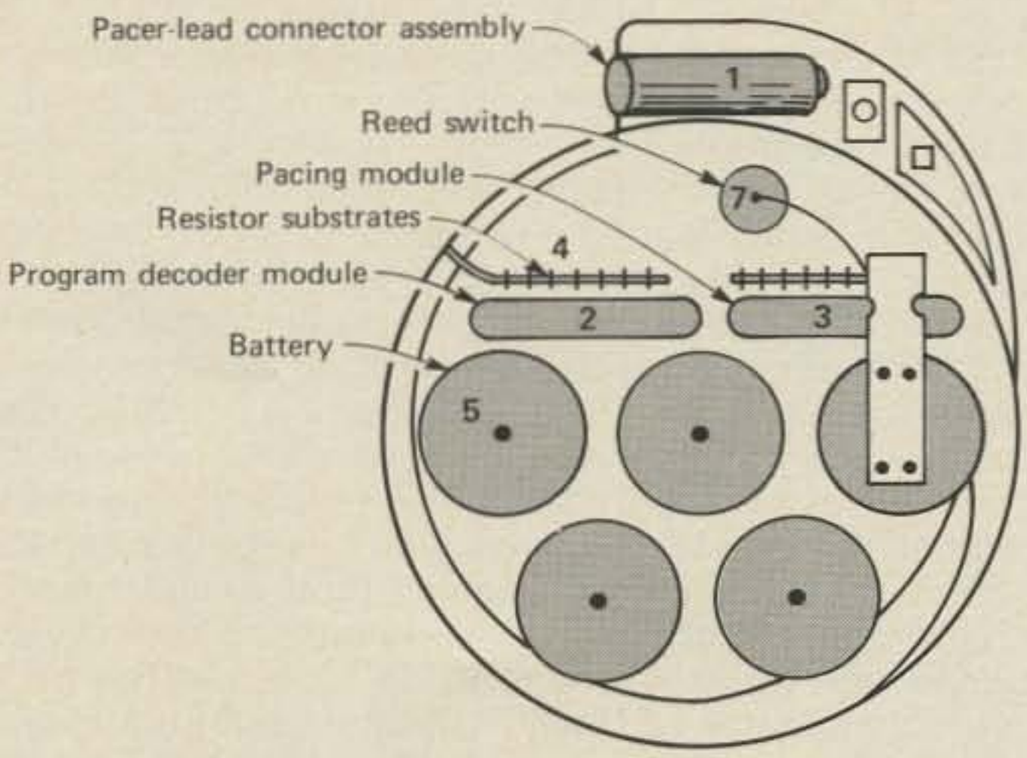


Fig. 2 — Illustration of the Cordis Corp. Omnicor *pacer.*

positive or negative direction, a logic voltage appears at the output each time the detected signal exceeds the threshold.

The **noise analyzer** (4) is controlled by the counter and is activated at count 128 to begin the noise sampling period. The noise analyzer counts outputs from the sensing amplifier. If four or more sensing amplifier outputs occur between counts 128 and 192, indicating persistent electrical interference, the noise analyzer disables the NOR gate (5) until the end of the full timing cycle. Therefore, when count 192 is reached, sensing will be blocked by the NOR gate and the counter will proceed to count 512. At count 512 a pacer spike will be produced. If the noise analyzer does not detect four or more sensing outputs during the noise sampling period, the NOR gate is unaffected and the alert period begins at count 192.

The **output control circuit** (6) turns the **output driver** (7) "on" at the end of clock pulse 512 and turns it "off" again when the next clock pulse is produced. However, if the counter is reset by the NOR gate before clock pulse 512 is counted, the output control will not activate the output driver. The output driver is a constant-current pulse generator that produces a rectangular pacer spike when activated by the output control. The width of the pacer spike is established by the time between the "on" signal and the "off" signal from the output control. Since the output control circuit is switched by the clock, the width of the pacer spike is determined by the programmed clock frequency.

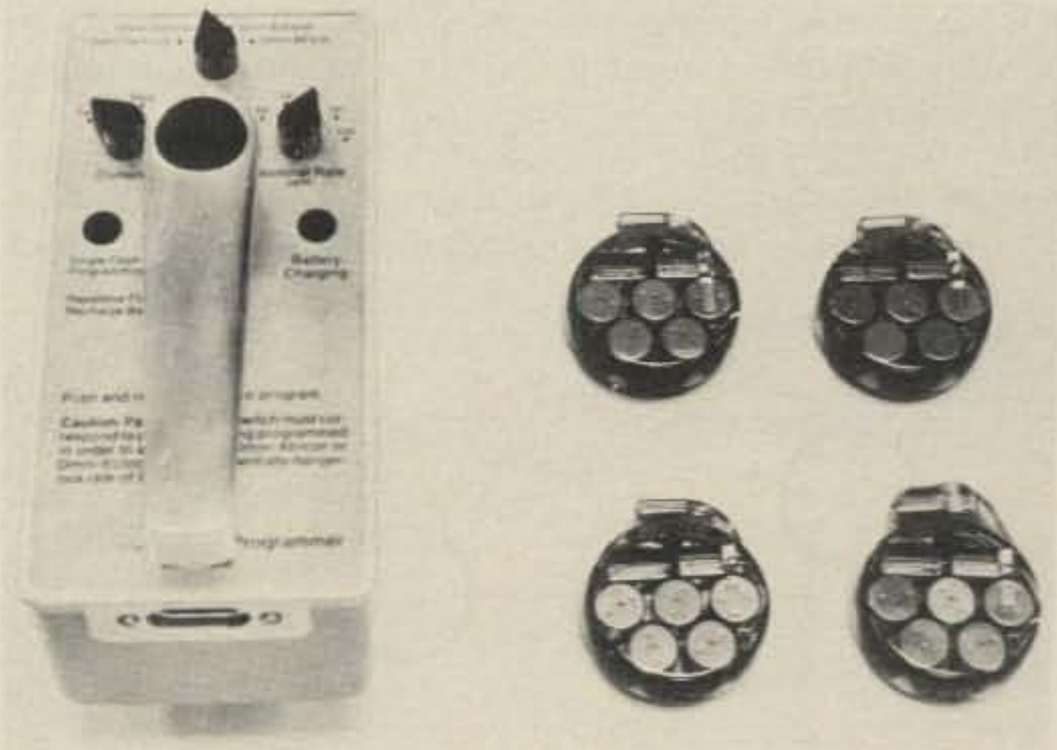
Two models of the Medtronics pacer. (Photo courtesy of Medtronics Inc.)

The **program decoder module** determines the fixed rate of the pacer and its output current level. Rate is programmed by setting the clock oscillator frequency. The resulting fixed rate is this frequency divided by 512. Output current is programmed by setting the operating characteristics of the output driver circuit.

As magnetic impulses from the external programmer activate the **reed switch** (8) during a programming transmission, a voltage pulse is produced each time the reed switch closes. These pulses are counted in a **binary counter** (9) and the sum determines which of the five **decoder** (10) output lines will be activated. Three of the decoder lines are used to set the clock for rate programming and the other two lines are used to establish the level of the output current. The decoder outputs are set by FET's acting as electronic switches that hold their state indefinitely with virtually no current consumption.

The timer (1) at the input to the counter is a safety device. It is activated when the first magnetic impulse is received. If another impulse does not occur within three milliseconds, this timer will turn off the counter and hold the program decoder output lines in the previously programmed state. Thus, stray magnetic impulses from the environment cannot by themselves change the program. As an additional protection, the counter circuits cannot be activated until eight impulses have

(Continued on page 98)



On the right are four models of Cordis pacers. Compare these with fig. 2. On the left is a Cordis pacer monitor. (Photo courtesy of Cordis Corp.)

Improving the quality and reliability of phone transmission has always been a mainstay of the amateur community. John Schultz discusses possible improvements in phone communications by pre-filtering processed audio.

An Optimum Speech Filter

BY JOHN SCHULTZ*, W4FA

In his article "Some Comments on Speech Processing," which appeared in the February issue of *CQ*, K20T lucidly covered the point of intelligibility versus fidelity in speech processing. His comments basically reinforce many of my own ideas on speech processing and filtering. For instance, in my article "Effective Speech Transmission" which appeared in the January, 1970 issue of *CQ*, I made the observation "to transmit speech with minimum power and still retain understanding, one should eliminate as much of the low frequency response as possible; perhaps to 1000 Hz." I then went on to discuss the tradeoffs involved between natural voice retainment and intelligibility, much as K20T mentioned.

Many tests both by amateurs and professionals in the speech processing area have proven the value of shaping the low frequency response of a speech processing system to achieve maximum intelligibility under poor (noisy) reception conditions.

Many of these tests make reference to "optimum filters" being used *before* speech processing equipment. Rather than go into any more theory, I thought it would be of interest to many amateurs to describe some of the practical circuitry for these "optimum filters." These filters can be tried with almost any external existing speech processing equipment or with transmitters having internal speech processing. The filter is simply a device used in the audio chain immediately after the microphone.

The filter is composed of a series string of RC coupled amplifier stages such as the basic model shown in fig. 1. The amplifier makes use of the frequency roll-off characteristic of a simple RC network as shown in more detail in fig. 2. A simple RC network can attenuate frequencies below its design value as shown on the graph. The "design" value for the RC network is simply taken as the frequency at which the output of the filter is 3 dB below its maximum output at an infinitely high frequency. Once, however, the filter does start to attenuate low frequencies, it takes on a very uniform attenuation characteristic. The attenuation characteristic is usually rated in terms of "dB per octave." The terminology is perhaps rather unfortunate and has confused many people because of the eight frequency steps between octaves in music. One has to remember that an octave is also defined as the total separation between two tones or frequencies having either twice or one half the given value. So, the awkward "dB per octave." expression means nothing more, in this case, than how many dB the output signal falls every time the input frequency is halved. In the case of the simple RC network shown, the fall-off is 6 dB per octave. Or, the output voltage is halved after the filter goes into its attenuation slope. If one cascaded filter networks, the total "dB per octave" characteristic is simply the addition of the individual network values. So, two cascaded networks would produce 12 dB per octave, three would produce 18 dB per octave, etc.

In reality, three different filter characteristics seem to have proven the most effective depending upon the actual method

(Continued on page 98)

*Box L, FPO New York 09544

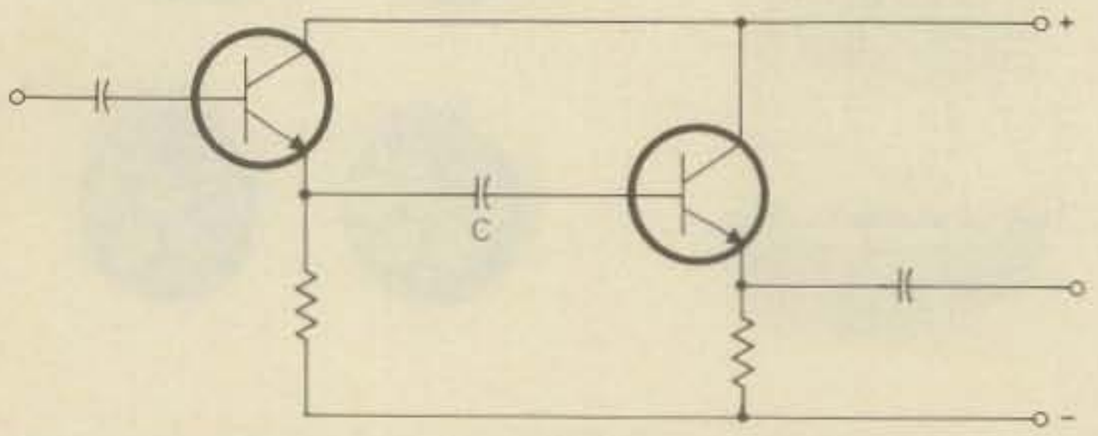


Fig. 1–The optimum filter is built up from a string of common collector or emitter follower stages with coupling components between stages of specifically chosen values.

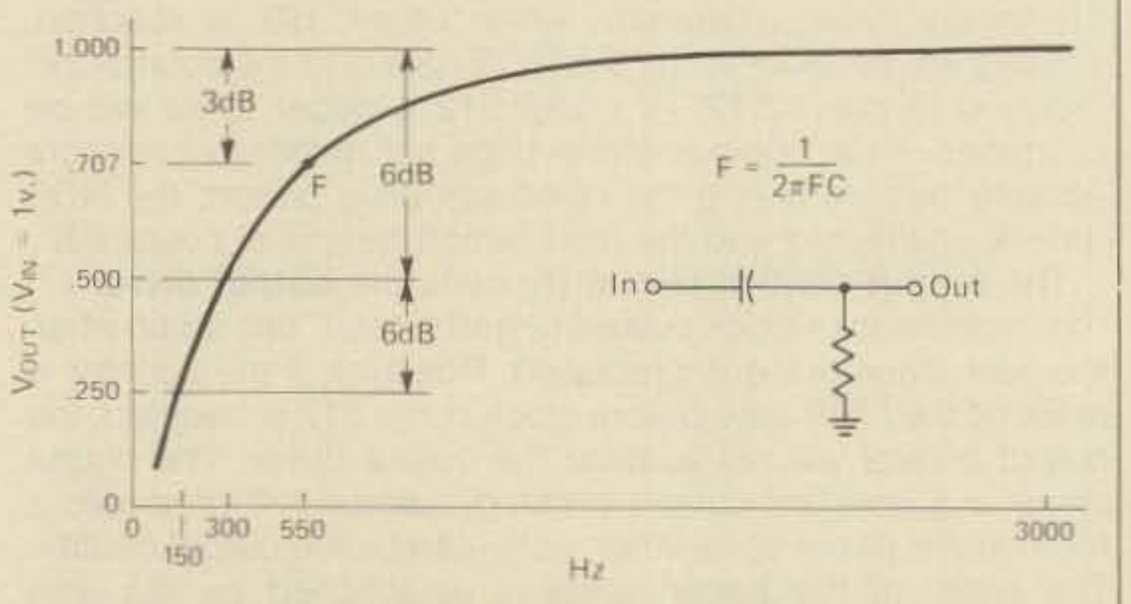
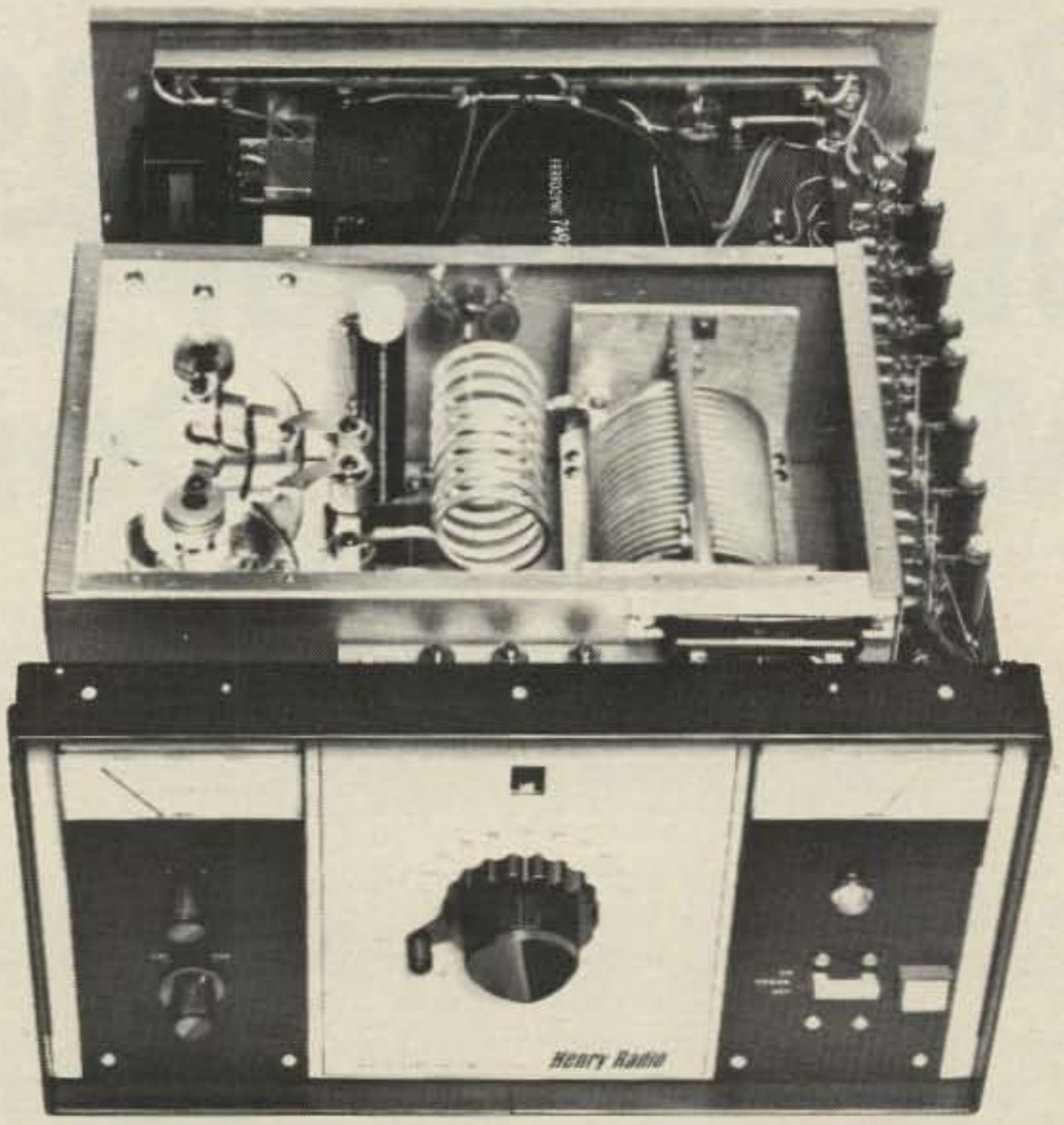


Fig. 2 – Even a single section RC filter can provide significant low frequency roll-off. The frequencies shown are for illustrative purposes only. They show what the roll-off might look like if the filter were designed approximately around 550 Hz.

Before you buy an amplifier



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Tempo 130A10	10W	130W	$189.00
Tempo 130A02	2W	130W	$209.00
Tempo 80A30	30W	80W	$159.00
Tempo 80A10	10W	80W	$149.00
Tempo 80A02	2W	80W	$169.00
Tempo 50A10	10W	50W	$ 99.00
Tempo 50A02	2W	50W	$129.00
Tempo 30A10	10W	30W	$ 69.00
Tempo 30A02	2W	30W	$ 89.00
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Tempo 70D10	10W	70W	$240.00
Tempo 70D02	2W	70W	$270.00
Tempo 40D10	10W	40W	$145.00
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Results of the 19th Annual CQ 160 Meter DX Contest

BY DONALD McCLENON*, N4IN/3

Band conditions were only fair during the contest, but we hit by far the best weekend of January, as noted by highest W/VE scorer K1PBW. Total activity was a little higher than last year (over 1930 operators active worldwide). There were more W/VE and less DX stations on. Seven less multipliers were available from the 50 states, 8 provinces, and 52 countries active. The severe winter over most of the U.S. damaged many antennas and often prevented repairing them or erecting new ones.

The worldwide six figure scores were KV4FZ 241,046, K1PBW 196,392, WA1RFM/VP9 190,196, W2YV 114,884, WA2SPL 114,456, GD4BEG 102,753. That was a real squeaker in N.Y. between the 2 two-man multiop. teams! GD4BEG is to be congratulated as the first European to join this group.

K6SE has moved up to second place in the top 10 W/VE single operator scores. His steerable 2-element beam shown, plus 4 Beverages helped him get 64 DX contacts.

Some of the rarer prefixes active were C6, DU, EA, EA8, GJ, GU, I, IS, IT, JD1, KG6, KM6, YB, YS, ZC, ZK1, 4U1, 4X4. 13 of these were not worked by any W/VE station. One contestant thought C6ANY was K6ANY! No maritime mobiles were reported this time.

There were at least 218 different G stations on, 168 OKs, 131 JAs, 82 DLs, 38 GMs, 20 YUs, and 16 OHs. 232 DX stations in 37 different countries made at least one W/VE contact. The larger number of these were 59 Gs, 43 JAs, 42 OKs, 22 DLs, and 7 KH6s.

*11310 Cedar Lane, Beltsville, MD 20705

Some of Japan's Top Banders are shown in the shack of JA2GQO. L. to r - JA1CUW, JA2GQO, JA5DQH (standing), JH2IRH (seated). They were all active during the contest.

K1PBW equalled his last year's top W/VE multiplier of 84. He was followed by W2YV 77, WA2SPL 76, N4PN 75, KV4FZ 73, and W21B, K3VA, N4WW, all 71. Eleven others made 67 or better. Top DX station multiplier was 73 made by KV4FZ, followed by WA1RFM/VP9 68, GD4BEG 49, ZF2AI 46, G3WPF/A 42, HKØBKX 41, JA1PIG/PZ 37, and GM3GRC 33. These were all far below similar 1977 figures.

The highest countries worked, a total of 33 was made by K1PBW, followed by KV4FZ 27, W2YV, WA2SPL both 26, GD4BEG 25, and W2IB, K3VA both 22. Fifteen others made 20 or better. The scarcity of available countries shows here.

TOP 10 W/VE SINGLE OP

K1PBW	196,392	W9RE	72,312
K6SE	84,500	W9LT	62,700
W2IB	80,798	N4WW	61,912
K3VA	75,402	WØAIH/9	60,852
KØRF	75,308	K8JK	59,928

New records were made in total QSOs. Leaders were K1PBW 537, WZYV 490, W9RE 448, N4PN & KØRF 442, W9LT 423, WA2SPL 421, K4SB 418, WØAIH/9 417, WB4SJG 408, and W2IB 401. Six others topped 375. The previous record was 434. The high Europeans in QSOs were GD4BEG 322, G3WPF/A 269, OK1KNH/P 260, GM4GRC 246, GM3IGW 239, OK1MMW 227, OK1FCW 225, DL3LU 210, and OH3XZ 203. The following outside of W/VE and Europe made over 75 QSOs: KV4FZ 365, WA1RFM/VP9 294, KH6CC 136, HKØBKX 128, ZF2AI 124, KH6IJ 114, JA1CUW 95, JA7NI 95, JA1PIG/PZ 85, and JAØYAN 79.

W/VE leaders in 10-point QSOs were K1PBW 158, WA2SPL 83, W2YV & K6SE 64, W1BB 49, W2IB 42, VE1AXT & K3VA 34, and LU1BAR/W3, N4WW, WB4SJG, all 31. 459 W/VE's made at least one DX QSO. DX station leaders in 10-point QSOs were KV4FZ 296, WA1RFM/VP9 266, HKØBKX 122, ZF2AI 118, KH6CC 103, GD4BEG 98, KH6IJ 90, JA1PIG/PZ 78, G3WPF/A 72.

There was fairly good agreement over wide areas, that although the noise level was low, DX propagation was only fair, and the weaker signals just didn't make it. The Pacific area stations seemed harder hit with this than was Europe.

Logging accuracy has improved greatly this year. Those who received warnings last time either straightened out, or didn't submit logs for this contest. A dupe sheet should be used at least before sending in the log. The information sent must

agree with that received both ways. We do check unusual multipliers and "unique" contacts. Within reason, all improper claims were corrected, and the scores shown are as fair as we can make them. Disqualifications: OK2PGF/P, K8CCV.

Under the CQ 3-year eligibility rule for top trophies, this year's W4OO Worldwide Score trophy was won by WA1RFM/VP9. A new Top USA Single Op trophy, donated by the West Gulf ARC, goes to K1PBW. A new Top European Single Op Trophy, also donated by the West Gulf ARC, was won by GD4BEG.

Certificates are being sent to the single and multiop winner in each State, Province, and Country for this 19th Annual Contest. A number of high-scoring stations didn't send in logs. This either leaves a blank in the listings, or gives the certificate to a lower scoring station who sent in his log. Send them in, we need them all!

Hope you will be in the next *CQ* 160 Meter Contest the last full weekend of January 1979 (Jan 26, 27, 28). Tell everyone to get on, and send SASE to *CQ* Magazine for log and summary sheets.

73, Don, N4IN/3

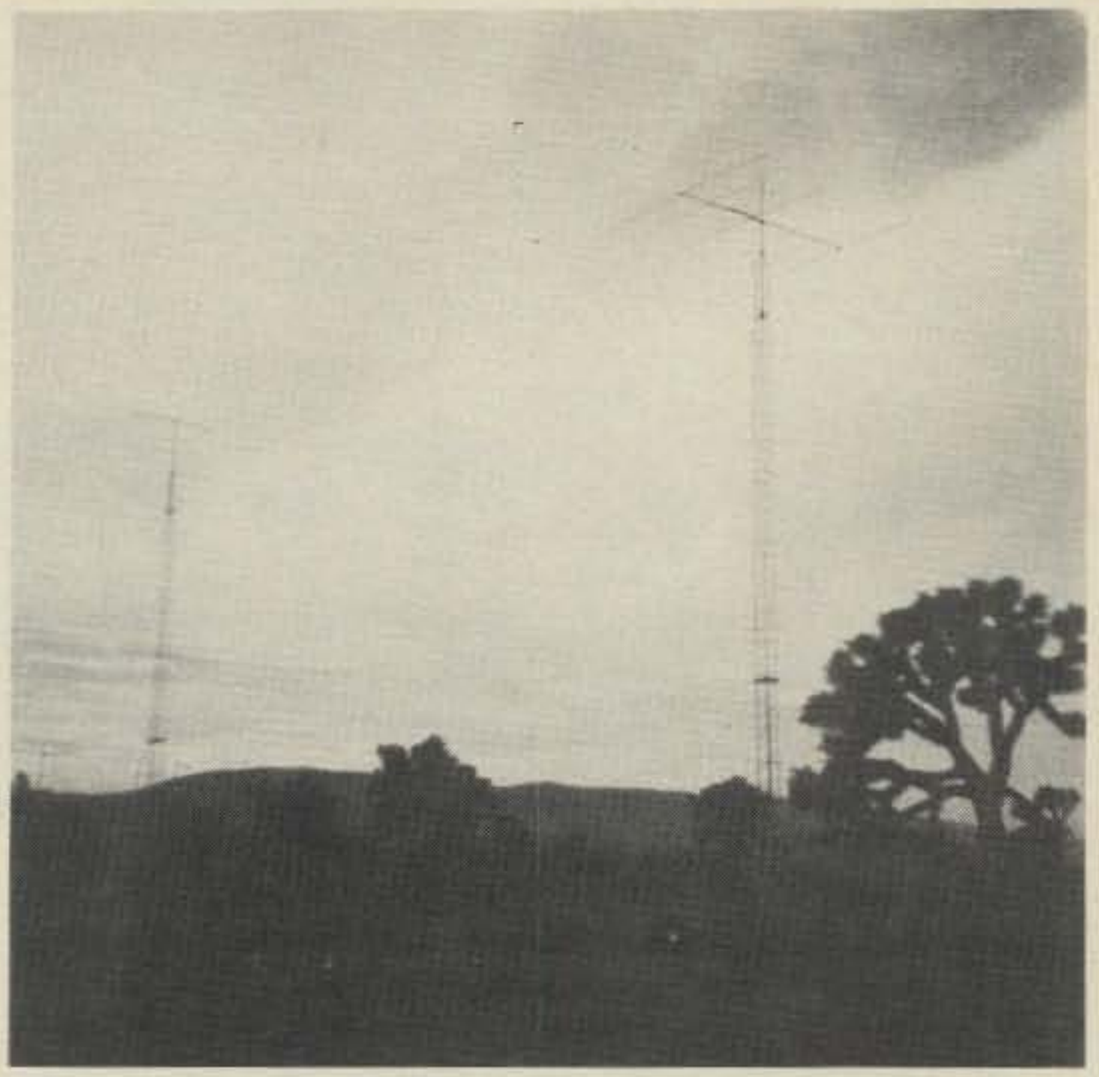
Soapbox

DX:

Surprised was able to work so many JA's on hurriedly put up antenna—DU1GF. Amazed no QRN first night after so many years of 20 dB plus static—KV4FZ. Enjoyed it, although 75 mph winds handicapped us. Next year hope to be on from GJ—GU4HFN. Put up a Minooka Special ant. on a 50 ft bamboo pole on the balcony. Top blew off in a shower of flames on QSO #13. Used dipole up to QSO #128, when both its ends fell down. Then Francisco and I went out and got drunk, Hi!—HKØBKX. Climbed up on roof twice to fix receiving preamp. We're closing down the Megawatt Monster Loran on 1950 kHz. in June, so hang in there—KL7JDJ. Condx not good, but enjoyed working US hams who are now good friends on the top band—F8VJ. Biggest thrill was having neighbor W4EV/VP9 come over to tell me he had worked WYO on 160 for his 6-band WAS—WA1RFM/VP9. At last worked ND to complete WAS from here in PZ—JA1PIG/PZ. Got 2 new ones YB7AAU and JA8IEV/JDI. Make this a 48 hour contest so we can have 2 chances for a DX opening—VK6HD. New sloping dipole worked FB for USA—JA1CUW. First night very good propagation. Second not so good—OH2BO. Band clear, low noise, but only 62 QSOs in 9 hours. Why?—YV1OB. Lowest QRN of the winter, but couldn't raise any EU. Don't know why; raised a batch the week before—VP2DD. First ever JD1-VK QSO on 160—JA8IEV/JD1. No complaint about condx, but overslept second morning. Fewer countries on and less activity this year—EI9J. Overslept first morning when QRN low. Pileup second morning, but heavy QRN—OA8V. My very first QSOs on 1.8 MHz.—YU1OCV. Heard over 100 N. American signals, but hard to get back to them—ZL1AZV. Real battle this year with all KH6 crowded into 10 kHz.—KH6CC. First night good, second poor. A special receiving antenna system is a must—OH3XZ. Enjoyed my first 160 contest very much. Hope to work W next year—JA4BKL. Condx worse than last year. Hope better next time—OK1DKW. Poor condx. Our first attempt at this contest was still enjoyable, and we look forward to next year—G4BPO. First contest with my own call—YU3TKB. Enjoyed the test very much—DK6AS. Using low power and low ant. Next time hope for big improvement—JA3BCT. First night good to USA. Second not so good so slept, sorry—OH6DX. Band condx appalling!—G3WPF/A. Fair condx—GM3IGW/A. Bad DX conditions—F8EX. I thank K6SE and KH6CC for hearing my weak signal—JG1RJB. Short time in contest because also in REF contest—OK2QX.

TOP 10 DX SINGLE OP

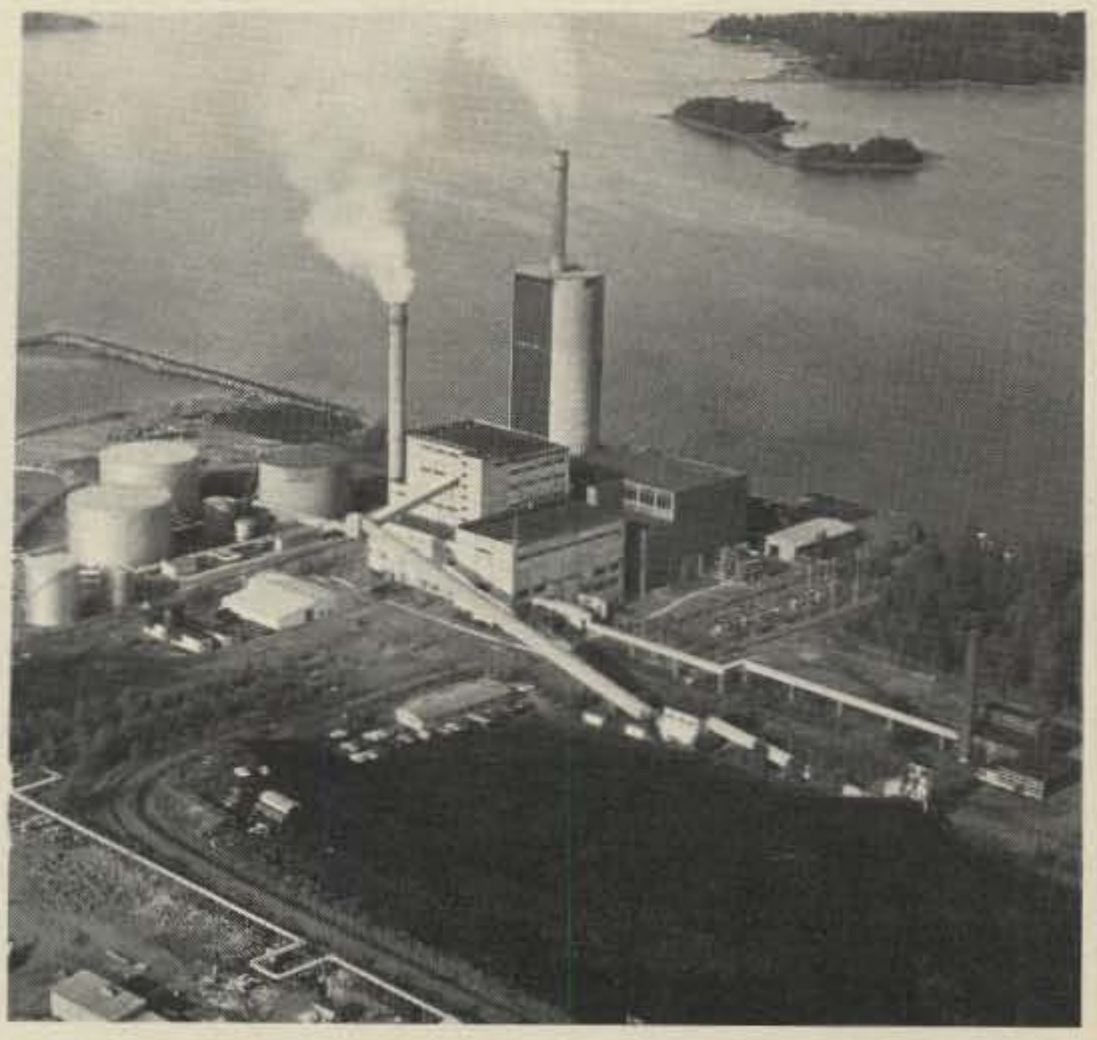
KV4FZ	241,046	KH6CC	37,856
WA1RFM/VP9	190,196	JA1PIG/PZ	30,155
GD4BEG	102,753	DL3LU	28,980
ZF2AI	55,660	KH6IJ	28,140
HKØBKX	50,000	DK6AS	26,622



The source of the second highest W/VE single op score, K6SE, a two-element switchable beam on 160. They are "top-loaded" 80 foot towers sitting on 5 miles of radials. Four beverage antennas were used.

USA/Canada:

The absolute most fun contest for me. First night sounded like the Sweepstakes on 40 meters—WAØZPT. After 2 months



How's this for an ideal location? The station of OH6DX sits 250 feet up at the top of the round power-plant boiler house. The top of his sloping antenna is fixed to the chimney 350 feet up. He made 9 USA QSOs with set-up.

DJ6TK says that all 160 meter amateurs are invited to drop by his shack for a visit.

of listening to a dead band, was sure surprised to hear so many on—VE7CRU. First time ever worked all 50 states. Will sure enjoy that steak dinner won on bet with K4SB—N4PN. For next year's contest, have engaged world famous witch doctor to put curse on N4PN. Tried it last year, but doctor misunderstood and took all N4PN's hair off—K4SB. VE2SD fell thru ice while putting up receiving antenna!—VE2OJ. My favorite of all contests, where the little man has a chance relative to the big guns—WB4URW. Enjoy this more than the ARRL Dec. Test. Hope to do it again next year—W5GWD. Fun contest with good condx and little QRN—VE1AYG. It will take several weeks to recover from poison oak received while trimming Vee at 11:30 p.m.—N6VR. Friday night super conditions. Again a great contest—W6MZW/1. Temporary setup in Fla with inverted Vee in a tree sure inferior to big vertical—N4IN. I'll be back next year to make up for the lack of Rhode Island activity this year—N1RI. Glad to be in it this year, but I need a better ant.—VE4VV. Just relicensed after 20 year layoff. First 160 contest— KØJPX/5. Good to EU but NG west. Hope full time next year—VE1CD. Didn't plan to enter, but got to enjoying it very much. Plan to repeat next year—W5BE. Condx poorer than last year, but W/VE & JA activity up, so score is higher. Lost time both nites fixing distant electric fence arcs—K6SE. Repeated last year's second place NEV

KØGVB was the big winner in Iowa. He has 240 acres on which to grow antennas among other things. By next year he plans to have quite an antenna farm under cultivation.

finish behind K7OX, both of us now with different calls. Ran out of audible stations to work the second nite. His secret weapon was a receiving loop—W7XZ. Very few DX stations, or else condx poor this year. Good to east coast—K7OX. Never have I seen such courteous and patient operating. I look forward to next year—K8MN. First time on 160 from here—W6VLD. Condx not as good this year as in past. Surprised to raise ZL2BT on a CQ—W2IB. Thanks for nice contest. Ant. stayed up in ice & high wind; just lucky I guess—W8KAZ. This is a super contest! The DX flavor really adds excitement. I'll certainly be back next year—KØRF. Certainly enjoyed my first contest because it's just big enough. Hope to enter next year—KØGVB. First night the best. Thrill to work three OH's, even though condx not the best—W1BB. Pleased to work remaining 4 states needed for WAS—LU1BAR/W3. Last year we didn't have enough wind for the kite-supported verticals. This year there was too much—N4UM. Special tnx to newcomers and SSB'ers who heeded requests to honor DX window. Tnx for the fun—W1PL. Must repackage the rig. It's getting too heavy to carry around—K6MO. Used FB7 National Rcvr and 30 Watt 1941 rig—W2FW. Sorry I didn't erect the vertical before the snow, wind, and cold arrived—K3BSY. Good condx, no QRN. Ice took down dipole before test. Climbed 65 ft pole to fix—W3BUR. As always, a most enjoyable test. Look forward to next year and Bev receiving

TOP 10 MULTIOP

W2YV	114,884
WA2SPL	114,456
N4PN	80,700
WB4SJG	74,480
W4PRO	70,518
K4SB	67,268
G3WPF/A	63,840
LU1BAR/W3	54,270
N4UM	44,764
GM4GRC	44,319

ant.—W4TMR. Better than last year, even with power leak. Lots of fun—W4DHZ. FB contest. Enjoyed my return to 160—K6TS. Hope to be back next year. Thanks for a good show—W8VSK. Condx perfect, no QRN either nite. How lucky can you get?—W6BYB/7. Activity up. I move often enough, you may make WAS working me if you stay around long enough—WØAIH/9. First time ever heard JA and ZL on 160—VE7AZG. Lots of fun my first time in this contest. Worked 45 states on 3 "slinkies" in series hung vertically 90 ft. worked against 16 radials—WA6DNM. First time full effort. Good DX showed up to keep it interesting—W9RE. Pleased to get W1YHK for my first ME and find that I was his first ME—W1HDC. Enjoyed the contest very much and got 2 new countries—K3VA. Heard VK6HD but no QSO—K5MA. Good condx—W7HZL. Couldn't find RI for a clean sweep of lower 48. KL7 too much to hope for—W9GT. 80 Meter dipole doesn't work so hot on 160—VE4UO. FB condx, low noise. Band not too crowded, maybe due to storm damage—W3AJS. Got VE5 above 1875 kHz.—W4NVN. Enjoyed the contest, and got 5 new states. May make WAS yet—W4KFB. Good contest, even though Murphy knocked out transverter so only ran 5 watts—W8SOP. My 46th year on 160. Too tired from snow shoveling to put in much time—W9PNE. Poor condx. East very scarce—W7ZC. How about W3NNK hiding behind his old call, making DEL hard to find?—K2FL. Frustrating to hear VK6HD working JA's but not listening on his own freq—K5RX. Very low QRN, but heard no EU—WB4FPK.

JA1CUW came in second highest in a very close race in Japan with this impressive station. The score included 15 USA QSOs.

WB4SJG with his Op Aid #1 (Budweiser) along with the assistance of K4CNW made 5th world high multi-op from this S.C. QTH.

Number groups after calls denote score, total QSOs, 10-point QSOs, multiplier, and DXCC countries worked. Multi-op scores follow single op listings.

Connecticut

WA3BGN/1	12,848	134	3	44	5
W1WY	360	14	1	10	3

Maine

W1HDC	2,808	50	1	26	3

Massachusetts

K1P8W	196,392	537	158	84	33
W1PL	36,288	220	26	56	18
W1YN	11,200	80	15	40	12
W1BB	10,080	56	49	20	17

New Hampshire

W6MZW/1	25,596	173	16	54	14

Rhode Island

N1RI	700	21	1	14	3
K1ZFN	2	1	0	1	1

Vermont

K1IK	30,456	226	14	54	14

New Jersey

K2FL	20,000	172	7	50	9
WA2ZWH	12,160	144	2	40	4
W2CVW	2,376	46	2	22	4
N2IN	144	12	0	6	1

New York

W2IB	80,798	401	42	71	22
K2BQ	26,784	199	20	48	12
K2MN	11,352	120	3	43	5
W2FW	180	15	0	6	2

Maryland

K3ZO	53,198	321	19	67	19
K3ZZ	48,230	299	18	65	17
W3USS	22,200	214	2	50	4
		(WA1FEO opr)			
WB3AVN	15,660	154	5	45	7

Pennsylvania

K3VA	75,402	395	34	71	22
W3BUR	28,560	219	9	56	10
W3UHP	24,400	228	4	50	6
K3BSY	20,196	182	4	51	6
W3AJS	16,608	165	2	48	4
W3AP	11,778	111	10	39	9
N3KR	7,956	109	2	34	4
K3DR	2,080	40	3	20	5

Alabama

K4TO	50,274	347	13	63	14

Florida

N4WW	61,912	312	31	71	21
N4IN	43,656	229	23	68	19
N4BP	1,980	37	2	22	4

Georgia

K4BAI	13,590	135	4	45	6
WA4GQJ	4,256	72	1	28	3

Kentucky

WB4FPK	13,860	146	2	45	4
W4KFB	7,350	101	1	35	3

North Carolina

W4TMR	46,252	329	11	62	12

Virginia

W4DHZ	38,192	260	12	62	14
W4NVN	18,810	197	3	45	5
WB4URW	16,376	158	5	46	7
W4KMS	4,774	65	3	31	5
K5KT/4	1,330	35	0	19	2

Arkansas

K5GO	48,006	341	10	63	12

Louisiana

K5KLA	7,616	111	2	32	4

Mississippi

W5GWD	1,512	36	0	21	2

Oklahoma

K0JPX/5	13,950	147	2	45	4
W5KI	3,000	50	0	30	2

Texas

K5MA	53,802	375	13	63	14
K5RX	49,664	344	11	64	12
W5BE	16,954	157	4	49	6
W5QF	16,626	151	3	51	5
W5FIX	9,272	118	1	38	3
K5SOR	6,992	88	1	38	3

California

K6SE	84,500	394	64	65	16
WA6DNM	23,766	201	8	51	7
K6MO	17,958	159	15	41	8
N6VR	9,248	88	12	34	6
K6TS	1,344	42	0	16	2
N6IH	208	13	0	8	1

Arizona

K7NN	17,640	150	15	42	7

Idaho

N7SU	20,240	200	5	46	6
W7HZL	14,480	165	4	40	4

Montana

W6BYB/7	43,524	299	13	62	11

Nevada

K7OX	40,704	280	26	53	7
W7XZ	35,000	258	23	50	8

Utah

W7ZC	13,464	137	4	44	6

Washington

N7AM	31,906	257	11	53	9
W7BYK	8,814	101	3	39	4
K7IDX	24	2	1	2	2

Wyoming

W7TO	6,270	87	2	33	3

Michigan

K8NS	30,552	240	7	57	9
WB8WTD	24,888	228	4	51	6
W8KAZ	10,692	158	1	33	3
W8VSK	9,828	110	4	39	6
K8DD	1,920	40	0	24	2
W8SOP	1,258	37	0	17	2

Ohio

K8JK	59,928	382	18	66	15
K8US	37,950	313	8	55	10
K8MN	33,600	284	4	56	6
W8EX	9,828	102	6	39	8
K8MR	4,088	73	0	28	2

West Virginia

K8OQL	20,022	201	3	47	5

Indiana

W9RE	72,312	448	19	69	18
W9LT	62,700	423	13	66	14
K9YWO	32,880	234	10	60	11
K9DA	22,950	209	4	51	6

Illinois

W9GT	57,352	376	13	67	14
K9BGL	31,964	222	10	61	11
W9YYG	30,090	219	9	59	11
K9BG	23,562	219	3	51	5
W9PNE	21,560	188	8	49	10
W9ABA	754	29	0	13	2

Wisconsin

W0AIH/9	60,852	417	11	66	13
WB9AVN	5,530	75	1	35	3

Colorado

K0RF	75,308	442	30	67	15
			(Opr W0UA)		
K0ZK	35,682	281	8	57	7

Iowa

K0GVB	27,984	252	3	53	5

Kansas

N0UU	9,512	104	3	41	5

Minnesota

W0EKS	3,300	50	0	33	2

South Dakota

WA0ZPT	18,624	186	2	48	4
WA0NSY	234	13	0	9	1

CANADA

New Brunswick

VE1CO	20,916	141	27	42	16

Nova Scotia

VE1AYG	7,808	106	4	32	6

Quebec

VE2TH	15,480	120	13	45	12
VE2WA	11,840	144	4	37	6

Ontario

VE3DAP	6,944	104	2	31	4
VE3IRN	2	1	0	1	1

Manitoba

VE4VV	1,152	36	0	16	2
VE4UO	126	9	0	7	2

British Columbia

VE7CRU	8,784	122	0	36	2
VE7AZG	1,440	36	1	18	3

Alaska

KL7JDJ	2,304	28	25	9	3

Australia

VK6HD	972	23	1	9	9

Bahamas

C6ANY	1,400	14	14	10	2

Bermuda

WA1RFM/VP9	190,196	294	266	68	21

Cayman Islands

ZF2AI	55,660	124	118	46	8
			(W0CW Opr)		

Czechoslovakia

OK1MMW	24,570	227	12	27	21
OK1FCW	21,648	225	10	24	20
OK1DKW	13,176	194	1	18	18
OK2KZR	10,999	180	4	17	15
OK1DFW	10,672	188	0	16	16
OL4ATY	10,206	125	5	21	19
OL9CGL	9,180	157	2	17	16
OL0CFI	8,064	142	2	16	15
OK1HAG	7,968	141	2	16	15
OK3CEG	6,912	128	1	16	16
OL6AUE	6,795	135	0	15	15
OK1JEN	5,768	127	0	14	14
OK3CCC	5,558	122	0	14	14
OK3YCF	5,160	101	2	15	14
OK2PAW	5,152	117	0	14	14
OK1KBN	4,641	111	0	13	13
			(OK1WC Opr)		
OK1MNW	4,564	103	0	14	14
OK1DCF	4,488	123	1	12	12
OK3CPY	4,121	90	1	13	13
OK1AIJ	3,696	111	0	11	11
OL5AVA	3,348	94	0	12	12
OK1DFR	3,322	98	0	11	11
OK1ATP	3,172	73	1	13	13
OK2BRU	3,000	102	0	10	10
OK3CGI	2,988	81	0	12	12
OK2KLD	2,952	78	0	12	12
			(OK2BHT Opr)		
OK3FH	2,860	92	0	11	11
OK1DDW	2,750	88	0	10	10
OK1KUJ	2,650	83	0	10	10
			(OK1TJ Opr)		
OK1KOK/P	2,475	65	1	11	11
OL5AWC	2,475	91	0	9	9
OL8CGB	2,232	82	0	9	9
OL3AWW	2,200	70	0	11	11
OL7AVX	2,160	90	0	9	9
OK2QX	2,020	65	0	10	10
OK3ZFA	1,950	60	0	10	10
OL8CIR	1,800	67	0	9	9
OK1AQO	1,750	59	0	10	10
OL7AVE	1,712	83	0	8	8
OK2BTI	1,610	82	0	7	7
OK3EQ	1,540	50	0	10	10
OL8CGN	1,377	54	0	9	9
OK1DJK	1,350	45	0	9	9
OK1AXT	1,323	51	0	9	9
OK1DKC	1,184	50	0	8	8
OK1HCH	1,176	51	0	8	8
OL5AWG	944	45	0	8	8
OK2KTE	882	45	0	7	7
			(OK2VJK Opr)		
OL0CJF	508	53	0	4	4
OK1OXP	500	41	0	5	5
OK1DFB	490	17	0	7	7
OK2SMO	355	25	0	5	5
OK1KPP	324	33	0	4	4
OK2BNZ	240	18	0	4	4
OL8CJO	216	30	0	3	3
OK3CXW	171	24	0	3	3
OK2BQU	152	12	1	4	4

Dominica

VP2DD	24,420	70	62	37	10

England

G3YMC	4,277	93	1	13	13

Finland

OH3XZ	21,978	203	4	22	20
OH6DX	21,670	194	9	22	18
OH2BO	12,180	122	5	20	18
OH1MA	9,660	130	3	15	14
OH3JR	992	29	0	8	8
OH1GL	22	4	0	2	2

France

F8EX	1,708	19	6	14	11
F8VJ	210	7	7	3	1

German Fed Rep

DJ8FR	30,480	192	28	30	20
DL3LU	28,980	210	18	28	20
DK6AS	26,622	171	24	29	18
DJ6TK	12,172	152	2	17	16
DL7BQ	8,505	125	1	15	15
DJ5BV	6,227	106	0	13	13
DK3AX	4,102	70	0	14	14
DF4BO	3,432	72	0	11	11

Hawaii

KH6CC	37,856	136	103	32	7
KH6IJ	28,140	114	90	28	5

Ireland

EI9J	21,000	149	19	25	17

Isle Of Man

GD4BEG	102,753	322	98	49	25

Israel

4X4NJ	3,135	57	0	11	11

Japan

JA7NI	3,708	95	13	12	6
JA1CUW	3,641	95	15	11	7
JH1LKH	942	50	6	6	4
JA7FFN/1	570	42	3	5	4
JG1RJB	360	38	1	4	4
JA4BKL	150	22	0	3	3
JA7GAX	111	13	1	3	3
JA5CEK/6	74	37	0	1	1
JA3BCT	52	26	0	1	1
JH7WEE	12	6	0	1	1

Minami Torishima

JA8IEV/JD1	600	29	1	4	4

Netherlands

PA0MRN	1,270	25	1	10	10

New Zealnd

ZL1AZV	165	8	1	5	5

Peru

OA8V	13,000	55	49	25	8

Philippines

DU1GF	40	8	0	1	1

San Andres

HK0BKX	50,000	128	122	40	8
			(W9UCW Opr)		

Surinam

JA1PIG/PZ	30,155	85	78	37	8

Venezuela

YV10B	18,720	62	55	32	10

Virgin Islands

KV4FZ	241,046	365	296	73	27

Wales

GW3GWX	455	13	0	7	7

Yugoslavia

YU3TJA	22,368	180	13	24	18
YU2BST	8,528	110	2	16	15
YU1OCV	6,660	117	0	12	12
YU3TKB	6,266	103	0	13	13
YU2OB	5,500	106	0	11	11
YU1ECD	148	8	0	4	4

MULTI OPERATORS

New York

W2YV	114,884	490	64	77	26
WA2SPL	114,456	421	83	76	26

Maryland

LU1BAR/W3	54,270	281	31	67	18

Florida

N4UM	44,764	277	21	62	16

Georgia

N4PN	80,700	442	24	75	21
K4SB	67,268	418	21	67	16

North Carolina

W4GG	26,832	230	7	52	9

South Carolina

WB4SJG	74,480	408	31	70	20

Virginia

W4PRO	70,518	395	29	69	20

Texas

K5RC	26,892	213	9	54	9

California

W6VLD	35,770	257	27	49	7

Washington

K7BNN	38,416	251	23	56	11

CANADA

New Brunswick

VE1AXT	36,782	211	34	53	18

Quebec

VE2OJ	28,900	265	6	50	8

Czechoslovakia

OK1KNH/P	33,870	260	21	30	21
OK1KSO	20,169	175	17	27	21
OK3KFF	14,950	171	7	23	20
OK1KKH/P	8,896	157	1	16	16
OK3KFO/P	7,968	148	2	16	15
OK1KPU	5,670	106	2	15	15
OK1KRY	3,278	95	0	11	11
OK1KYS	2,519	70	1	11	11
OK2RGC	2,330	82	0	10	10
OK3KXC	1,020	65	0	6	6

England

G3WPF/A	63,840	269	72	42	21
G4BPO	27,559	179	30	31	19

German Fed Rep

DK8LN/P	9,581	163	0	13	13

Guernsey

GU3HFN	17,420	172	4	20	19

Japan

JA0YAN	2,770	79	13	10	6
JA2YKA	432	43	2	4	4

Scotland

GM4GRC	44,319	246	43	33	19
GM3IGW	40,796	239	29	31	21

Check log is gratefully acknowledged from K4YFQ.

MULTI OP STATION CREWS

W2YV: W2YV, N2NT. **WA2SPL;** WA2SPL, K2TR. **LU1BAR/W3:** WA3ZAS, N8II. **N4UM:** N4UM, N4BP. **N4PN:** N4PN, N4RJ. **K4SB:** K4SB, WA4IAR. **W4GG:** AA4VV, WD4DII. **WB4SJG:** WB4SJG, K4CNW. **W4PRO:** W4PRO, N4DJ, W4HBK, WA4QIT, N5BA. **K5RC:** K5RC, K5WA. **W6VLD:** N6KN, K6TXA, WA6DPQ. **K7BNN:** K7BNN, N7NW, K7CR, WB7ELG. **VE1AXT:** VE1AXT, VE1BCZ. **VE2OJ:** VE2SD,, VE2DNW, VE3HJV. **OK1KNH/P:** OK1ALW, OK1DWA, **OK1KSO:** Not given. **OK3KFF:** OK1TPV, others. **OK1KKH/P:** OK1VY, OK1MDK, OK1-20498. **OK3KFO/P:** OL8CGD, OK3-26558, **OK1KPU:** Not given. **OK1KRY:** Not given. **OK1KYS:** OK1FVA, OK1DEY, OK1FRF. **OK2RGC:** OK2RGC, OK2SVK. **OK3KXC:** OK3CKQ, OL0CGG, OL0CKH. **G3WPF/A:** G3WPF, G3VMW. **G4BPO:** G3RPB, G3RHP, G3OTK, G3YCY, G3XDY, G4FSG, G3TZE, G3XAP, G4FZZ, G4AKU, G4GBA, G3UUS, G3ZNU, G3NYK. **DK8LN/P:** DK8LN, DJ2EA, DK4VP, DK9LO. **GU3HFN:** GU3MBS, GU4EON. **JA0YAN:** Okubo, Maruyama. **JA2YKA:** JH2QXG, JA4UDP. **GM4GRC:** GM3YOR, GM3ZSP, GM4BRM. **GM3IGW:** G3IGW, G4MH.

Radio Shack *has been a mainstay supplier of parts and components for all electronics hobbyists. In this very practical article Author Chuck Elliott reaches into the other side of the tracks (CB-land), and modifies one of Radio Shack's "good buddy" Yagis for ten and fifteen meter amateur use.*

Converting the Radio Shack Crossbow III C.B. Beam for 10 and 15 Meter Use

BY CHUCK ELLIOTT*, W8URK

Amateur radio magazines are currently filled with antenna stories . . . and this is another antenna story.

But before you say "ugh" and flip the page, read two more paragraphs.

This antenna can be either a semi-homebrew three-element 10 meter or a two-element 15-meter Yagi beam that's easy to build in less than two hours and all the parts are available locally in one place.

And the cost is less than $40.

The rapidly approaching sunspot cycle 21 has created a new interest in both the 10 and 15 meter bands and many radio amateurs are looking for effective but inexpensive beams to take advantage of the uncrowded and wide open communications possibilities.

*4308 Princeton Road, Hamilton OH 45011

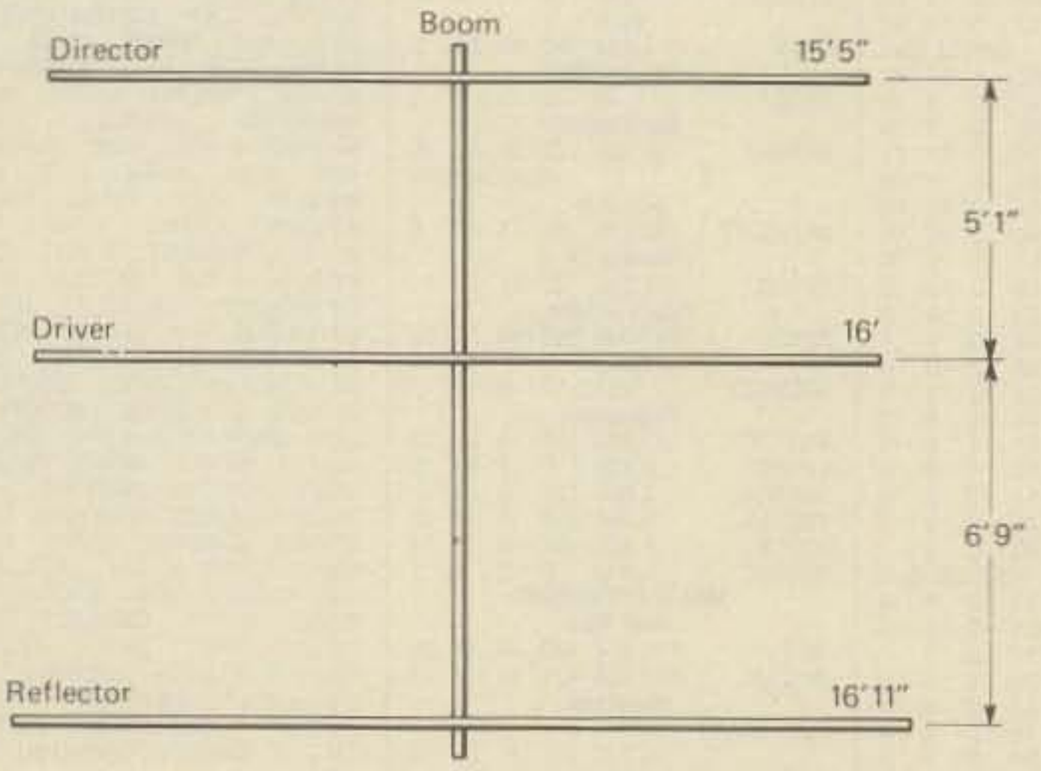


Fig. 1 — The ten meter configuration.

This beam has many advantages over other homebrew beam ideas and beats the price of most commercial amateur beam antennas.

First, the wind resistance is minimal and the beam itself is exceptionally lightweight. So you don't need one of those super-expensive heavy-duty rotators.

Any rotator large enough to handle a television antenna will do the job.

Another plus for this antenna is an extremely short boom length (12 feet), which must be a major consideration for those with limited room or a mounting problem.

And finally, all the parts, from element rods to screws, come boxed up in one neat package available at your neighborhood Radio Shack store.

The test antenna started life under the Radio Shack name of *Crossbow III* (21-933), a three-element 11-meter beam with a price of just $39.95.

There's no problem building the beam, either, since you follow Radio Shack's instructions. After all, the professional design engineer who gave birth to the antenna is the same guy who wrote the book on putting it together.

Radio Shack's instructions are well written in plain English and there are plenty of illustrations. Remember, the antenna was designed for a CBer to build and, as a rule, CBers don't know much theory.

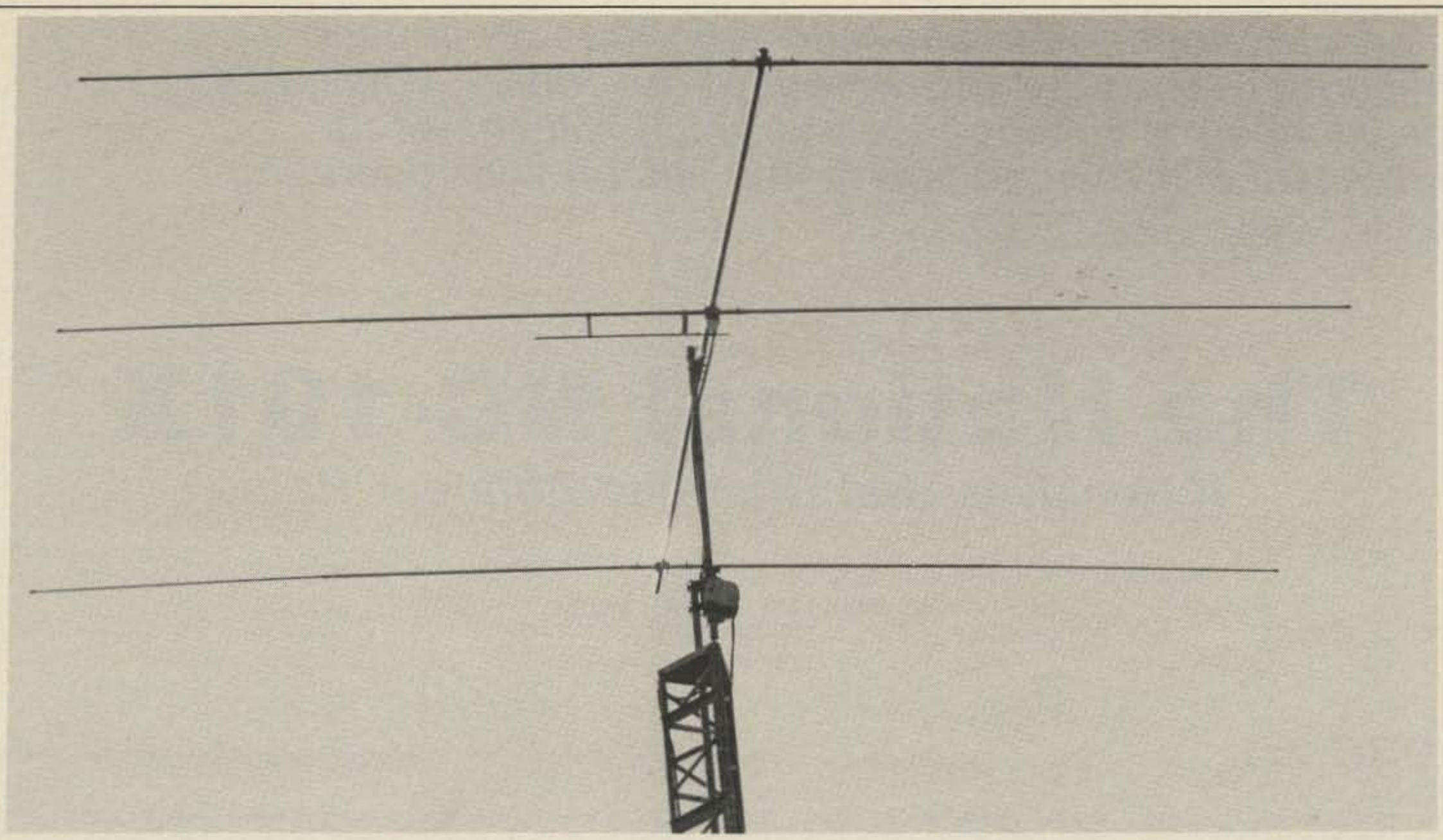
Beams are usually mounted atop towers and towers are expensive.

For those without the funds to invest (or the willingness to spend) fairly large dollars for a tower, the *Crossbow III* instructions give a couple of ideas how to mount the beam without a tower.

Tools are no real problem, either.

All it takes to build the antenna is a screwdriver, a couple of wrenches and an electric drill.

The drill is needed when constructing the beam elements.



This is the Radio Shack Crossbow III *beam antenna converted to 10 meters. The antenna is lightweight and can be easily turned with a television rotator. Note the gamma match on the driven (center) element* must *be facing down. (Photo by Chuck Elliott, W8URK)*

The original antenna has pre-drilled holes for the 11-meter band. But the holes don't line up when the beam is used on either 10 or 15 meters.

Before getting into construction notes, there are a couple of facts you should know.

First, forget everything you've ever read or heard about the ideal height of a beam antenna. On paper, the ideal would seem to be "the higher, the better."

But in practice, things aren't always as perfect as they are on paper. The best place to mount the antenna is wherever you can mount it and at whatever height you can get it. A beam antenna is so much more effective than a dipole or long wire or vertical, that even mounted under less than perfect conditions, it will out perform all else.

During experiments with the antenna used for this story, a good match (1.2 to 1) was achieved with the beam mounted only 12-feet above the ground.

The s.w.r. did not change when the antenna was mounted atop an old 33-foot tower.

And that's important to know. Because it's easier to tune the antenna when you can work from a step ladder than climbing a tower.

And, if you are forced to mount the antenna near the ground, you can be fairly certain it will work.

During antenna testing at the 12-foot level, several European and South American stations were worked with a QRPp rig (five watts input).

The purpose of this article is to show you how to convert the Radio Shack *Crossbow III* (or any Yagi CB antenna for that matter) from 11 meters to either the 10 or 15 meter band.

Radio Shack engineers and technical writers have done all the original work. And they did a good job. So why not take advantage of their know-how?

And a fellow ham by the name of Edward M. Knoll, W3FQJ, wrote a book entitled "Ham and CB Antenna Dimension Chart," that gives all the necessary measurements.

All this article has done is to combine the knowledge of the experts and report on test results using their knowledge.

After building the beam to Radio Shack specifications, here's what you do to get it working in the sideband portion (28.500 to 28.800 MHz) of the 10 meter band.

The antenna seems to be very broad banded, matching 1.4 to 1 from 28.500 to 29.400 MHz.

See fig. 1.

Shorten the driven element to 16-feet, eight on each side of the boom. Do not cut off elements to obtain proper length.

Remove the screws holding the two end pieces of tubing and slide the tubing towards the boom. When proper length is achieved, retap the hole with the drill and secure the sections with the screw.

The reflector is the longest element in the array, 11 inches longer than the driven element. The shortest element is the director, seven inches shorter than the driven element.

Again, element lengths should be equal on either side of the boom. Alter lengths as with the driven element.

Many amateurs feel the spacing between the elements isn't as critical as the element length. That may be true, but since this is my article, I'll also specify the element spacing.

The distance between the driver and the director is five feet, one inch. The spacing between the driver and reflector is six

(Continued on page 97)

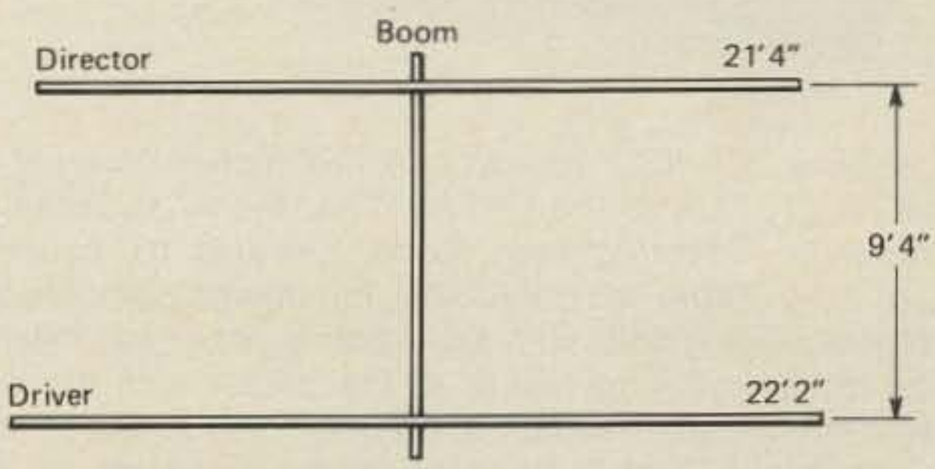


Fig. 2 — The fifteen meter configuration.

A few contributions to amateur radio have an impact which influences the very breath of our hobby. William Orr speaks about a vintage receiver which still shows its significance in the equipment that sits on your operating desk today.

The National NC-101X

A Receiver That Changed Amateur Radio

BY WILLIAM I. ORR*, W6SAI

1936 was a pivotal year.

"There is a mysterious cycle in human events. To some generations much is given. Of other generations much is expected. This generation has a rendezvous with destiny."

Franklin Delano Roosevelt (June 27, 1936. Franklin Field, Philadelphia).

Landon 32 states and 370 electoral votes. Roosevelt 16 states and 161 electoral votes.

The *Literary Digest* Public Opinion Poll. Fall, 1936.

Hitler and Mussolini sign the Rome-Berlin Axis Treaty. October, 1936.

In this volatile, changing world of 1936 amateur radio flourished. Perhaps it afforded an escape mechanism from the stresses of life. Still gripped in the doldrums of depression, America was facing forces from abroad that were new and ominous. But at home, amateur radio was beginning to assume the image it has today, especially in the equipment field.

A volume of *QST* for 1936 tells the story. Look!

January—Reports that 10 meter activity is at an all-time high. Unusual radio conditions are correlated with solar eruptions.

March—Transmitter bandswitching systems are shown and discussed.

April—A practical v.f.o. for amateur operation is shown.

May—RCA introduces the beam-power concept with the 6L6 tube.

July—Long distance 5 meter contacts are reported.

September—The effect of the ionosphere with respect to long distance communications is disclosed.

November—RCA announces the 807 beam transmitting tube.

December—National Company announces the NC-101X amateur receiver.

All of these developments had a profound, long-term effect on amateur radio. Radio propagation, the v.f.o. and the 807 had consequences that are apparent today. Not so apparent was the impact of the NC-101X receiver which changed amateur radio in a way few amateurs could imagine in those long-ago days which live only in one's memory.

*Varian, EIMAC Division, 301 Industrial Way, San Carlos CA94070

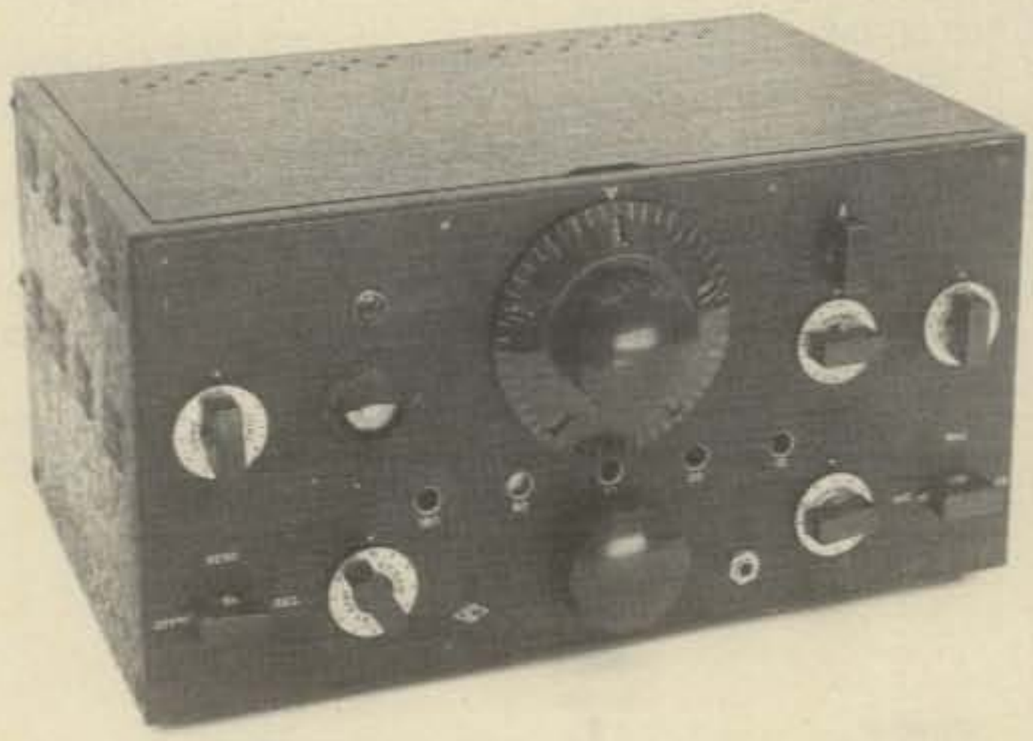


Fig. 1 — The NC-101X receiver. A mechanical marvel, the National NC-101X was the first ham-band-only superheterodyne receiver. Covering 160, 80, 40, 20 and 10 meters by means of a moveable coil catacomb, the design combined the efficiency of plug-in coils with the advantages of bandswitching. The receiver tuning dial is at the center with the band change knob directly beneath it. Early models of this receiver had a "magic eye" tuning indicator—that was before the days of the infamous S-meter.

The Story of the NC-101X

Was amateur radio ready for a new receiver? To the contrary, it looked as if that was farthest from the minds of amateurs that Jim Millen, W1HRX, met on his annual tour of dealers, distributors and radio clubs as he crossed country for the National Company. Earlier that year, National had announced the NC-100 receiver, a bandswitching, general-coverage receiver intended for amateur and s.w.l. use. It marked a great departure in design for National, who clung steadfastly to the concept of plug-in coils. For, as every amateur knew, plug-in coils were much more efficient than any band-change scheme. The NC-100 tried to meet this issue head-on. It incorporated sets of coils in a mechanical catacomb that was moved about by the band-change control. In effect, the receiver boasted a complete set of plug-in coils, controlled by a bandswitch.

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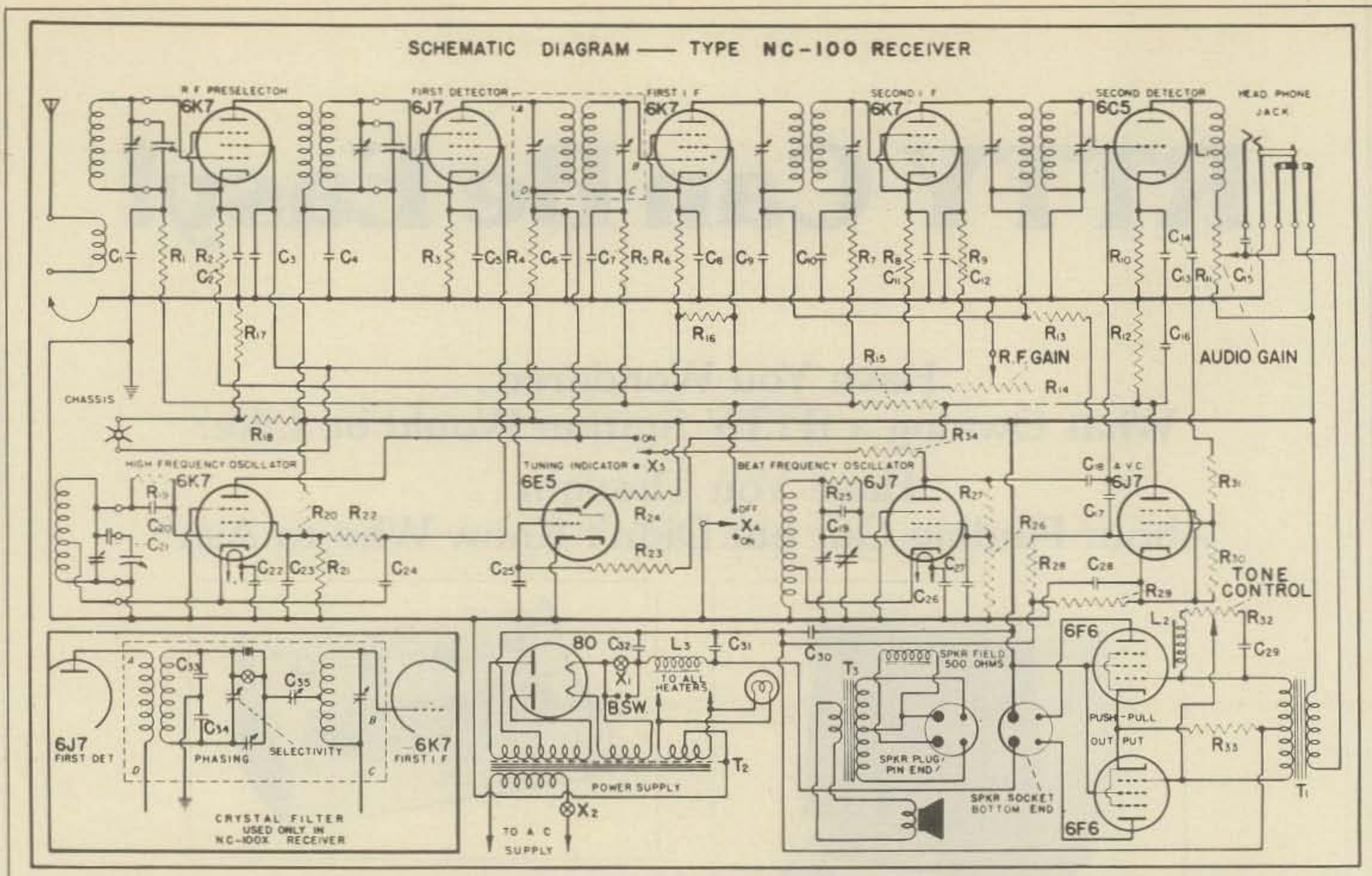


Fig. 2 — Schematic of the NC-101X and 101XA receivers. The amateur receiver incorporated a crystal filter. The 101XA (a later version of the receiver) dispensed with the famous National epycyclic dial and used a conventional pointer dial. The push-pull audio stage was guaranteed to blast you out of the room on a strong signal! The weak link in the receiver was the choice of the 6K7 as the high frequency oscillator. Substitution of a 6BA7 in a plug-in adaptor in the author's receiver eliminated much of the short-term frequency drift.

The radio world took this novel concept calmly. The general reaction to the NC-100 that Jim Millen learned from his travels was that no matter how intriguing the bandswitch construction, no matter how artistic the receiver styling, the lack of "bandspread tuning" doomed the receiver as far as the amateur was concerned.

Competitive receivers, such as the RME-69 and the many Hallicrafters models all featured bandspread tuning—Hallicrafters advertising "full electro-mechanical bandspread," whatever that was.

In any event, the modern 1936 receiver had a separate dial that allowed the bands to be spread out for ease in tuning—and the NC-100 lacked this vital design element.

Jim Millen reasoned that an "amateur-band-only" receiver could be evolved from the NC-100 and he sent a quick note and some sketches back to the factory even before he had completed his trip. Could the NC-100 be turned into an amateur receiver at little cost?

It appears that the problem was turned over to three amateurs: Dana Bacon (W1BZR), Calvin Hadlock (W1CTW) and Tom Leonard (call unknown). These three, under the supervision of Phil Eyrick, a machinist-model maker, turned out a prototype NC-101X receiver in short time, the first commercial receiver for amateur-band-only reception! It was the design of this receiver (see fig. 1) that set the stage for the famous Collins receivers in the post-war period and the myriad of receivers and transceivers in use today.

The NC-101X Receiver

The amateur-band-only concept had farreaching results. The receiver could be calibrated in kilocycles (kilohertz, to you young-uns - Ed.), providing a reasonably accurate readout in terms of operating frequency and the edges of the amateur bands. In addition, the bandspread showed up the faults of *other* receivers, such as receiver instability and frequency drift which were usually masked on a receiver having a separate, uncalibrated bandspread dial. Transmitter instability, too, became immediately apparent on the large, spread out dial of the NC-101X. And, indirectly, because the user tuned the amateur bands only, he became more isolated from the communication activities going on outside the amateur bands. Amateurs who were once used to tuning in the overseas broadcast signals over the hole high frequency spectrum were at once walled into the restrictive amateur bands by the new receiver concept.

But the amateur-band-only idea was a good one and the NC-101X was a great receiver. Views of the set are shown in the photographs and a schematic diagram is given in fig. 2. This drawing, taken from the original NC-101X manual, is revealing in itself. Heretofore, most schematic drawings had an individuality of their own. No attempt had been made to formalize symbols or schematic drawings. Some were drawn left-to-right; others, right-to-left. They reflected the concept of the draftsman. As a result, most 1936-era schematics had an archaic air about them. National attempted to formalize the schematic, and the NC-101X drawing was an early attempt at standardization. Note the formality of the drawing. Resistors and capacitors are alined as if soldiers on parade and common ground and supply busses are shown.

The NC-101X schematic, drawn over 40 years ago, in fact is quite in line with modern schematic layout and represents a large leap forward in the art of creating a readable operating manual. Most receiver schematics and manuals of this period were fuzzy, bleary copies run off on a tired mimeograph machine that strained the eyes of the reader.

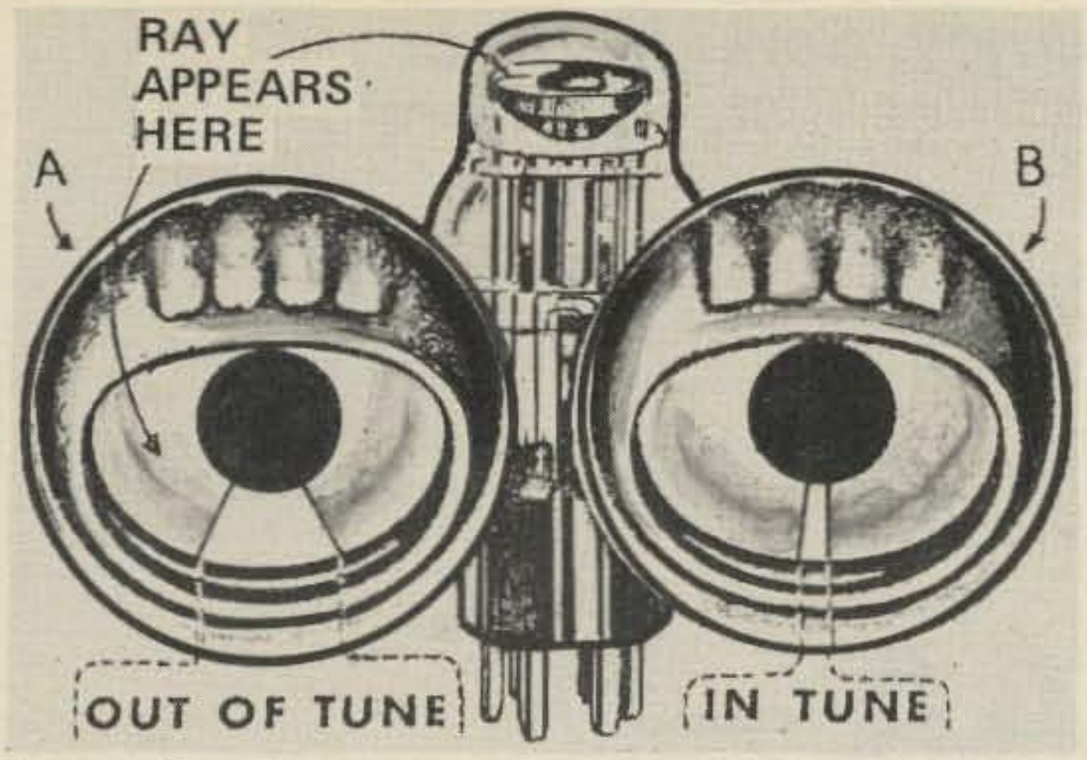


Fig. 3 — The 6E5 "magic eye" tuning tube. Target of the tube indicated the degree of a.v.c. voltage and thus served as a simple signal strength indicator. It was much more attractive than an S-meter! Later versions of the NC-101X substituted a meter for the 6E5.

Receiver Circuitry

With regard to circuitry, the NC-101X was quite conventional and had few surprises. One tuned r.f. stage, a pentode mixer, two 455 kHz i.f. stages, a triode second detector, a conventional pentode high frequency oscillator and b.f.o., and a pentode a.v.c. amplifier. The NC-101X had the efficient Millen crystal filter, which was an optional filter on the NC-100X general coverage receiver.

Of interest today is the "magic eye" tuning indicator (a 6E5 tube). This midget electon gun is connected to the a.g.c. (a.v.c.) line and provides an indication of control voltage proportional to signal strength (see fig. 3). It is an inexpensive and colorful signal turning indicator that unhappily did not withstand the test of time.

As the NC-101X was developed in the early beginnings of the "hi-fi" audio craze, a push-pull pentode stage was incorporated that was able to blast the listener out of the room with 8 or 10 watts of audio power. Judged by today's standards, the audio section had a high distortion level, but nobody ran the volume at maximum anyway.

Receiver Calibration

Of great interest to a receiver historian was the unique coil catacomb and tuning mechanism of the NC-101X. Circuit constants of the front-end were chosen so that each amateur band started at 50 on the 500-degree dial and ended at 450 That provided 400 degrees of "bandspread" for each band. The famous National epycyclic dial was used, allowing ease of readout to about half a degree.

On the 20 meter band, for example, 14.0 MHz was spotted at 50 on the dial and 14.4 MHz (the top of the pre-war band) fell at 450 on the dial. Four hundred kHz were thus spread over 400 dial degrees, at a tuning rate of 1 kHz per degree. Since the space between the dial marks was about a quarter-inch, this gave an agreeable feeling of frequency precision that really wasn't there. Even so, an expert DX operator could read the dial and guess the incoming frequency much closer than the electrical alignment of the circuit could permit!

The Aluminum Coil Catacomb

The modern owner of an NC-101X will marvel at the moveable cast aluminum coil catacomb hidden under the chassis (see fig. 4). As it is explained in the manual, "Immediately below the dial is the Range Selector Knob which actuates the coil changing mechanism. This knob must be rotated approximately one turn to change from one range to another. The

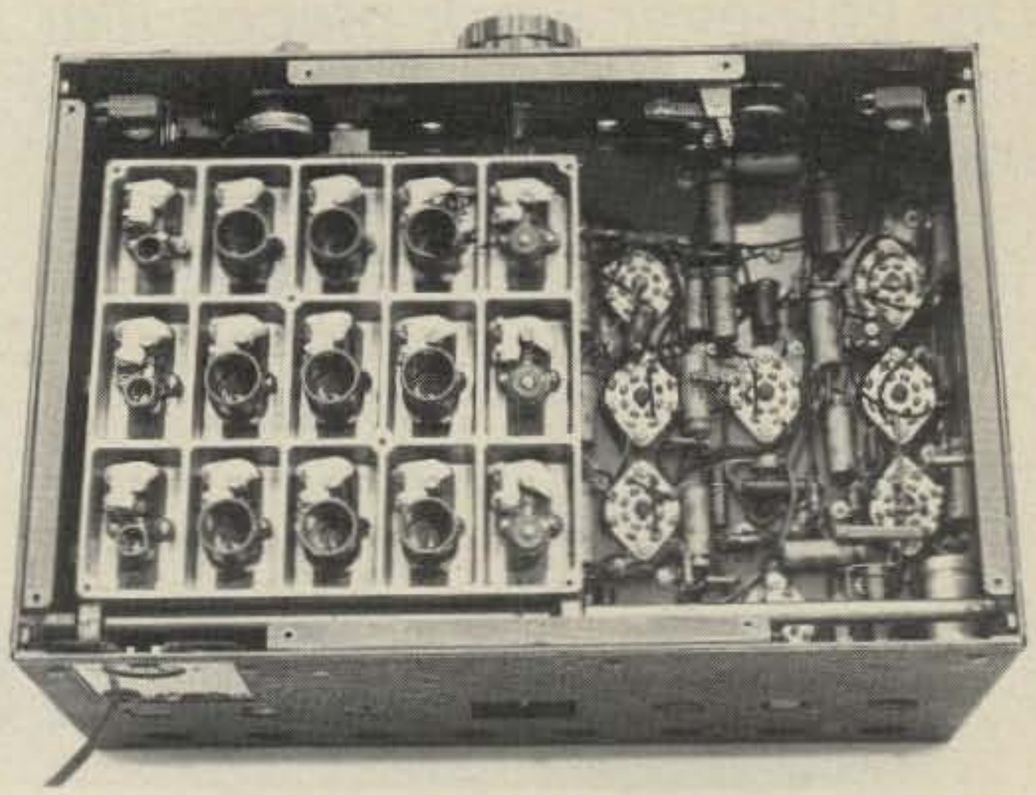


Fig. 4 — The marvelous coil catacomb of the NC-101X. Fifteen compartments housed r.f., detector and oscillator coils for five amateur bands. The catacomb moved from one side of the receiver to the other as the control knob on panel was rotated. The track along which the catacomb moved is visible along the rear of the receiver. The bottom of the catacomb was removed for this photograph.

arrangement is unique in that each individual coil is completely shielded from all others and that only the coils actually in use are in any way connected in the circuit. The five coil ranges are marked on the front panel in a horizontal line directly over the Range Selector Knob. Each of the range markings has a small window in back of which an indicator appears when that particular coil assembly is plugged in the circuit."

This was a clever way to perpetuate the use of plug-in coils without resorting to inefficient bandswitch techniques, which weren't very sophisticated in those days!

The coil catacomb is a massive aluminum casting which travels the length of the receiver on a guide rod. It is gear-driven by the Range Selector Knob. Each compartment has a high-Q coil and an associated air padding capacitor which can be easily adjusted through a hole drilled in the bottom plate of the catacomb. It is an ideal arrangement and one that is much copied in today's expensive signal generators of high stability and accuracy. Unfortunately, the cost is prohibitive in today's receivers, in this era of wave-soldered circuit boards and plug-in circuitry. However, the substitution of circuit sophistication for yesterday's brute-force technique is not lightly to be brushed aside.

The NC-101X Today

Alas, few survivors of this unique receiver exist today. The author was fortunate enough, however, to find an NC-101X in near-mint condition a few years ago. After replacing the electrolytic capacitors in the power supply and giving the set a good alignment, it played in an impressive fashion. Sensitivity was excellent on all amateur bands and the famous National dial provided a good frequency readout after the oscillator adjustments were completed. It was possible to read frequency to about a kHz and this was an impressive achievement in the pre-war days.

Receiver stability and s.s.b. reception proved to be adequate. More b.f.o. coupling into the second detector no doubt would improve s.s.b. reception ar.d the substitution of a 6BA6 with a plug-in adaptor for the 6K7 oscillator dropped the long-term frequency drift to a great extent.

But why spoil a good design? The NC-101X isn't a modern communications receiver. Rather it is a fascinating example of the communication art as it existed four decades ago. Leave well-enough alone!

(Continued on page 99)

Did you ever work places like Alderney, Sark, Herm or Jethou? Each can add to your countries' list. For more information, read on.

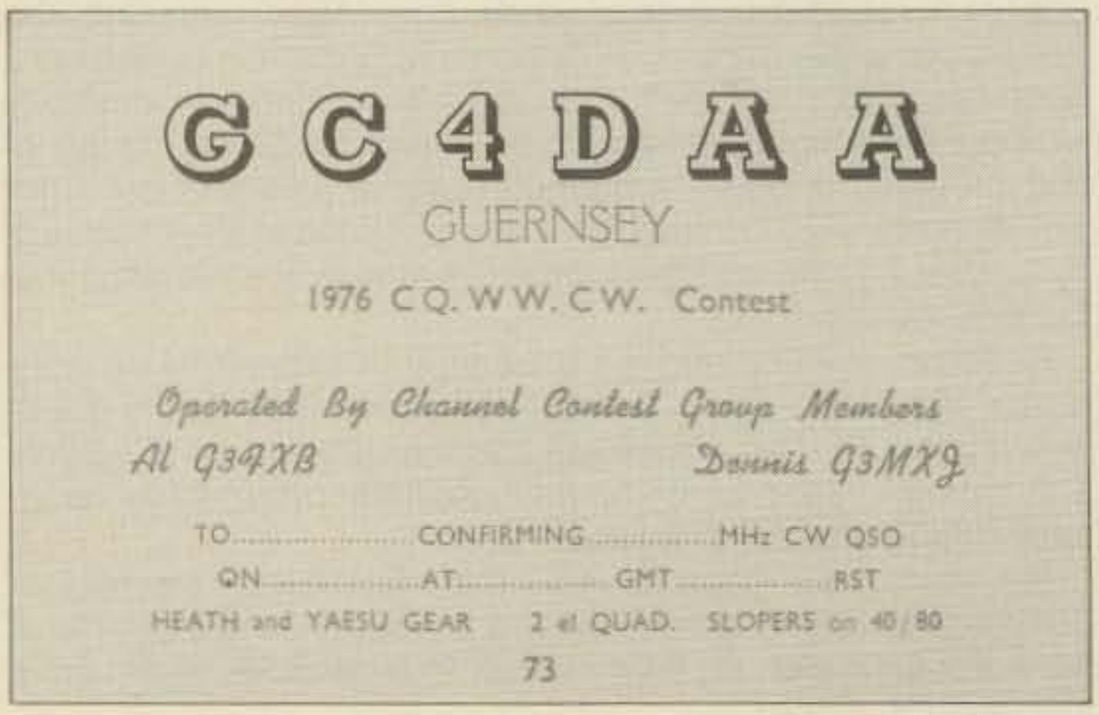
GC4DAA — Guernsey Island

BY AL SLATER*, G3FXB

The Channel Island of Guernsey lies in the bay of St. Malo just 30 miles from the coast of France and 80 miles from the south coast of England. Guernsey together with its smaller dependencies of Alderney, Sark, Herm and Jethou form a group of the Channel Islands known as the "Bailiwick of Guernsey."

The Bailiwick of Guernsey is part of the British Isles. But unlike Scotland, Wales and Northern Ireland is not part of the United Kingdom. Guernsey has its own government—its ties with Britain lie in a chosen loyalty to the English Crown dating back to the days of William the Conqueror. While the island and the islanders are British its Norman-French background is still very much in evidence—with street names in French as well as English and many older islanders still speaking the Guernsey/French patois of their ancestry, which can still be traced in hundreds of Guernsey family names.

*"Wychwood," Park Lane, Maplehurst, Horsham, West Sussex, England RH13 6LL



A rare QSL card.

With a land area of only 24 square miles Guernsey is a small island. It has a population of 50,000, with the majority earning their living from the thriving horticultural and tourist industries on which the islands' economy depends. Being further south and nearer to the Gulf Stream the climate is the mildest in the British Isles. The island supplies much of the early tomatoes in the British Isles and seen from the air much of the acreage is given over to glass houses. In addition it is of course a separate country for DXCC which makes it an interesting spot to consider for contest operation.

For many years the writer has been an avid contester and a dream came true back in 1973 when the Channel Contest Group was formed and commenced operation under the G4DAA call. It was not long before the group considered a DX-pedition for one of the major contests and being in southern England what more logical choice could there be but the Channel Islands? It is interesting to reflect that the title of the Club at no time had anything to do with any projected operation from the Islands. It had come into being insofar as some of our early G4DAA activities were from a farm on the Sussex Downs from which there was a most breaktaking view of the English Channel.

Our first trip to Guernsey was in 1975 for the *CQ* WPX s.s.b. Contest and we were fortunate indeed in securing the cooperation of the Guernsey Radio Society for the use of their HQ. The amateur population of Guernsey is probably more v.h.f. than h.f-minded and they do enjoy some very useful and well equipped club premises situated in semi-rural surroundings on quite high ground overlooking St. Peter Port. Looking back on this 1975 operation we realized that the WPX contest with its single multiplier credit was not really the way to go and that in any event the island was well represented on SSB by such regulars as GC2RS, GC3YIZ, GC4CHY, GC8HT and others. We therefore decided that next time c.w. was the way to go and so it was that Dennis-G3MXJ and yours truly embarkred for Guernsey on November 22nd 1976 for operation in the *CQ* WW c.w. contest.

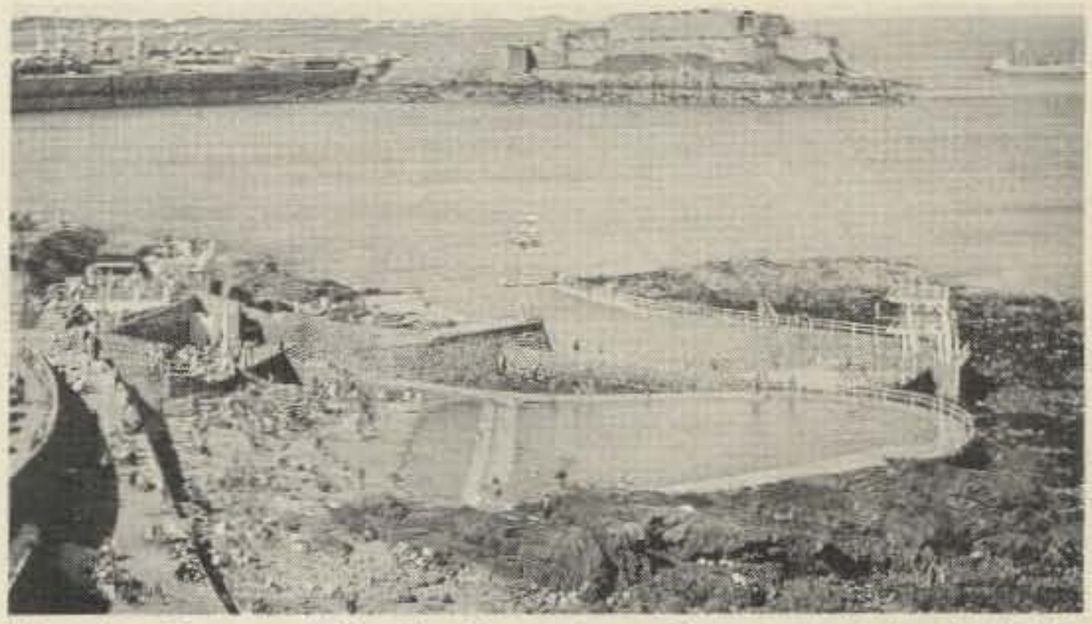
In our first operation from Guernsey we had to rig all our antennas so the operation involved transporting our G4DAA quad complete with gin pole, guys and all associated hardware so the car ferry was a must. We used the car ferry again for our second trip and boarded at Weymouth on an absolutely perfect late fall day. The weather was so superb we figured that we had everything going for us until we were informed that the sailing would be delayed due to "industrial action." On both our Guernsey trips we have run into this problem. Maybe we have just been unlucky but such delays are frustrating—fortunately in this case the delay was only an hour and a half. The sea trip to Guernsey is around four hours and despite the delay the secretary of the Guernsey Amateur Radio Society was waiting for us on the quayside and within a short time we were at Club HQ.

On our arrival we gathered to our great delight that the club had a 60 foot crank-up tower newly erected with nothing on the top so far. Although there were no facilities for tilting it over it was indeed the answer to all our prayers and on the following day the younger and fitter member of the team—G3MXJ—was soon ascending the tower to install the rotator and hoist to get the quad in position. By the late afternoon of the first day—Wednesday—we were all set to go on the h.f. bands and handing out a few s.s.b. QSO's leaving Thursday clear to get out l.f. sloping dipoles in position. There were four on 40 m. similar to the set-up by K1THQ in the ARRL *Antenna Handbook* and four more on 80 m. By Thursday evening we were all set and raring to go, leaving Friday to take a leisurely look around St. Peter Port, lunch with the Club Secretary and do a bit of shopping, with a few s.s.b. QSO's for good measure.

Propagation conditions sounded quite fair. Afterwards we learned that it had been quite a good week-end for a low sun-spot year at the end of November. We were also to find out that even just 150 miles further southwest from our home locations the propagation was just that bit different to permit propagation to the States up to half an hour after the band had gone out at home. It was not long after the start of the contest that we began to realize the impact of our call which was particularly noticeable after years with a mere G call. In the first 3 hours of the contest Dennis had knocked off 250 QSO's on 7 MHz and the first hours on 3.5 MHz produced similar results. This was to set the scene for the entire contest with peak hours producing scoring rates in the region of 120 per hour. Our only problem was the wind for on Saturday night a force 10 gale blew up and being just a little apprehensive of the Club tower we wound it down a few notches inevitably degrading our performances just a bit, particularly on the i.f. bands.The final tally of 2760 QSO's was considered quite satisfactory.

On Monday came the time for dismantling and a farewell dinner for the boys that had been so helpful and interested in our activities. In his official capacity as RSGB Council member G3MXJ was able to give the Club some insight into the work of the RSGB and the IARU particularly in view of the coming WARC Conference. Some final shopping and a trip round the island on Tuesday completed what had been a most enjoyable operation. During this trip the condition of the sea being tossed still by a force 9 gale was viewed with some concern but in fact the crossing home was as smooth as the outgoing one.

To tourists we can recommend Guernsey. It is certainly interesting and different from the rest of the British Isles. There are interesting trips to the various other islands and to the French mainland, and the beaches and coastline have much to offer. The Channel Islands of course were the only part of the British Isles occupied by Germany in World War II and the remains of Hitler's "Atlantic Wall" are still to be seen. In addition the level of taxation is far below that in England. Petrol or if you prefer, gasoline, is a third cheaper than at home. Cigarettes. drink, etc., are all cheaper, there is no "value added tax" and income tax is only 20 pence on the pound compared with our 35 at home. Another bonus to the amateur is the fact that there are no HV power lines and the low noise level of the l.f. bands has to be heard to be believed. On the first of January 1977 the prefix for Guernsey become GU and for Jersey GJ. Maybe one day GU3FXB and GU3MXJ may become permanent but in any event we hope to do a bit more contesting from there particularly with these rising sunspots. CQ



Havelet Bay and Castle Cornet on Guernsey Island. In the background stands the 750-year old Castle Cornet.

Author Al Slater, G3FXB (right) and Dennis, G3MXJ.

Pages 35-36 missing

CQ Reviews: Flesher Corp. TU-170 RTTY Terminal Unit

BY IRWIN SCHWARTZ*, K2VG

The Flesher Corp. TU-170 RTTY terminal unit is a self-contained amateur radioteletype demodulator and frequency shift keyer. It is small (7-¼" x 3-¼" x 7-½") and attractive.

Specifications

Power Required:	115 v.a.c., 50-60 Hz., 15 watts max.
Demodulator:	Input required: 100 mV; 4-16 ohms impedance. 3-stage active mark and space filters. Mark-hold circuitry.
Autostart:	Adjustable threshold. Solid-state relay output.
Loop Supply:	Built-in 60 mA loop supply with loop switching circuit.
A.F.S.K.:	200 mV sine wave output. Phase coherent frequency shift. Mark frequency: 2125 Hz.
Controls:	Power ON/OFF. TRANSMIT/RECEIVE switch. Autostart ON/OFF/AUTO switch. Autostart THRESHOLD control. Tuning meter.
Auxilliary Inputs and Outputs:	Demodulator output (TTL compatible). Loop keying input (TTL compatible). Loop monitoring output (TTL compatible) A.F.S.K. keying input (TTL compatible). 10 volt r.m.s. outputs from mark and space filters for scope "+" display.

The TU-170 is not built "Heathkit-style." The instruction manual, for example, will tell you to "install all resistors." You must follow the x-ray view of the printed circuit board (and have a fluent knowledge of the color code) to put them in. The same applies to the installation of the capacitors, the diodes, and so on.

*Technical Editor, *CQ*

On balance, the TU-170 kit is not for beginners. But it is easily in reach for the intermediate amateur who has had some experience in building equipment.

The guts of the demodulator are built onto one circuit board. This tended to make construction of the kit much easier. The p.c. board is, of course, pre-drilled. By following the instructions and the x-ray view closely you shouldn't experience any trouble at all in doing the job. The usual rules of thumb apply: solder carefully, with as little heat as possible and watch out for solder bridges.

The other major part of the construction involved wiring the cabinet. This was very easy to do and took a fraction of the time of putting the p.c.b. together. The cabinet is pre-punched and pre-drilled. I experienced no problems with it.

The final construction step involved wiring the p.c.b. to the cabinet. This involved soldering a multiple-wire harness (which you put together yourself) from the board to the cabinet.

And that's it. Total time—about ten hours (off-and-on work. Less if you do it in one sitting).

I used the TU-170 unit on two Teletype® stations. One was mechanical and the other was video. The demodulator performed very well with both.

The mechanical station used the Teletype® Model 28ASR. The receiver was the Drake R-4B. After having alined the TU-170 (following Flesher's instructions) the unit performed flawlessly. Based on its simplicity of construction, the '170 does a commendable job. It is sensitive enough to process the weakest of signals. The tuning meter is an aid to maximizing its performance. Merely tune for greatest meter deflection to the point where the pointer stands still. Some users may have to get used to tuning with the meter. There may be three maximums. However, two of these will make the pointer fluctuate. One will not. Use that one.

The autostart feature is one of my favorites. The threshold is continuously variable for different degrees of sensitivity. The Model 28 was plugged into the back of the TU-170 (it has a three-wire plug on its rear apron) and I called a friend. He was able to turn on my machine. For some strange reason, I still get a charge out of autostart. Flesher didn't let me down.

The video equipment I used was Info-Tech's. With this equipment, too, the TU-170 performed admirably. Of course, since video gear is volatile, it is not possible to use the autostart feature. The message is lost forever when power is removed from the video converter. However, in spite of this small inconvenience, Flesher's unit will make a fine component for any video RTTY station.

The Flesher TU-170 RTTY terminal unit is not a kit for beginners. It is, however, one for the discriminating amateur who wants the fun of building it himself and the service needed for good conversion of RTTY signals.

The kit sells for $149.95. For those who would like to purchase the TU-170 as a factory-wired unit, the price is $219.95. Contact Flesher Corp., P.O. Box 796, Topeka KS 66601.

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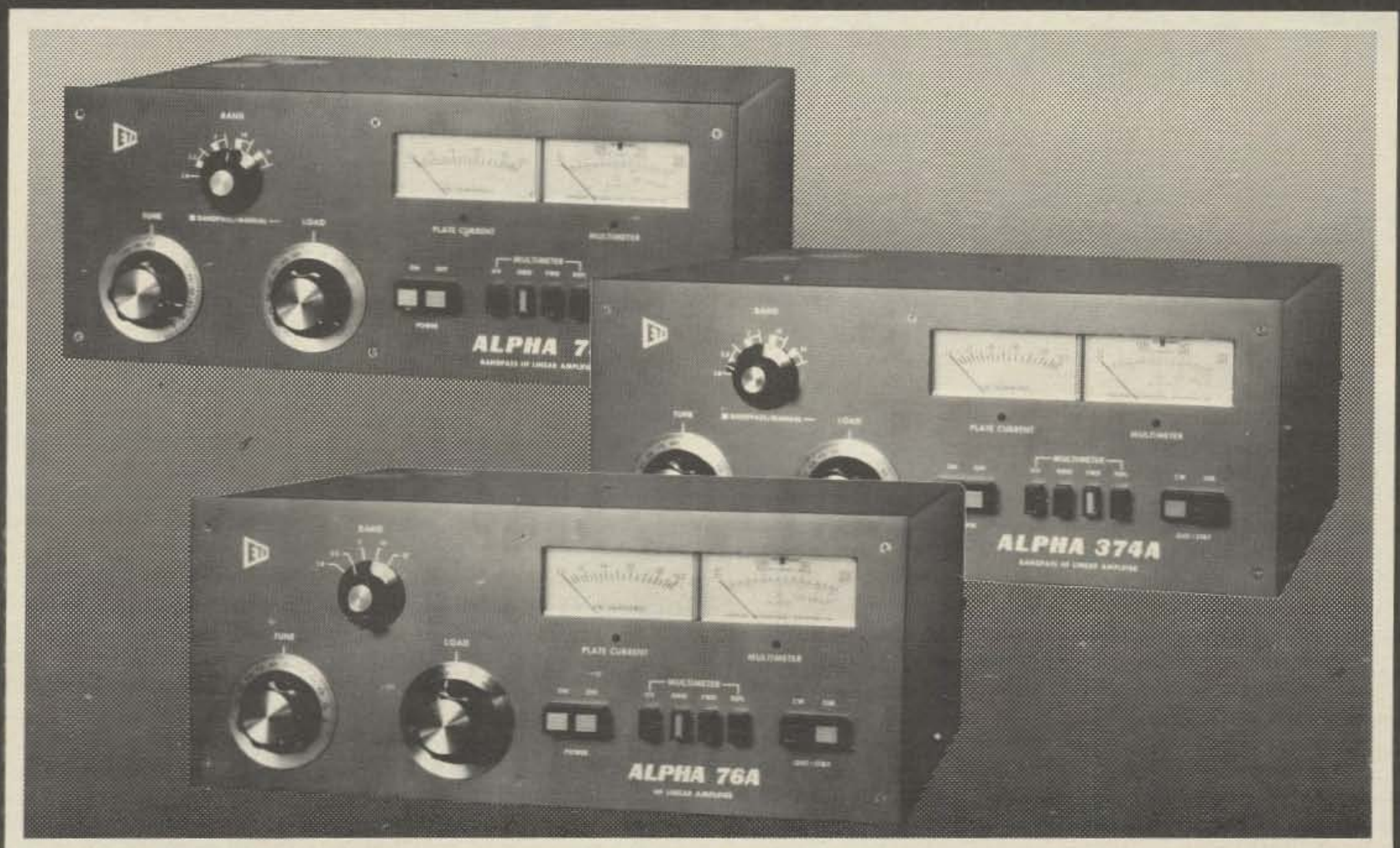

There are many so-called "Maximum Legal Power" linear amplifiers on the market. Why do so many knowledgeable amateurs, after checking out (or even owning) other makes, ultimately choose ALPHA?

Well, "maximum legal power" can be misleading . . . it doesn't tell the whole story. Most manufacturers' ratings assume that amateur service is inherently intermittent, so terms such as "continuous" and "100% duty" may be meaningless unless explicitly defined. The result can be a power transformer or tube going up in smoke during a long operating period.

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The new ALPHA 76A series is FCC type-accepted and [illegible] descriptive literature and list [illegible]

CQ Reviews: Electronic Research of Virginia Model SL-55 Active Audio Filter

BY IRWIN SCHWARTZ*, K2VG

Some months back I received a Model SL-55 audio active filter from Electronic Research Corp. of Virginia for review. I installed it in my all-Drake station and was impressed with the results. Most of my operation is limited to c.w. and I was personally looking for a filter that would make life easier on the crowded lower portion of the twenty-meter c.w. band. The SL-55 seemed to do good job of separating the wanted signal from all the QRM that surrounded it.

I was satisfied by the filter's performance.

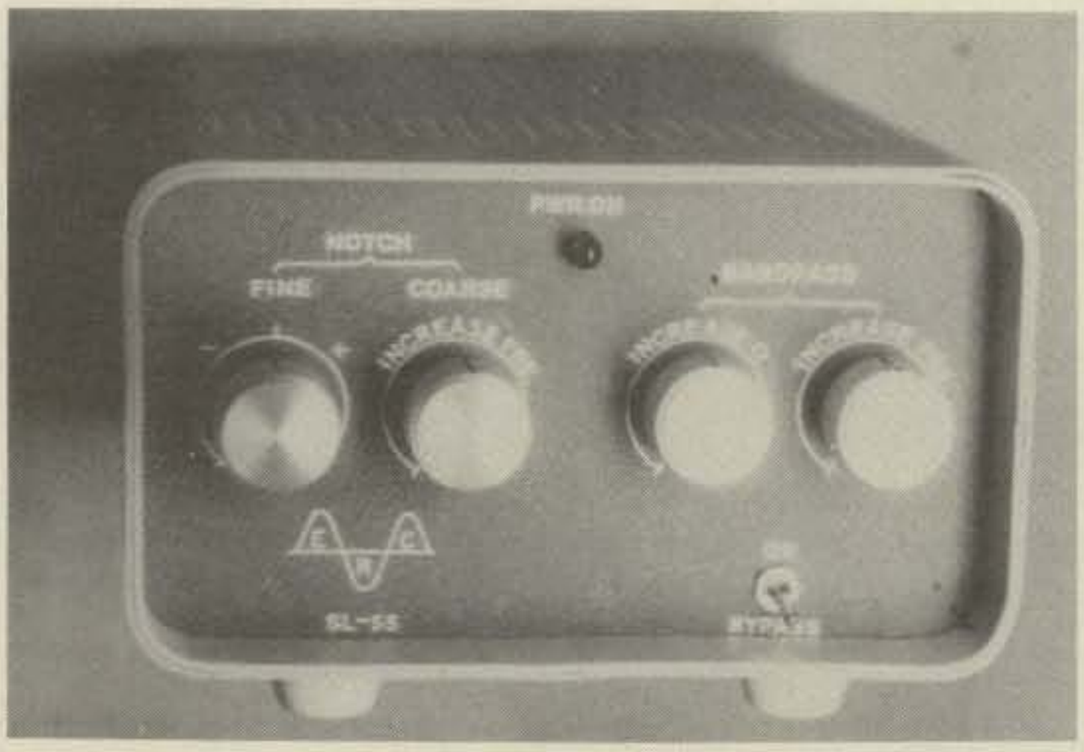
Not being much of a phone man, I didn't really put the '55 to the test on s.s.b. I listened a bit on the phone portion and was mildly affected.

About the middle of May I received another filter and a letter from Timothy Hulick, W9QQ, who is the president of ERC. He indicated in his letter that a modification had been made to the original filter. The change effected only the s.s.b. reception characteristics. Since I had not really put the unit to the test the first time, I decided that I would give the modified unit a run for its money.

The filter performs magnificently on c.w. I was able to separate signals that ordinarily lie one on top of the other, even with the narrow filter in my receiver.

The SL-55 allowed me to vary the passband of reception and notch out any interfering signals lying near the desired one.

*Technical Editor, *CQ*



To that end, the filter has two sets of controls. One set adjusts the bandpass of the receiver putput. The center bandpass frequency is continuously variable from 200 to 1400 Hz. The bandpass itself is continuously variable from 14 to 2100 Hz.

The other set of controls applies to the notch filter circuit. The notch frequency positioning is continuously variable from 300 to 1400 Hz. The notch depth is fixed nominally at 30 dB. The 3 dB notch width is 50 Hz at the low end and 200 Hz at the high end. The notch filter can be switched in and out independent of the bandpass filter.

The filter's performance on s.s.b. is equally commendable. When I do go on phone, my operation is generally limited to 15 meters. Since activity on that band is on the upswing (particularly on weekends) I felt that the combination of a familiar band and an unfamiliar filter would be the best test.

The SL-55 performed very well.

When I first tried the filter, I followed the operator's manual to the letter. The instructions are easy to use as a guide. I found, however, that experience is a much better teacher than any book and, therefore, played with the unit as I saw fit. With one afternoon's experience I became an expert at handling the SL-55.

The filter is much easier to learn to use on c.w. Since voice characteristics are so variable, it takes a bit more time to get used to the filter in s.s.b. service. However, one day's use will make you an expert also.

I was informed in Dr. Hulick's letter that "all purchases (of the SL-55) will be retrofitted with the new modification. This can be done either by the owner or, if he wants to send it back, at no cost, except for postage."

Modification kits are being sent out to all owners of the older version. I agree with Dr. Hulick when he says, "The change is well worth the effort" and can be made in fifteen minutes. The waranty is not voided if the owner makes the modification, but he must follow the instructions enclosed with the kit.

Other specifications include an 8-ohm audio output impedance (standard ¼-inch headphone jack or RCA phono socket—you can drive a speaker with the SL-55), all solid-state construction (seven IC's) and unity audio gain.

The unit weighs 1.75 pounds and measures 5.5W x 3.5H x 7.5D inches. It sells for $69.50 and can be purchased from Electronic Research Corp. of Virginia, 1280 Southfield Place, Virginia Beach VA 23452.

In October 1948 CQ held its first World Wide DX Contest. Get set now to be part of this 30th Anniversary of Championships and Champions. There's nothing like it anywhere.

1978 CQ World-Wide DX Contest

Phone: October 28-29 & C.W.: November 25-26
Starts 0000 GMT Sat. Ends 2400 GMT Sun.

I. OBJECTIVE: For amateurs around the world to contact other amateurs in as many zones and countries as possible.

II. BANDS: All bands, 1.8 thru 28 MHz.

III. TYPE OF COMPETITION:

1. Single Operator (Single band, and all band). Single operator stations are those at which one person performs all of the operating, logging, and spotting functions. The use of DX spotting nets or any other form of DX alerting assistance places the station in the Multi-Operator category.

2. Multi-Operator (all band operation only).

a. Single Transmitter, only one transmitter and one band permitted during the same time period (defined as 10 minutes). *Exception*: One—and only one—other band may be used during the same time period if—and only if—the station worked is a new multiplier.

b. Multi Transmitter (no limit to transmitters but only one signal per band permitted).

3. QRP_p (single operator only) Power must not exceed 5 watts output. Stations in this category will be competing only with other QRP_p stations for awards.

IV. NUMBER EXCHANGE: Phone: RS report plus zone (i.e. 5705). C.W.: RST report plus zone (i.e.: 57905).

A station in a call area different than that indicated by its call sign is required to sign portable.

V. MULTIPLIER: Two types of multiplier will be used.

1. A multiplier of one (1) for each different zone contacted on each band.

2. A multiplier of one (1) for each different country contacted on each band.

Stations are permitted to contact their own country and zone for multiplier credit. The *CQ* Zone Map, DXCC country list, WAE country list and WAC boundaries are standards.

VI. POINTS: 1. Contacts between stations on different continents are worth three (3) points.

2. Contacts between stations on the same continent but different countries, one (1) point. *Exception:* For North American stations *only*, contacts between stations within the North American boundaries count two (2) points.

3. Contacts between stations in the same country are permitted for zone or country multiplier credit but have zero (0) point value.

VII. SCORING: All stations: the final score is the result of the total QSO points multiplied by the sum of your zone and country multiplier.

Example: 1000 QSO points × 100 multiplier (30 Zones + 70 Countries) = 100,000 (final score).

VIII AWARDS: First place certificates will be awarded in each category listed under Sec. III in every participating country and in each call area of the United States, Canada, Australia and Asiatic USSR.

All scores will be published. To be eligible for an award, a Single Operator station must show a minimum of 12 hours of operation. Multi-operator stations must operate a minimum of 24 hours. A single-band log is eligible for a single-band award *only*. If a log contains more than one band it will be judged as an all-band entry, unless specified otherwise.

In countries or sections where the returns justify, 2nd and 3rd place awards will be made.

All certificates will be issued to the licensee of the station used.

In the QRP_p category certificates will be awarded for single operator only.

IX. TROPHIES & PLAQUES. (Donors)

PHONE

Single Operator, All Band

World—Bill Leonard, W2SKE
U.S.A.—Potomac Valley Radio Club.
Canada—Jack Baldwin, VE3BS
Carib./C.A.—Jim Neiger, N6TJ
Europe—W4BVV Operators.
Africa—Gordon Marshall, W6RR
Asia—Japan CQ Magazine
Oceania—No. Calif. DX Club
S. Amer.—Rafael Ponce de Leon, CX3BR

Single Operator, Single Band

World—K2HLB Memorial, N. Jersey DX Assoc.
World—3.8 MHz—Fred Capossela, K6XX
U.S.A.—3.8 MHz—Arnold Tamchin, W2HCW
U.S.A.—So. California DX Club.
Canada—Gene Krehbiel, VE7KB
Carib./C.A.—Pedro Piza Jr., KP4RF

CQ **World Wide DX Contest** CQ

Last Full Weekend of October (Phone) & November (CW)

Page 8 of 15 Pages

Call Sign W1MDD ☐ Phone ☒ CW Log for 21 MC Band

(Use separate log for each band!)

DATE GMT	TIME GMT	STATION	SERIAL NUMBER SENT	SERIAL NUMBER RECEIVED	INDICATE MULTIPLIERS ONLY ZONE	INDICATE MULTIPLIERS ONLY COUNTRY	QSO POINTS	
	1405	G3HCT	58905	57914	14	G	3	
	08	DL9PF	579	58914		DL	3	
	11	DM2ATD	579	57914		DM	3	
	20	VB5WF	599	59916		VB5	3	
	23	W1NY	599	59905	05	W		0
	25	G4RJ	569	57914			3	
	32	OH8RC	579	59915	15	OH	3	
	40	YE5US	599	59904	04	YE		2
	45	DL9WX	589	58914			3	
	47	YO8DD	579	57920	20	YO	3	
	1500	4Z4HF	589	58920		4X4	3	
	2215	WA6GLD	599	59903	03			0
	17	KV4FZ	599	59908	08	KV4		2
	19	YV5BPJ	599	59909	09	YV	3	
	28	W4WSF	589	58904				0
	31	KH6ZJ	589	59931	31	KH6	3	
	46	JA8MM	569	57925	25	JA	3	
	48	JA3WCZ	579	56925			3	
	52	JH1RCJ	579	57925			3	
	2300	KL7MF	589	57901	01	KL7		2
	1315	DH2BM	579	58915			3	
	17	HB9AG	579	58914		HB9	3	
	24	UA1JZ	579	57916		UA1	3	
	29	~~4Z4HF~~	~~589~~	~~57920~~		DUPE		0
	32	G3FXB	599	59914			3	
	1600	PJ8CC	599	59909		PJ	3	
	05	ZD3Z	589	58935	35	ZD3	3	
	17	CR6CA	579	59936	36	CR6	3	
	1820	F9FF	579	57914		F	3	
	22	~~KH4FZ~~	~~599~~	~~59908~~		DUPE		0
	28	DX2TA	579	57914			3	
	32	DX1JA	579	58940	40	DX		2
	35	TF1WFZ	589	58938	38	TF	3	
	50	ZS5DW	599	57925		ZS5	3	
	2130	JA5SZ	579	58925			3	
	35	~~FA8MCZ~~	~~569~~	~~58925~~		DUPE		0
	38	JA9MF	569	57925			3	
	2200	VK2EO	589	58930	30	VK	3	
	24	KA2AB	599	57925			3	
	58	YS6DO	569	57924	24	YS6	3	
		37	TOTALS (This Page Only)		18 (Zones)	25 (Countries)	98	

QSO's (minus duplicates)

Note: Duplicate QSO's can mean disqualification!

Year 1975

CQ **World Wide DX Contest** CQ

Last Full Weekend of October (Phone) & November (CW)

Call Sign W6DGH U.S.A. Country

☐ Single Operator ☒ Multi-Operator (All Band Only)

☒ Phone ☐ Single Band ☐ Single Transmitter

☐ CW ☒ All Band ☐ Multi-Transmitter

	QSO's (minus duplicates)		QSO Points		Zone Multiplier		Country Multiplier		Score	
1.8 mc	1	→	0	×	1	+	1	=		1.8 mc
3.5 mc	46	→	116	×	19	+	30	=		3.5 mc
7.0 mc	49	→	130	×	18	+	23	=		7.0 mc
14 mc	164	→	458	×	33	+	67	=		14 mc
21 mc	578	→	1714	×	31	+	69	=		21 mc
28 mc	175	→	495	×	27	+	59	=		28 mc
All Bands	1013	→	2913	×	129	+	249	=	1,101,114	All Bands

How to score: QSO Points × (Zones + Countries) = FINAL SCORE

EXAMPLE: 1000 QSO Points × (30 Zones + 70 Countries) = 100,000 points

Station Description: KWS-1 75A3

Antenna(s): 2 el. 40, 4 el. 20, 7 el. 15, 5 el. 10, Dipoles 80, 160; 2 el Quad 10-15-20

Operators:

Remarks (Biggest thrill in Contest, funniest story, comments, etc.): Report sent 5903; Received 5925 unless otherwise noted.

Club Competition (Minimum 3 logs): Southern California DX Club

This is to certify that in this contest I have operated my transmitter within the limitations of my license and have observed fully the rules and regulations of the contest.

Type or Print (Signature): Richard J. Norton

Name: RICHARD J. NORTON Call: W6DGH

Address: 21290 West Hillside Drive

City: Topanga

State or Country: California (Zip): 90290

Logs must be postmarked no later than December 1st for PHONE and January 15th for CW. Indicate PHONE or CW on envelope.

Mail to: CQ Contest Committee, 14 Vanderventer Ave., Port Washington, N.Y., U.S.A. 11050

Note: Duplicate QSO's can mean disqualification!

CQ Form 1057A 1969

Oceania—14 MHz—VK3JW Memorial.
(International Pacific DX Net)
Oceania—21 MHz—Lee Wical, KH6BZF

Multi-Operator, Single Transmitter

World—Don Wallace, W6AM
Canada—Calgary A.R.A.

Multi-Operator, Multi Transmitter

World—Radio Club Venezolano.
U.S.A.—Dale Hoppe, K6UA

Contest Expeditions

World—Single Opr.—Stuart Meyer, W2GHK
World—Multi-Op.—Bill Schneider, K2TT

C.W.

Single Operator, All Band

World—Larry LeKashman, W2AB
U.S.A.—Frankford Radio Club.
Canada—Canadian DX Association
Carib./C.A.—Jim Neiger, N6TJ
Europe—W3AU Operators
Africa—Gordon Marshall, W6RR
Asia—Japan CQ Magazine.
Oceania—Maui Amateur Radio Club
S. Amer.—Rafael Ponce de Leon, CX3BR.

Single Operator, Single Band

World—W2JT Memorial, N. Jersey DX Assoc.
World—3.5 MHz—Fred Capossela, K6XX
U.S.A.—No. Illinois DX Assoc.
Carib./C.A.—DX Club of Puerto Rico.
Europe—14 MHz—G2LB Memorial.
(From His Friends)
Oceania—21 MHz—Pacific Radio Amateur Transmitting Society.

Multi-Operator, Single Transmitter

World—Anthony Susen, W3AOH

Multi-Operator, Multi Transmitter

World—Hazard Reeves, K2GL
U.S.A.—Rush Drake, W7RM

Contest Expeditions

World—Single Operator, K2HLB Memorial.
(Don Miller, W9WNV)
World—Multi-Op., Bill Schneider, K2TT

Special—Single Opr., All Band

World—Phone/C.W.—John Knight, W6YY

Clubs

World—Phone/C.W.—CQ Magazine
World—Phone/C.W.—Southeastern DX Club.

QRP$_p$

World—Phone—Adrian Weiss, K8EEG/0
World—C.W.—Gene Walsh, N2AA

Trophy winners may win the same trophy only once within a three year period. (This does not apply to any of the CQ special Special Awards.)

The Canadian, Carib./C.A. and the African awards are for residents *only*.

A resident is defined as one living in that country with an established Post Office address.

X. CLUB COMPETITION:

1. The club must be a local group and not a national organization.

2. Participation is limited to members operating within

(Continued on page 91)

YOU... AND AMSAT PHASE III

An exciting new era in amateur radio is about to begin...the era of AMSAT PHASE III OSCAR satellites.

Many of you are familiar with the benefits of the AMSAT OSCAR satellites, notably OSCAR 6 and 7. These satellites, with a combined total of over 8 years in orbit, have provided communications between amateurs throughout the world. They have also provided a capability for an educational program in space sciences and many interesting experiments.

AMSAT, with members and contributing groups worldwide, and headquarters in Washington, D.C., has been responsible for our current satellite program. Many people feel that perhaps the greatest value of the amateur satellite program is the dramatic demonstration of amateur resourcefulness and technical capability to radio spectrum policy makers around the world.

The value of this aspect of amateur radio as we prepare for the 1979 World Administrative Radio Conference (WARC) is enormous.

The AMSAT PHASE III satellite program promises a continuing demonstration that amateur radio is at the forefront of modern technology. PHASE III satellites will routinely provide reliable communications over paths of up to 11,000 miles (17,600 km) for 17 hours each day. You can think of them as a resource equivalent to a new band.

The cost of these PHASE III satellites is a projected $250,000. Commercial satellites of similar performance would cost nearly $10,000,000.

Your help is needed to put these PHASE III OSCAR satellites in orbit.

Your valued, tax-deductible contribution can be as small as one of the 5000+ solar cells needed. A handsome certificate will acknowledge the numbered cells you sponsor for $10 each. Larger components of the satellites may also be sponsored with contribution acknowledgements ranging to a plaque carrying your name aboard the satellites. Call or write us for the opportunities available.

Your membership in AMSAT is important to the satellite program, and will give AMSAT a stronger voice in regulatory matters concerned with satellites. At $10 per year or $100 for life, you will be making a most significant contribution to the satellite program and the future of amateur radio. You will also receive the quarterly AMSAT newsletter.

Clip the AMSAT PHASE III coupon below and send your support today, or call 202-488-8649 and charge your contribution to your BankAmericard (VISA) or Master Charge card.

AMSAT PHASE III
Radio Amateur Satellite Corporation
Box 27 Washington, D.C. 20044
202-488-8649

YES, I want to support AMSAT PHASE III OSCAR satellites. Enclosed is:

☐ $_____ *in sponsorship of* ____ *solar cells (@ $10 each)*
☐ *$10 Annual membership* ☐ *$100 Life membership*
☐ *Send information on sponsoring larger satellite components.*

Name *Call* *AMSAT Member?*

Street

City *State* *Zip*

The publisher has donated this space to AMSAT in support of AMSAT and the PHASE III program.

In this installment Ade Weiss discusses and offers plans to build a receiver which makes his QRPp project a complete transceiver.

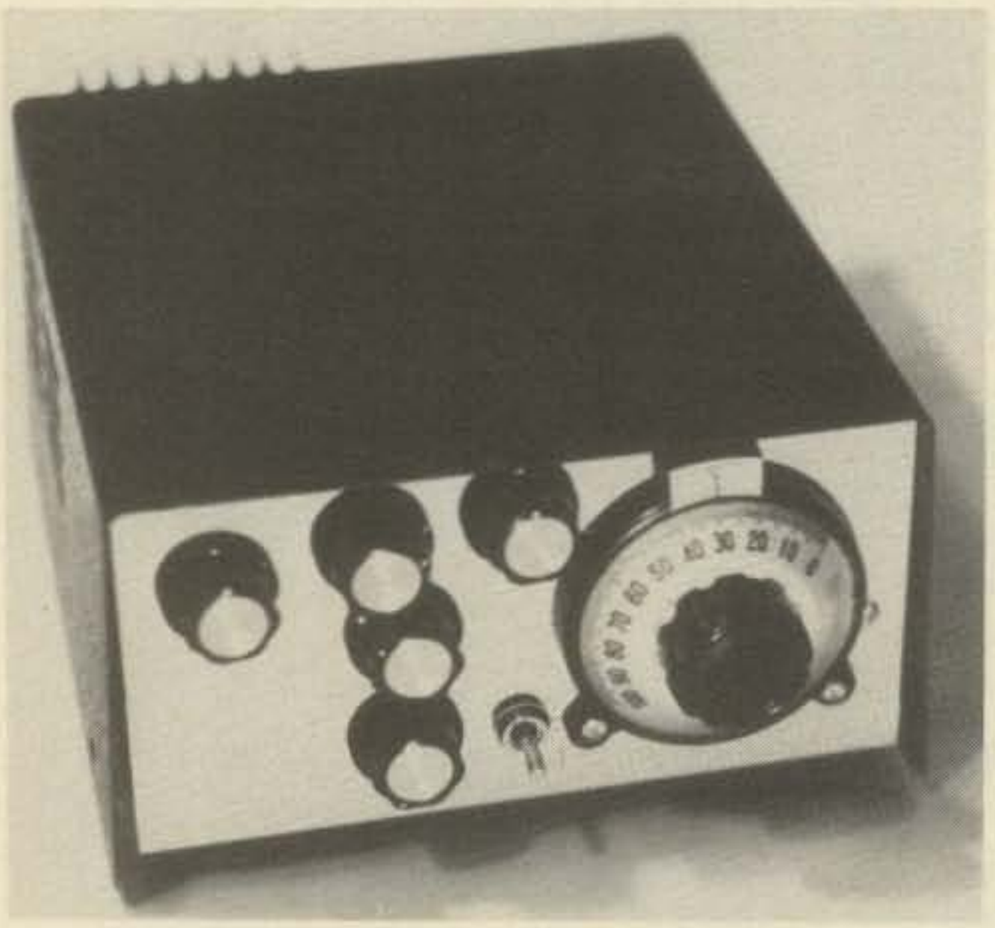
A QRPp Transceiver Part IV: The QRP 420XC 4-20 Watt Transceiver for 7 – 14 MHz

BY ADRIAN WEISS*, K8EEG

In the first three parts of this paper, I described a controlled transmitter capable of producing 3-20 watts r.f. output on 7-14 MHz. The original conception underlying the project was completed at that stage. However, an exclusion to the local Radio Shack supply house produced an enclosure that was one size too large for the transmitter. The remaining, unused space provided too great a temptation to surmount, even though the remaining space was small enough to make the incorporation of a receiver section a more-than-modest challenge. As usual, temptation and challenge have always combined to lure this writer to his downfall, whether in regard to beautiful ladies sitting unattended across the way, or snatching barbells loaded with more than a reasonable weight. The result in this case was a happy one—a direct conversion receiver with great sensitivity and good selectivity which fills the remaining space in the transmitter enclosure, with some space to spare. The greatest amount of thought, when I look back on the entire project, perhaps was expended in coming up with an appropriate title for the transceiver, and I finally settled on the designation "QRP 420XC," or "420XC" for short.

Now, this will make sense after a word of explanation. First, the "QRP" bit is self-explanatory. Next, the "420" bit is a very significant one, and has multilayered implications. On the first level, it is an abbreviated indication of the frequency coverage of 40 and 20 meters, with the "0" of the "40" omitted for brevity and wit. But beyond that, it also functions on another semantic level as an indication (in rounded numbers) of the power capability range of the transmitter, namely, about 4-20 watts, give or take a few on either end, depending on where the Drive Control is set, and the magnitude of V_{cc}. Now, the "XC" bit is an interesting addition and adds to the sophistication of the transceiver designation. On one level, the "X", it seems to me, has always added a bit a class to a unit designation, perhaps because of its centuries-old association with the unknown quantity in mathematical formulae, usually designated "x." This association is admirably suited to QRPp operation, which, as all seasoned QRPp'rs know, involves a very definite dimension of the unknown and mysterious, since one never knows what to expect from QRPp. On another level, furthermore, "X" oftentimes is used in designating a transmitter, as in "xmtr," and the author intends this association also. Finally, the "C" bit is a rather arbitrary choice of the second consonant usually found in the abbreviation for receiver, namely "rcvr." Of course, one could look at the "XC" from a totally different perspective, and consider it merely a shortened form of the usual abbreviation for "transceiver," namely, "xcvr." Beyond this, a "C" can often indicate

*83 Suburban Estates, Vermillion SD 57069

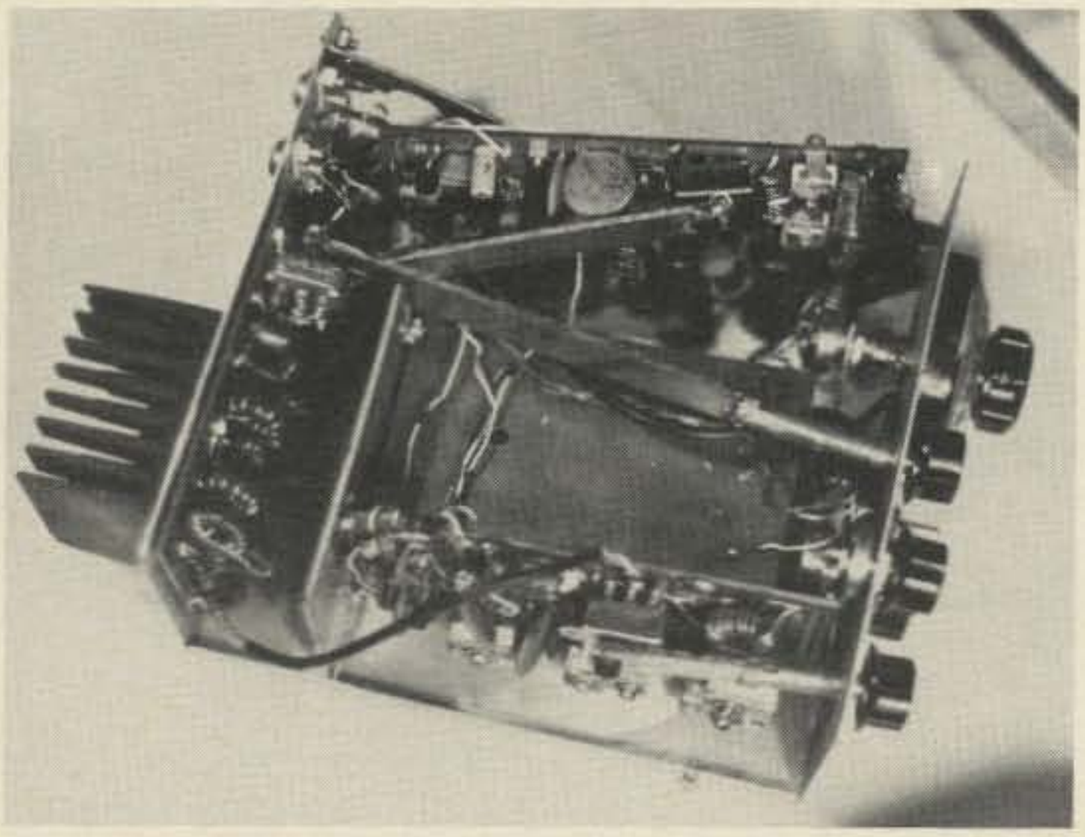


The completed QRP-420XC transceiver. The vernier dial controls the v.f.o. frequency and receiver front-end tuning. Southwest of the vernier dial is the T/R antenna switch, S2. Northwest of the vernier is a "push/pull" final amplifier/receiver bandswitch. The driver bandswitch is at the upper left corner. The vertical row of knobs at the center consist of, from the top: a.f. gain, r.f. gain and drive level controls.

the third unit in an alphabetical series, i.e., A-B-C, and that it does admirably, since this is the third transceiver designed by this writer, not counting, of course, units designed before 1974, which seems a reasonable cut-off point. And so, the completed unit described in this series of papers bears the official designation "QRP 420XC" for obvious reasons. At the risk of questioning Shakespeare's now-famous line form *Romeo and Juliet* on the general subject of names-entities relationships (i.e., "A rose by an other name, etc"), I don't hesitate to claim, without qualification, that the "QRP 420XC" designation can apply only to this specific unit, and no other. In other words, there is so compelling a consonance between the nature of the unit so designated, and the designation (re: name-entity relationship), that to designate it any other way would be analogous to designating a rose by the name "pig" and claiming that it smelled the same.

Circuit Descriptions

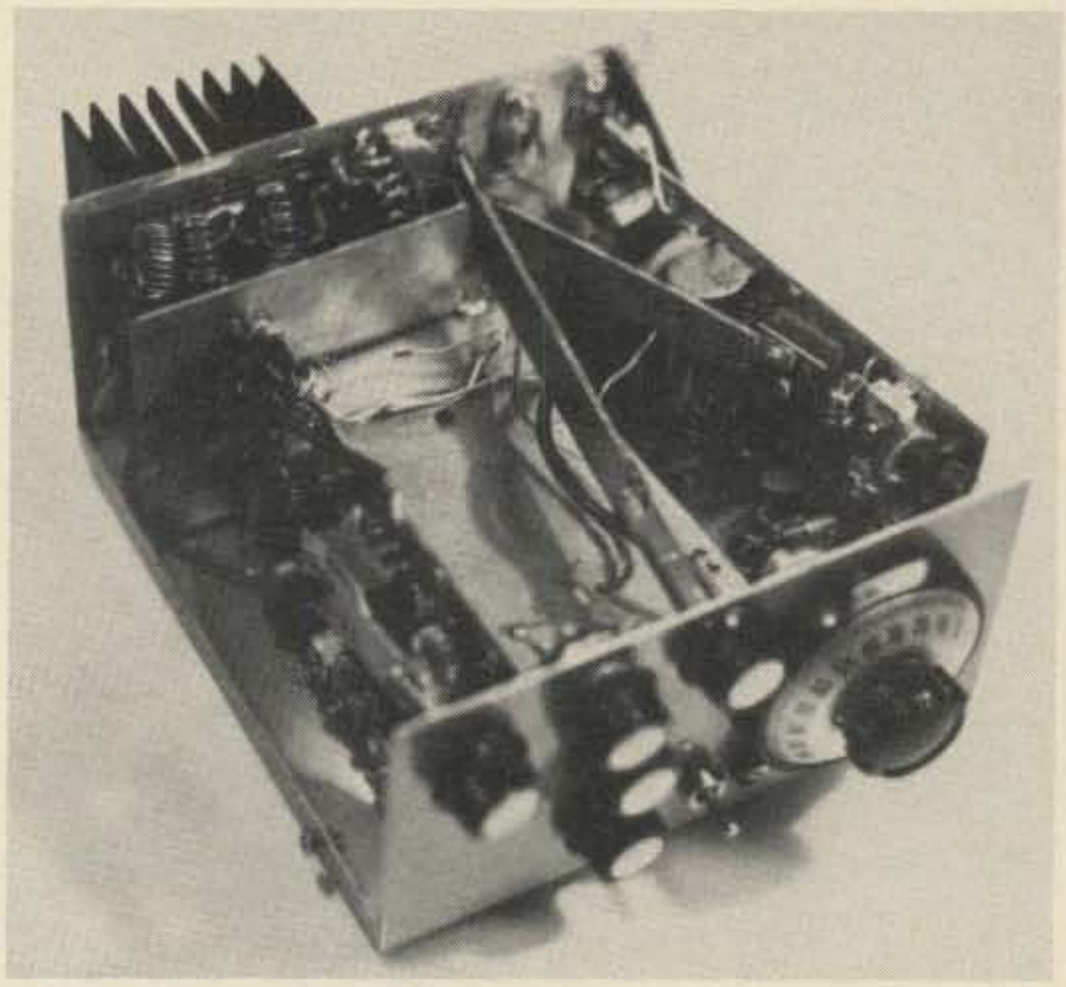
Fig. 1 shows the circuit of the direct conversion receiver, which employs FET's in the front-end and mixer stages, a bipolar audio amplifier, and a quad-amp IC as a c.w. Filter and audio pre-amplifier. Several aspects of the design bear detailed comment.



The receiver board is mounted at an angle, as seen from the top of the unit. The detail of the bandswitch coupling/ extension arms form a "V" below the receiver board. The receiver arm is attached at the right end to the receiver SW1 through the same method shown for the driver and final bandswitches in an earlier part of this series. The left end of the receiver SW1 bandswitch extension is mitred to fit flush against the final amplifier switch extension and then soldered to it. Behind the front-panel mounted vernier, some of the detail of the tuning pot mounting bracket can be seen. The receiver board parts that are visible are (right to left): C1, L1 (40 m.), C2, RFC2, S1AB, C12, C6, C36.

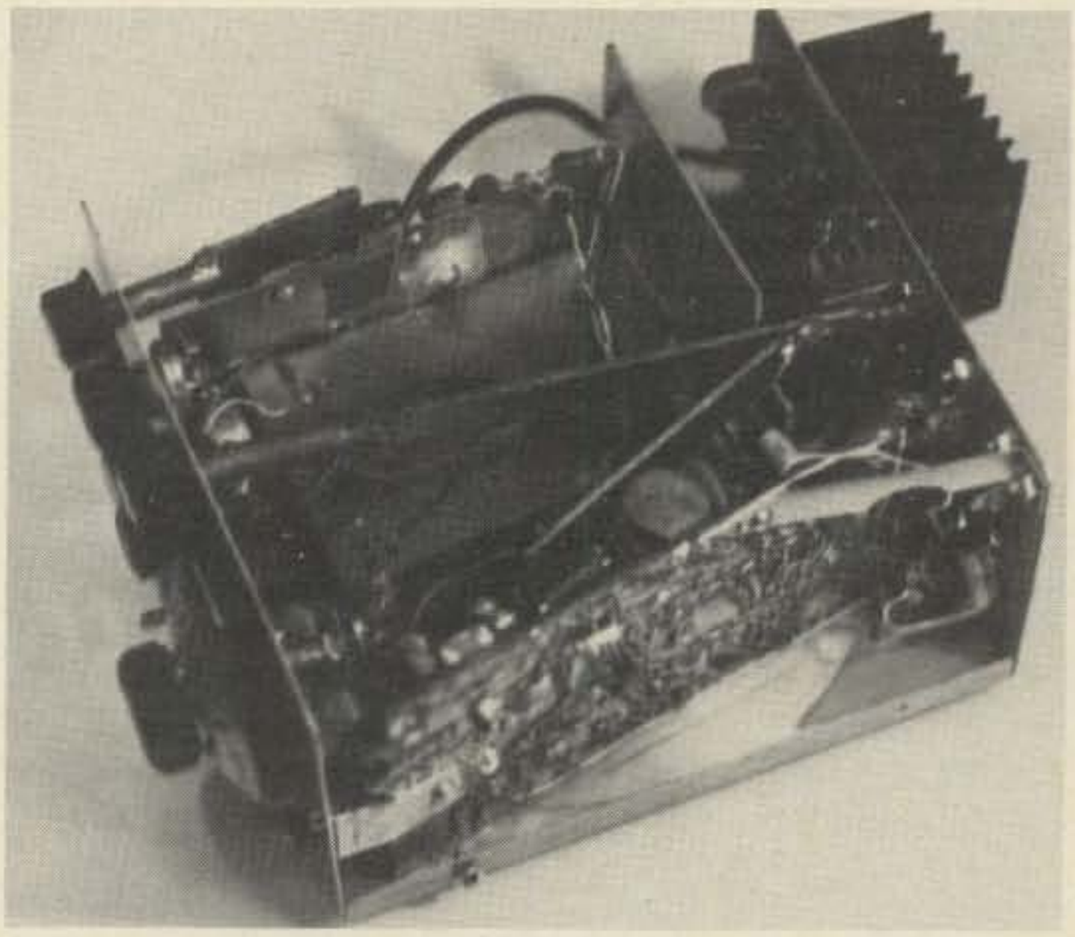
R. F. Amplifier

A MPF102, or the more sensitive 2N5486, FET is used in a conventional r.f. amplifier front-end which employs a parallel-tuned tank circuit with very light inductive coupling to the antenna. Fig. 1 shows an optional approach to connecting the front-end to the antenna which will permit full break-in operation. This consists of D6-7, C38, and R30. This is a version of the classical "The Simplest T/R Switch" which appeared in *CQ* several years ago. The purpose of R30 is twofold: 1) it is necessary because of front-end receiver sensitivity in improving cross-modulation characteristics under very-strong signal band conditions; 2) it introduces a resistive component into the reactance presented to the final

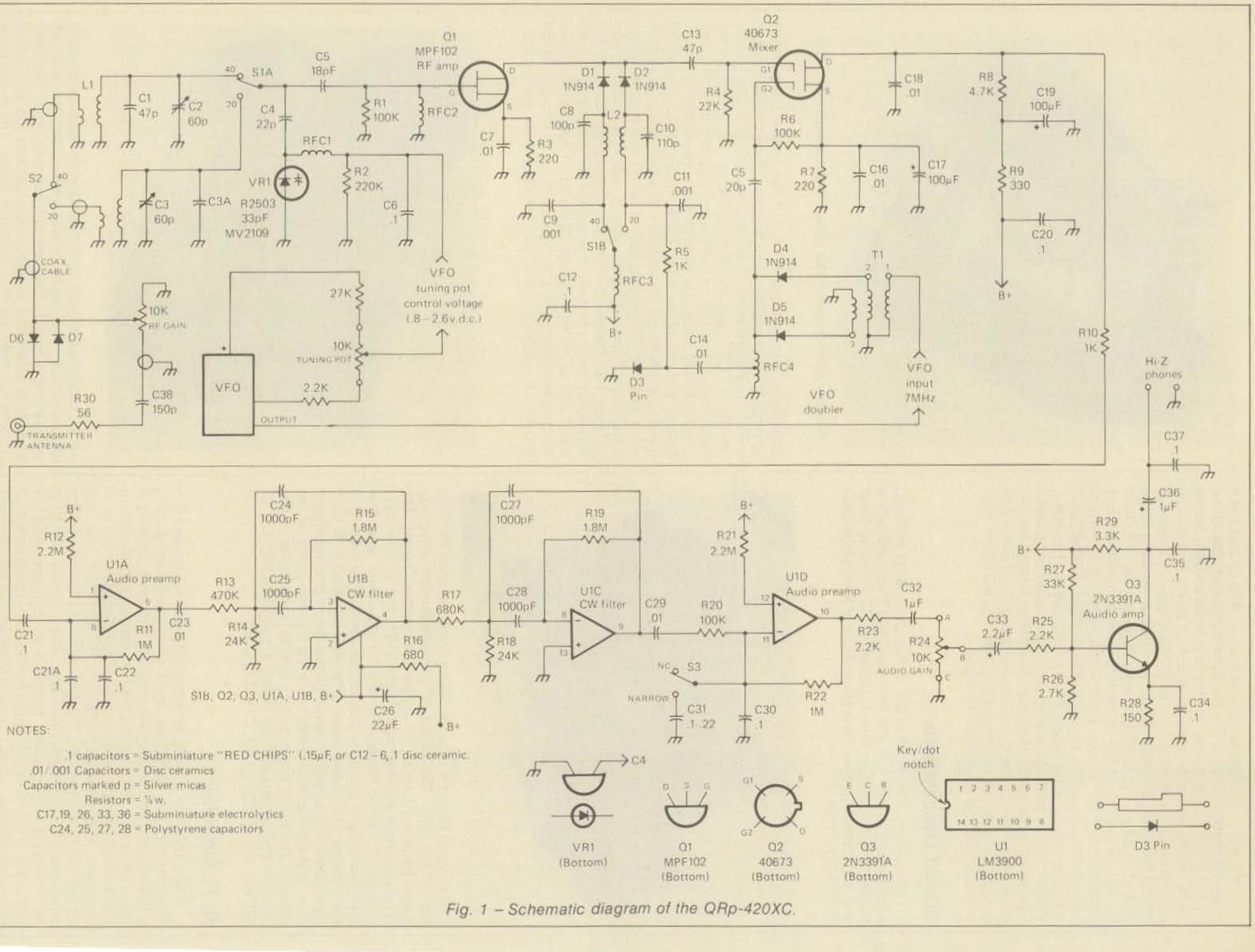


Another shot showing the detail of the bandswitch arm.

amplifier output by the C38-D6/7-L1 link circuit. The alternate approach consists simply of a manual T/R switch SW2: a dpdt switch is selected with three positions, "ON-OFF-ON", and in the center "OFF" position, the receiver is disconnected from the antenna. The 10k potentiometer functions as an r.f. gain control, and is necessary because of the gain of the front-end. Notice that miniature coax cable (RG-174U) is used for making all off-board connections to avoid pickup of signals extraneous to the signal path. The 40 meter tank circuit parallels a fixed capacitor (mica) with the compression trimmer, but the 60 pF trimmer is adequate for reaching resonance on 20 meters. If a smaller trimmer (40 pF) is on hand, a 27 pF mica (shown as C3a in fig. 1) may be inserted at the proper holes on the p.c. board. An on-board dptp switch is used for selecting the L1/L2 tank circuits for each band.



Detail showing the method of mounting the receiver board in the enclosure. The brackets are seen at the right and left edges of the board. They are cut and bent from 1/16 inch aluminum stock and drilled to line up with the p.c. board ground foil; they are then bolted in place. The headphone jack is at the lower left rear panel.



NOTES:

.1 capacitors = Subminiature "RED CHIPS" (.15µF, or C12–6, .1 disc ceramic.
.01/.001 Capacitors = Disc ceramics
Capacitors marked p = Silver micas
Resistors = ¼w.
C17,19, 26, 33, 36 = Subminiature electrolytics
C24, 25, 27, 28 = Polystyrene capacitors

Fig. 1 – Schematic diagram of the QRp-420XC.

the super-compact

alda 103

only 3¼" high x 9" wide x 12½" deep • less than 8¼ pounds

ALDA 103, the trim little powerhouse with incredible performance for the price! ALDA 103 provides a full 250 watts PEP input for SSB operation, and 250 watts DC input for CW. And when it comes to performance, ALDA 103 is the hottest little transceiver going — all solid state, totally broadbanded and super-stable VFO.

Ideal first transceiver for brand new novices! You'll want a full-capability CW/USB/LSB unit with all the power and performance you can use. ALDA 103 gives you 250 watts DC input for CW, the maximum allowable power for your novice license. When you upgrade to technician, you've got 2 bands for CW operation. And with your general license, just plug in your mic and use the ALDA 103's full 250 watts PEP on SSB!

Perfect second or mobile unit for seasoned hams! If you're looking for a super-sharp, compact unit to use in your car or boat, ALDA 103 will live up to your expectations. Absolute worst case sensitivity 0.5 uV for 10 dB S+N/N — a must for mobile operation. Receiver audio output of 3 watts minimum — another must. Also, very low receiver power drain of only 5.5 watts — that's 0.4 amps at nominal 13.8 VDC including power for dial and meter lamps!

$495

GENERAL SPECIFICATIONS

Semiconductors:	39 diodes, 23 transistors; 11 integrated circuits
Power Requirements:	Nominal 13.8 VDC input at 15 amps, negative ground only
Power Consumption:	Receive — 5.5 watts (includes dial and meter lamps); Transmit — 260 watts
Dimensions:	3-1/4" high x 9" wide x 12-1/2" deep (82.55 mm x 228.6 mm x 317.5 mm)
Weight:	8-1/4 lbs. (3.66 kg)

PERFORMANCE SPECIFICATIONS

Frequency Range:	80 meter band — 3.5 to 4.0 MHz 40 meter band — 7.0 to 7.5 MHz 20 meter band — 14.0 to 14.5 MHz
Modes:	CW; USB; LSB
RF Input Power:	SSB — 250 watts PEP nominal CW — 250 watts DC maximum (adjustable)
Transmitter:	
Antenna Impedance:	50 ohm, unbalanced
Carrier Suppression:	Better than −45 dB
Side-Band Suppression:	Better than −55 dB at 1000 Hz
Distortion Products:	Better than −26 dB
AF Response:	500 to 2500 Hz
Spurious Radiation:	Harmonics better than −45 dB below 30 MHz; better than −60 dB above 30 MHz
Frequency Stability:	Less than 100 Hz drift per hour (from a cold start at room temperature)
Microphone:	High impedance 3000 ohm
Receiver:	
Sensitivity:	Better than 0.5 watts audio output for 0.5 μV input
Signal-to-Noise Ratio:	Better than 10 dB S+N/N for 0.5 μV input
Image Ratio:	Better than −60 dB (typical with respect to 0.5 μV input: 80 meters — −130 dB; 40 meters — −100 dB; 20 meters — −75 dB).
IF Rejection:	Better than −70 dB (typical with respect to 0.5 μV input: 80 meters — 110 dB; 40 meters — 80 dB; 20 meters — 75 dB).
Intermodulation Intercept Point:	Better than 10 dBM
Selectivity:	2.5 kHz — 6 dB; 5.0 kHz — 60 dB
Audio Output Power:	More than 3 watts
Audio Distortion:	Less than 5% at 3 watts

OPTIONS & ACCESSORIES

Microphone **$14.95**

Mobile Mount **$3.95**

Noise Blanker — Model No. PC 701 ..... **$39.95**

100 kHz and 25 kHz Dual Crystal Calibrator — Model No. PC 801 ..... **$19.95**

Portable Power Supply — Model No. ALDA PS 115: average duty 15 amp unregulated; input — 115/230 VAC, 50/60 Hz; output — 13.8 V nominal at 15 amps... **$84.95**

Heavy Duty Power Supply — Model No. ALDA PS 130: output — regulated 30 amp at 13.8 VDC; input — 115 or 230 VAC, 50/60 Hz... **$149.95**

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ALDA 103 is completely manufactured in the U.S.A.

CIRCLE 1 ON READER SERVICE CARD

R.F. Amplifier Switching

SW1a switches the L1 tanks directly, while the L2 tanks are diode switched by means of the B+ applied through SW1b. RFC3-C12 bypass and isolate the B+ line at r.f.. C8 and C10 are fixed value mica capacitors which permit resonating the L2 inductances in the proper frequency band. In the prototype, trimmers were used at C8 and C10, but the response of the drain circuit was deemed sufficiently broad to allow omission of the trimmers. Peaking is accomplished by varying the magnitude of the L2 inductances on each band by either compressing or spreading the turns on the toroid core circumference. If L2 winding data is followed closely, no problem should arise in peaking the drain circuits. Finally, RFC2 was required to lower the gain of the r.f. amplifier. The tuned-gate/tuned-drain configuration is ideal for self-oscillation, and this problem was encountered. RFC2 eliminates any tendency to self-oscillation, and its value was determined expermentally. Overall gain of the front-end may be further decreased, if desired, by inserting a resistor of up to 1.8k ohms in the B+ lead to SW1b. It is recommended, however, that this approach be avoided, utilizing the r.f. gain control instead.

Mixer/VFO Doubler

Output from the r.f. amplifier is capacitively coupled to the input gate of the 40673 mixer. The mixer stage is conventional. C20-R9-C19 filter any a.c. which may appear on the B+ line, while R8 establishes the bias level which provides the best gain vs. noise figure. C18 provides a small degree of suppression of high frequency audio appearing in the output from the mixer.

The v.f.o. doubler circuit permits use of 7 MHz v.f.o. input on both 7 and 14 MHz. In simplest terms, the circuit is a full-wave rectifier configuration in which both positive and negative peaks of the a.c. cycle are added in the output. T1 provides the matching and phase reversal necessary. RFC4-C14-D3 are the key to the dual-band operation of the circuit. The basic function of RFC4 is to provide a high impedance at the desired frequency, while bypassing to ground fundamental and odd-multiple frequency products. The overall RFC4 value was selected which produced the best 7 MHz output waveform to C15. Several methods were attempted for shorting out a portion of RFC4 which would result in an inductance which presented the best impedance at 14 MHz. Diode and FET switching at D3 failed. Rectifiction across the junctons defeated the purpose of the switch. Finally, a PIN diode, which passes, but does not rectify a.c., was tried and performed as well as a direct shorting of the tap to ground. C14 isolates the RFC4 branch from the d.c. bias applied to D3 while permitting passage of r.f. current. Forward bias to D3 is taken from the 20 meter position of the SW1b bandswitch. When the switch is in the 20 meter position, forward bias is applied to D3, which conducts and shorts out a portion of RFC4. Output to C15 is a very clean 14 MHz waveform with a small trace of fundamental 7 MHz energy. A bipolar switch functioned almost as well as the PIN diode, but required several more components.

Audio Preamps–U1a-d

The LM3900 quad-amp IC provides the basis of the audio section of the receiver. Two sections of the LM3900 function as high-gain preamplifiers, the first amplifying mixer output to an appropriate level for filter drive, the second boosting the output of the second filter stage to a level which is adequate to drive a pair of hi-Z phones with medium level r.f. signals applied to the input of the receiver, or, as is the case in the present design, far more than adequate output to drive an audio amplifier stage to speaker-level output. The gain of the preamplifier configuration is determined by the R10/R11 (or R20/R22) ratio. The feedback loop is established by R11 and R22 at the 1 megohm level, as suggested by the manufacturer. R10 was selected empirically under operating conditions utilizing a very marginal antenna such as might be necessary during motel and portable operation. Since the r.f. gain control will limit the signal level at the receiver front-end, the value shown for R10 need not be changed even though operation with high-gain antennas is contemplated. C21a-C22, and C30-C31 control the high-frequency audio roll-off, and the builder may select a value up to 0.3 mF to suit his taste in audio channel response. In the unit described, C21a was omitted, and a selectivity switch places a .22 mF capacitor, C31, in the circuit when extra suppression above about 1 kHz is desired in QRM situations. The effect upon high frequency audio notes is marked and considered worthwhile in this case. Output from U1d is taken through R23, which serves as a parasitic suppressor.

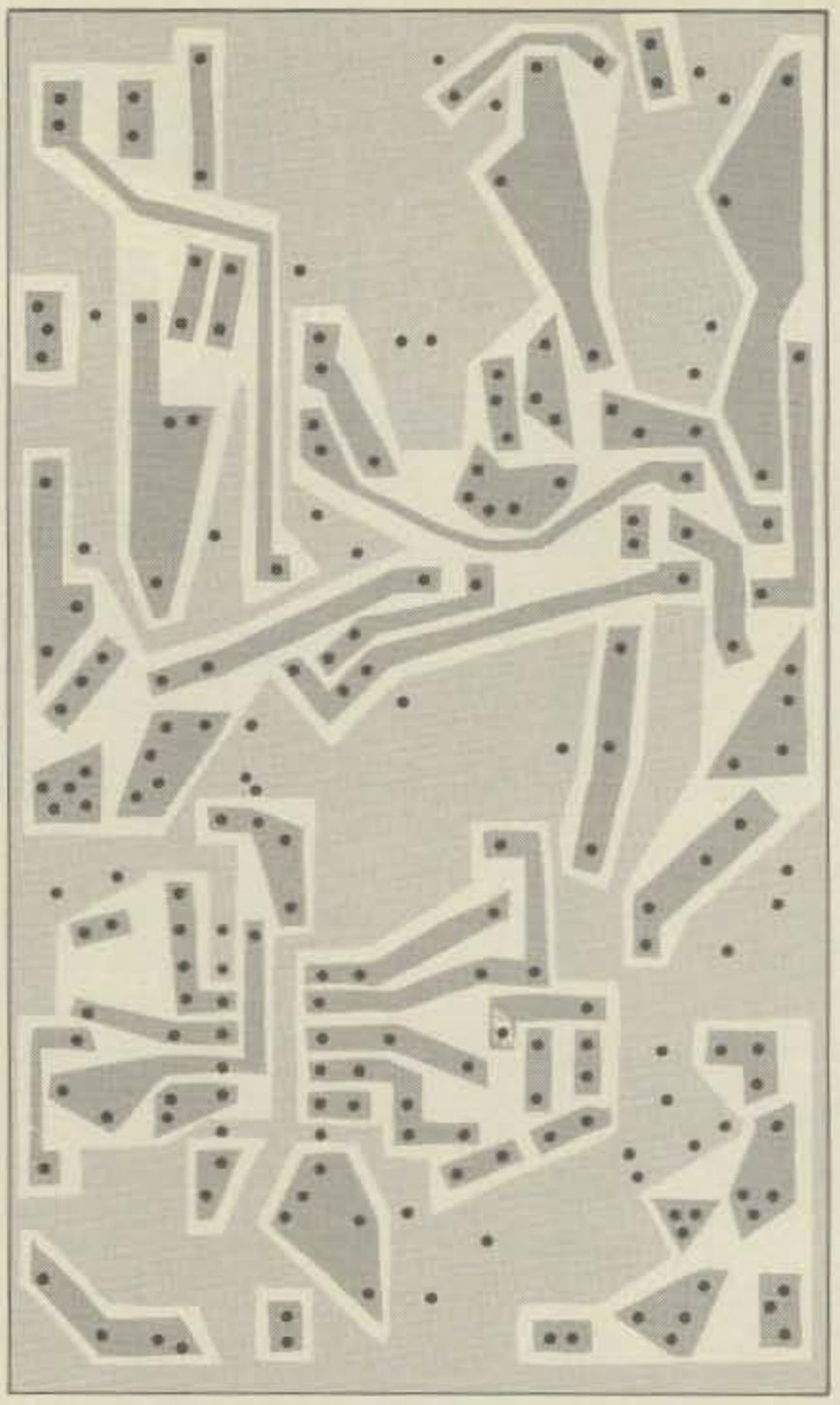


Fig. 2 – Actual size printed circuit board template.

C.W. Filter

The remaining two sections of the LM3900 are used in an active bandpass filter circuit borrowed from the MFJ CWF-3 design. R17 and R13 control stage gain, while the C24-C25-R15 and C27-C28-R19 RC networks establish the bandpass curve. R13 was selected to increase the overall gain of the audio chain for weak-signal conditions. Output from the filter sections shows a very good passband response, but loading and passband shaping in U1d and Q3 add a second peak at about 750 Hz. Considerable amplification of signals occurs at the response peaks. One characteristic that should be considered in narrowing the passband response in a chain such as this has to do with the apparent increase in the internal noise level as the passband in decreased. This creates an impression of an overall degradation of signal-to-noise ratio. When tuning the unit in search of weak signals, SW3 is left in the "wide" position, and once the weak signal is centered in

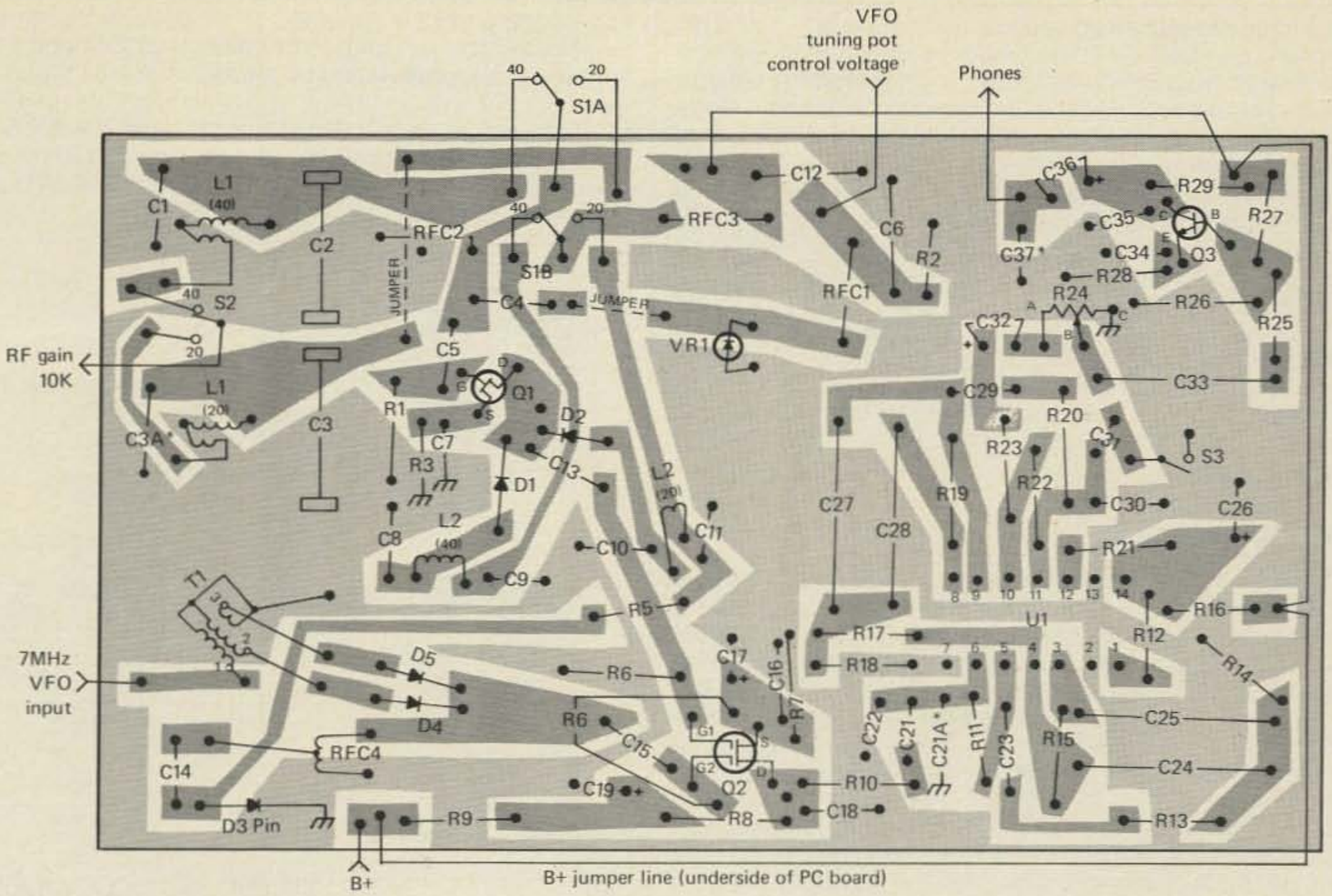


Fig. 3 – Parts placement on the printed circuit board.

the passband, it is switched to "narrow" with worthwhile improvement in copiability.

Audio Amplifier

A 2N3391a high-gain, low-noise device is used in a conventional Class A audio amplifier circuit. C34 establishes the gain of the stage at a far-from-maximum level, and maintains the passband established in earlier stages. A 2.2 mF, C34, provides the maximum stage gain possible, and tends to broaden the passband. C36 likewise is chosen with regard to its effects on the passband curve, and C37 is optional for additional high-frequency roll-off. With the values shown, more than adequate headphone volume is produced by extremely weak signals. If it is desired to add a speaker, an audio output transformer can be connected across the existing output terminals (10k:8, 2k:8 ohms).

Varactor Diode Tuning

A novel feature of the "QRP 420XC" receiver is the use of varactor diode tuning in the front-end to allow precise tracking with the v.f.o. frequency. The control voltage applied to VR1 is taken from the wiper of the main v.f.o. tuning potentiometer, and is the same voltage which controls v.f.o. frequency 0.8-2.6 v.d.c. The value of C4 was arrived at experimentally, and, in combination with the L1 tank circuit values, permits precise tracking on both bands. Inclusion of the varactor system was found to be necessary because of the rather narrow resonance peak (about 15 kHz) of Q1 which results form the high Q of the circuit. RFC1 and C6 perform the typical r.f. isolation function. R2 adds a resistance across the varactor to establish a current path so that the charge built up across the varactor may dissipate as the control voltage is lowered. Otherwise, the varactor will "freeze" at the capacitance level caused by the highest level of reverse bias applied to it after turn-on. R2 is not necessary in a v.f.o. circuit because of the much higher current flow in an oscillating tank circuit. By inserting the receiver into the existing transmitter circuit, a modification of the original v.f.o. control voltage tuning system was found desirable because of the increased requirements for bandspread and tuning ease brought about by the receive function. Fig. 1 shows the improved version which produces a very smooth 70 kHz on 40, and 140 kHz on 20 meters. In combination with a 2 inch vernier, excellent bandspread and accuracy of tuning are achieved.

Construction

Because the p.c. board had to be fit into the enclosure rather than selecting the enclosure to fit the p.c. board, a medium high-density board approach was necessary. The full size p.c. board template is shown in fig. 2, while fig. 3 shows the parts placement overlay. Miniature parts such as ¼ watt resistors and Red Chip bypass capacitors (or the type shown in the parts list) are used throughout. I hesitate to recommend this project for beginners. However, if you have completed the earlier three units described in this series, you should have the expertise necessary to move on to this level of project complexity. A close and exhaustive study of the p.c. board design and parts placement is a must, needless to say. However, with close attention to detail, and patience, the project could be completed successfully. The p.c. board is prepared using self-adhesive address labels, as described in an earlier part of this series. Since several areas of the p.c. board require close tolerances, careful drilling of component holes is a must, as well as the use of a razor-sharp knife tip or *Exacto* blade in cutting away the unwanted label material. It is wise to have all parts on hand before drilling component holes, since some adjustment of holes may be necessary to fit the actual parts used. The board is made from double-clad p.c. stock. The parts-side foil serves as a gound plane and

continuous ground, since various leads at several points on the board are soldered both to underside and topside ground foils. After drilling component holes, it is necessary to enlarge topside holes through which ungrounded component leads must pass. This can be done with a 3/32 inch drill bit, or more simply, by inserting the blade of a knife into the hole, and twisting it around the circumference of the hole to remove the groundplane foil from around the hole. When installing parts, care must be taken to avoid any shorts between component leads and topside ground foil. A 14 pin DIP socket is soldered into the p.c. board for mounting IC1. SW1 is a subminiature slide switch. It is mounted at an angle to the p.c. board, with the end contiguous to RFC2 flush against the board, and the end contiguous to RFC3 raised as high off the board as will allow soldering the leads to their proper foils. Otherwise, parts are mounted in conventional fashion with shortest possible leads.

Testing/Alignment

It will be wise to first verify proper operation of the audio section, which can be assembled and tested before proceeding with the remaining sections. An audio voltage of about 0.01 v.r.m.s. can be fed to R10 from an audio generator, or from an existing receiver through a dropping resistor. The signal should be centered in the filter passband, and if no output is obtained from Q3, check along the signal path for the location of the difficulty, and recheck for solder bridges, correct parts placement, and foil connections. It is possible that one section of IC1 will malfunction, and in this case, another IC1 must be inserted into the circuit. If all connections and parts placements are correct, and supply voltage is reaching all points in the circuit, no difficulties should arise.

Once the audio section is operating properly, assembly and alignment of the r.f./mixer sections can proceed. A signal source, such as an r.f. signal generator, crystal oscillator, or v.f.o., can be hooked to the antenna terminals temporarily for initial alignment. Switch the the 7 MHz position of SW1 and SW2. Connect the transmitter v.f.o output to the v.f.o. doubler input through a .01 mF ceramic capacitor. Connect the v.f.o. tuning pot swiper to the VR1 port. Turn everything on and locate the signal generator source on the receiver. Adjust C2(40 m) for peak response. Next, check VR1-v.f.o. tracking. Tune the receiver and signal generator to one end of the band, and peak C2. Move both to the other end of the band; no repeaking of C2 should be necessary. If repeaking is necessary, the value of C4 must be adjusted so that proper tracking occurs. This is a matter of substituting slightly smaller and larger values than that shown. Finally, to check for proper operation of the v.f.o. doubler, momentarily short out the PIN diode D3 while monitoring the incoming signal.

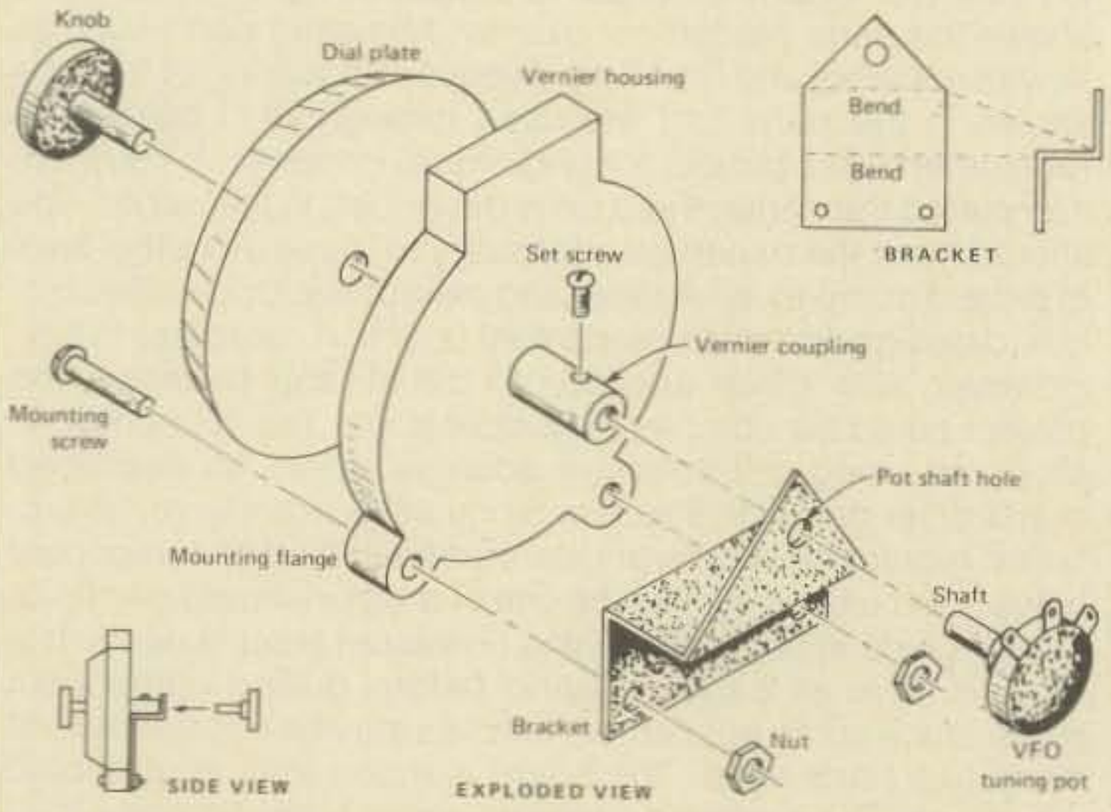


Fig. 4 – Illustration of the v.f.o. tuning potentiometer.

The shorting should produce a drop in received signal magnitude. The last step is to peak L2 by compressing or spreading the turns wound on the toroid. A very broad peak will occur, if it is noticeable at all. To insure proper peaking of L2, momentarily place a 220 pF mica in parallel with C8—this will produce a significant drop in signal level if L2 is properly adjusted. The same process is repeated for 14 MHz alignment. The receiver is then ready for operation.

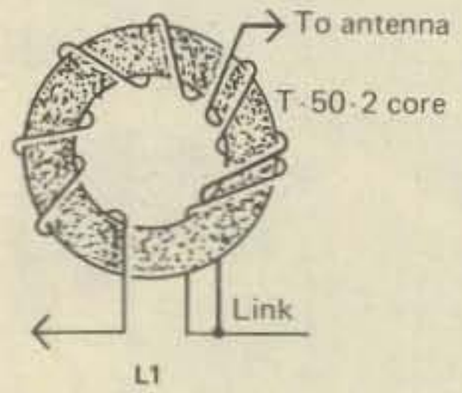
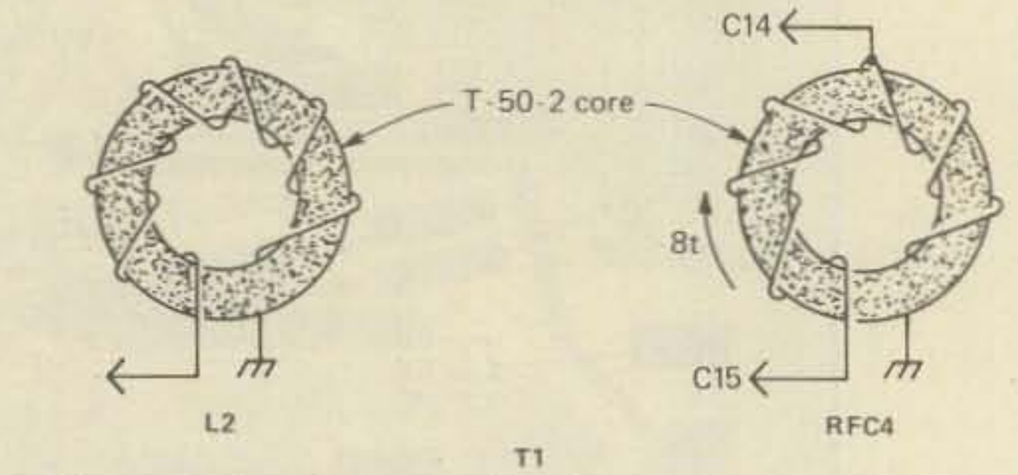
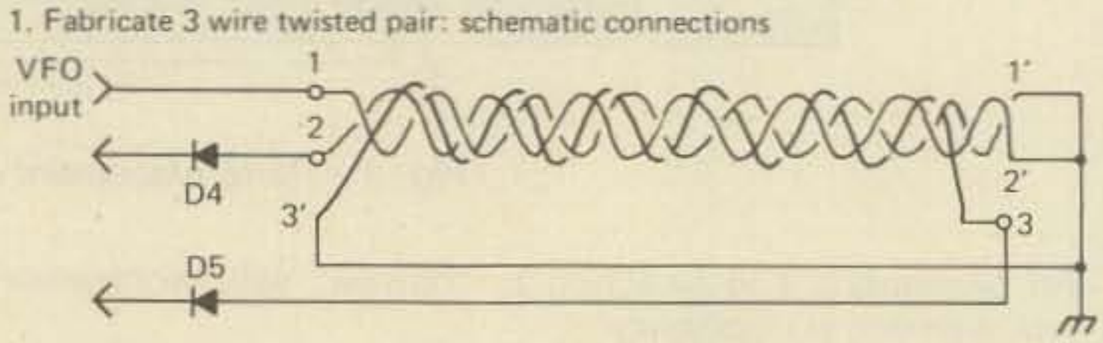


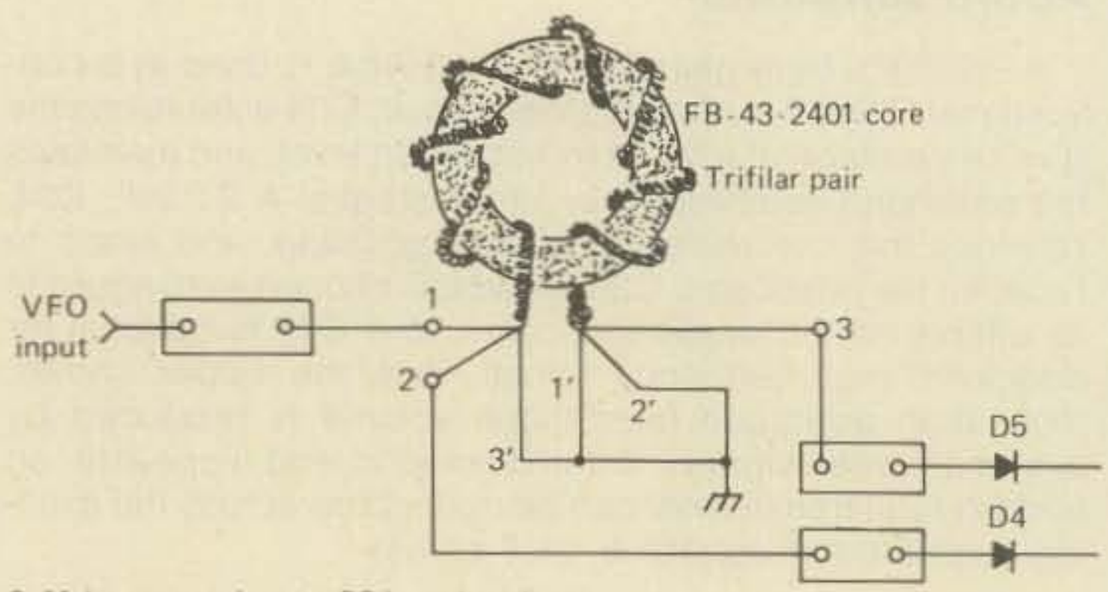
Fig. 5 – Coil winding data.



1. Fabricate 3 wire twisted pair: schematic connections



2. Wind trifilar pair for 9 turns around FB-43-2401 core



3. Make connections to PC board as shown

Final Installation

As can be seen in the accompanying photos, the receiver board is mounted at a slight angle in order to provide clearance for the subminiature v.f.o. tuning potentiometer, and to establish the proper angle for the switch arm which connects SW1 to the final amplifier bandswitch at the rear of the enclosure. The final amplifier end of the double-clad p.c. stock switch arm extension is mitered or beveled to an angle which allows a flush fit against the final amplifier bandswitch extension arm. It is then soldered to that arm with a short piece of #18 hookup wire. Two metal brackets secure the receiver board in place. A phone jack is substituted for the previous phono jack at the bottom corner of the rear panel. The upper corner phono jack than serves as the keyer jack. The photos do not give a clear picture of the manner in which the tuning potentiometer-vernier combination are mounted. A

Coil Winding Data

Part No.	Winding Turns/wire #	Amidon Core*
RFC1	25/28	FB-43-2401
RFC2	41/28	FB-43-2401
RFC3	10/28	FB-43-801
RFC4	18/24**	T-50-2
L1 (40m)	27/28***	T-50-2
L1 (20m)	17/28***	T-50-2
L2 (40m)	27/28	T-50-2
L2 (20m)	12/24	T-50-2
T1	12/24	FB-43-2401 (See fig. 5)

*See earlier parts of this series for Amidon Associates prices and location.
**Tapped 8 turns from top.
***Link of 1.5 turns of #24 wire, tight wound at ground end.

Parts List*

D1-7	1N914 or equiv.	16/$1
D3	MPN3401	$0.70
VR1	MV109/R2503, 33 pF	$0.90
C21, 21a, 22, 30, 31, 34, 35, 37	"Red Ship" ceramic, 0.15 mF** ceramic subminiature #124 (0.1 mF), #224 (0.22 mF) types	$0.96
Q1	MPF102	$0.40
Q2	40673	$1.25
Q3	2N3391A	$0.75
U1	LM3900	$1.20
SW1	DPDT	$0.40
VFO tuning pot, R24, RF gain	10k #B1-662	$1.00
C2-C3	Elemenco trimmer #404 (60 pF)	$1.22

*Prices shown for Circuit Specialists, Box 3047, Scottsdale AZ 85257
**Order from Burstein-Applebee, Mercier Street No., Kansas City MO 64118

bracket is cut from aluminum stock as shown in fig. 4, and bent to support the potentiometer in the proper position for insertion of its shaft into the vernier dial coupling. The bracket can be cut, drilled and bent before mounting on the front panel. The major objective in hole-placement and bending is to provide a free, tensionless connection between the potentiometer shaft and vernier coupling.

Results

The major objectives in this design were excellent sensitivity and the best selectivity to be expected from a two stage audio filter. The receiver is quite a success in both respects. Its sensitivity equals that of the HW-8, and considerable DX has been logged on 40 meters from VK, JA, SA, EU, and Asia. Cross-modulation is adequate, but slightly inferior to the HW-8. In all, the entire project has been a considerable source of satisfaction and well worth the effort. CQ

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CIRCLE 29 ON READER SERVICE CARD

Author Rod Linkous made a substitution for the speech processor in his TS-820. Here's his story.

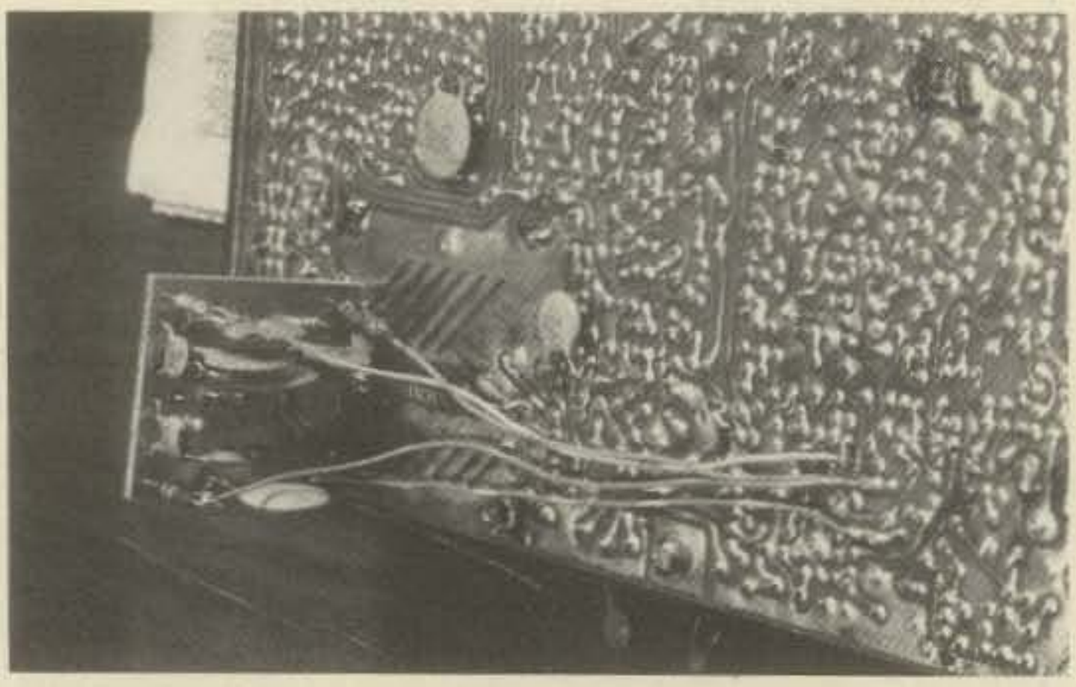
The Magicom R.F. Processor Module in the TS-820

BY ROD LINKOUS*, W7OM

A large percentage of the DX community has switched to the *Kenwood*[1] TS-820 during the past year or so. Not to be outdone by the competition, W7OM has joined the ranks. Operation of the '820 has been a joy. Listening is superb, its dynamic range represents a significant improvement over my old rig, spurii are non-existent (allowing me to live amicably with my next-door neighbor) and the i.f. shift (bandpass tuning) helps to sort out the weak ones. On balance, I am very pleased with the rig.

*5632 47th Ave. SW, Seattle WA 98136

[1]*Trio-Kenwood Communications Inc., 1111 West Walnut, Compton CA 90220.*



The Magicom speech processor module installed on the TS-820 i.f. circuit board.

I am of a breed which was weaned during the old vacuum tube, home-brewing days of amateur radio. Whenever I get a new piece of equipment one of the first things I do is open it to get a look at its innards. Well, I did just that with the TS-820. It is a marvel to behold. It is compact, well-designed and, should it ever be necessary, not impossible to work on. In addition, I suffer from a terminal case of a common amateur ailment—*speechprocessoritis*.

Let me say from the outset that I have nothing against the very fine processor built into the TS-820. It is, in fact, one of the most effective stock processors I've ever used.

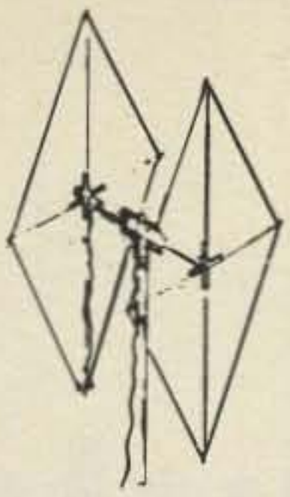
But, you must also remember, I've got this monkey on my back. During a fit of delerium tremors (DT's) I succombed to my disease. I *had* to try my own processor.

The photograph shows the Magicom R.F. Processor module[2] installed on the i.f. circuit board of the author's TS-820. Several prototype installations were made to check out the processor on Western Washington DX Club members' rigs. In all cases, the results were identical: improved voice quality, more "punch," higher S-meter readings. All of this was realized with no increase in bandwidth and with minimal residual background noise.

The installation of the Magicom requires about 45 minutes. No "amputations" are required and the rig can be restored to its original configuration, if desired. The best part is that there are no new controls and the installation does not require adjustments or tweaking.

Right now, I feel fine, thank you. But I never know when sickness strikes . . . CQ

[2]*Magicom, P.O. Box 6552Q, Bellevue WA 98007. The module is available for $20 (U.S.) or $23 (non-U.S.), post paid.*



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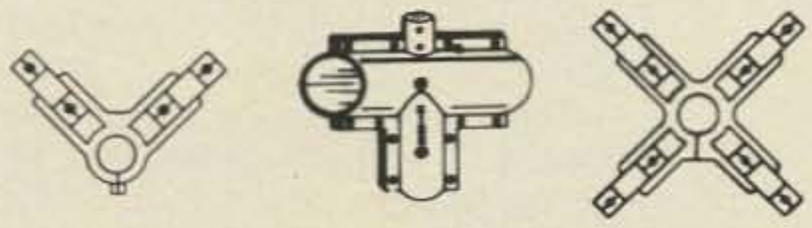

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	(1)	1¼" Boom to 1¼" Mast T-Mount	$15.12
QM-3	(2)	1½" Hub Spiders	
	(1)	1½" Boom to 1½" Mast T-Mount	$16.10
QM-4	(2)	2" Hub Spiders	
	(1)	2" Boom to 1½" Mast T-Mount	$24.69
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	(1)	3" Boom to 2" Mast T-Mount	$40.64

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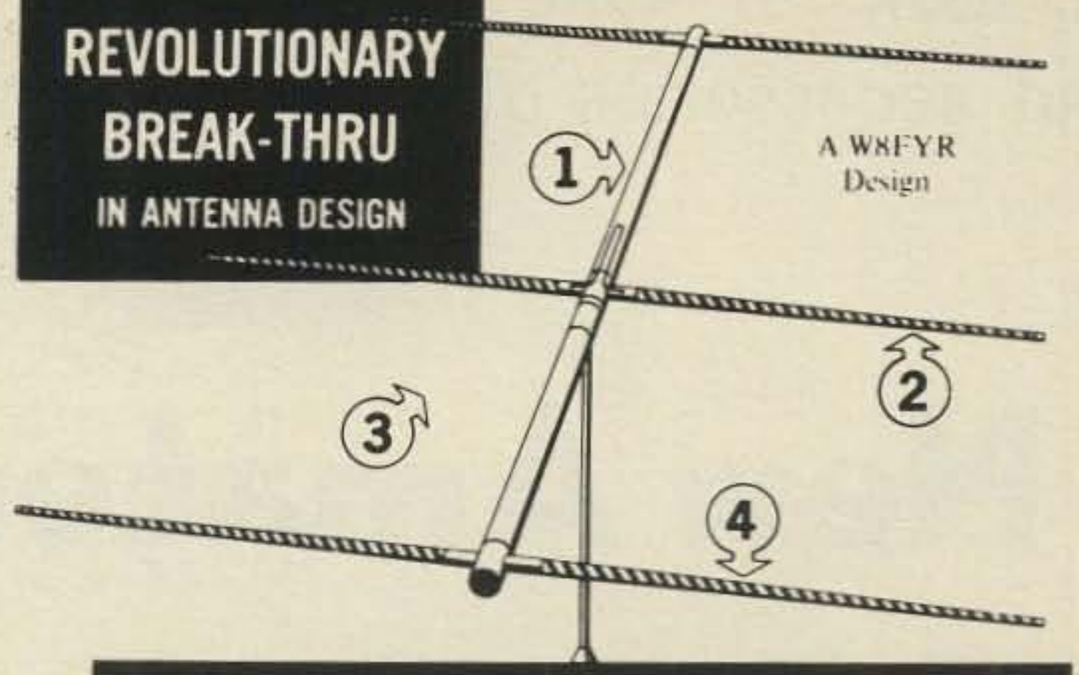

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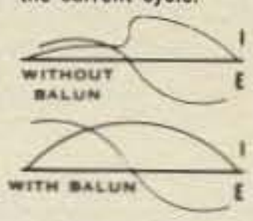

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Heath Company Model IM-4190 Bi-directional Wattmeter

The IM-4190 is a self-contained unit that measures transmitted radio power up to 300 watts and reflected power up to 30 watts. Covering the 100 MHz to 1 GHz spectrum, the wattmeter can be used for service and repair or as an accessory to the amateur radio station.

A single 9-volt battery powers the IM-4190. N-type coax connectors are utilized for input and output.

The kit sells for $114.95 and the assembled version (SM-4190) sells for $195.00.

Contact Heath Co., Dept 350-630, Benton Harbor, Mich 49022 for further details.

Astatic 1104CM Base Station Microphone

The new Astatic 1104CM pre-amplified base station microphone features a built-in audio meter and external tone and volume controls.

Powered by a 9-volt battery, the 1104CM allows instant monitoring of audio input and battery output voltage through the base mounted meter.

The microphone comes with a six wire coil cord for versatile hookup and is available in black, beige and white.

For more information contact Astatic Corporation, Conneaut OH 44030.

Radio Shack's Realistic Sound Level Meter (Model #42-3019)

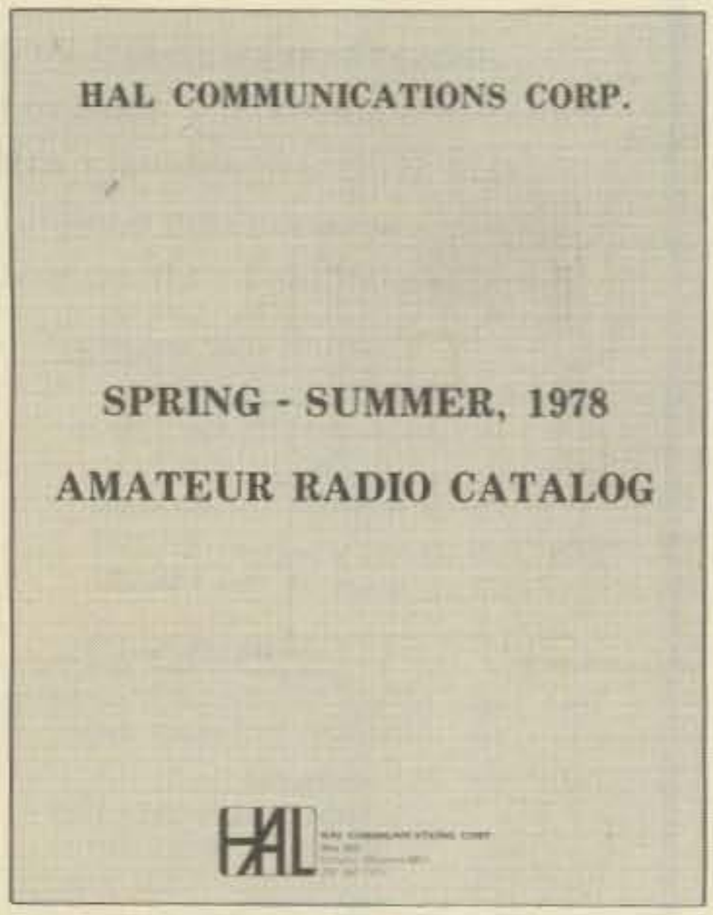
Radio Shack announces a new sound level (dB) meter. The hand-size meter features a weighting selector for measuring either wideband sound level ("C" weighting), or the 500 to 10,000 Hz range ("A" weighting), which is the area of greatest sensitivity to the human ear.

A range switch selects six sound level ranges, each spanning 16 dB, for an overall range of 60 to 126 dB.

A phono-type output jack permits use of the sound level meter as a high-quality, dual-response microphone, or for connection to high-impedance headphones, an oscilloscope, frequency analyzer or other test equipment.

The meter is 6-¼ x 2-7/16 x 1-¾ and weighs 7-¾ ounces. It operates on a standard 9-volt battery.

The Realistic sound level meter sells for $39.95 and is available from all Radio Shack Stores.



HAL Communication Corp. Spring-Summer, 1978 Catalog

The latest HAL catalog contains the latest HAL amateur RTTY equipment. All of HAL's equipment is solid-state and up-to-date.

Included in the catalog are RTTY demodulators (both factory wired and kit), single- and multi-mode keyboards, video display units and other equipment of interest to the most discerning RTTY enthusiast.

The catalog can be obtained from HAL Communication Corp., Box 365, Urbana IL 61801. CQ

Say there, Oldtimer! Here's an article that's bound to make you reminisce. You might smile or you might sigh as John Nagle takes you down memory lane.

How Many of These Magazines Do You Remember?

BY JOHN J. NAGLE*, K4KJ

The radio magazines listed here were not too well known or did not last very long. Since these magazines were neither well known nor long lived, information on them is scanty. Many of them are not even listed by the Library of Congress, so that when those who knew them firsthand are gone, knowledge of these early magazines will be gone, too.

No pretense is made that this list is either complete or accurate; it is, however, based on the best information that is available to me at this time. These magazines are a part of the radio scene of yesteryear and, if this scene is to be preserved, it will be because people like you, who are interested enough in the subject to be reading this article, do their part to help preserve it.

Therefore, if you are aware of any errors or omissions, please let me know. I will be only too glad to set the record straight and to add missing facts to make it more complete. My most sincere thanks will go to anyone who is able to add even one more clue to this list which has been pieced together over a year's time for numerous sources, one bit at a time.

Floyd Lyons of San Francisco conceived the idea for these lists of old radio magazines and published two lists of better known magazines in the Antique Wireless Association's Old Timer's Bulletin[1]. Floyd asked me to make up a list of the lesser known magazines because he felt I was more familiar with the amateur publications than he was. I am not too certain of this as Floyd has contributed heavily to the present list, but I am happy to present the following list and hope it helps other collectors to bring it all together.

*12330 Lawyers Rd., Herndon VA 22070

[1]*Old Timer's Bulletin*, September 1975 and June 1976.

Name Of Magazine	Date Of Issue First	Last	Remarks
Short Wave Listener	Unknown	Unknown	Published by Popular Book Co. New York Hugo Gernsbock, President and Editor Published every other month Absorbed by Short Wave Craft either June or July 1936
Radiogram	May 1915	Aug. 1915	Published by? Elmira, New York Editor? Only 4 issues (Vol. 1, Nos. 1-4)
Collins Wireless Bulletin	Jan. 1908	Oct. 1910	Publisher? Where Published? Editor?

Name of Magazine	Date Of Issue First	Last	Remarks
Ham News	Unknown	Unknown	Publisher? Where published? Editor?
The Oscillator	Dec. 1928	Dec. 1931	Published by Amateur Radio Research Club of Los Angeles Publsihed in Los Angeles and Gardena, California Melvin S. Wood, W6AVJ, editor No. 36 was last number published Serialization taken over by R/9 starting with No. 37 No apparent relation with Pittsburg publication (See next item)
The Oscillator	Unknown	Unknown	Published by the Radio Engineering Society of Pittsburg, Inc. Pittsburg, Pennsylvania P. E. Wiggin, Editor-in-Chief Vol. 2, No. 2, dated January 1922 No apparent relation with California magazine (See previous item)
Radio Station Technical News	Unknown	Unknown	Published by R. N. Eubank (in mimeographed form) Mechanicsville, Virginia Editor? Mentioned in R/9, Feb. 1935
(Title Unknown)	Unknown	Unknown	Published by Mr. E. L. Thompson, W3CQS Salisbury, Maryland Editor?
The Modulator	1921	Sept. 1922	The Executive Radio Council, 2nd District, Inc. 120 Liberty Street, New York City William F. Crosby, editor Succeeded by Amateur Radio (See next item)
Amateur Radio	Nov. 1922	Unknown	Official Organ of the Executive Radio Council, 2nd District 120 Liberty Street, New York City Lloyd Jacquet, editor Est. 1921 as The Modulator (See previous item) Vol. 3, No. 12, Dec. 1924
International Short Wave Radio	Unknown	Unknown	International Short Wave Club East Liverpool, Ohio Editor? Monthly, $1.00/year
Radio Relays	Unknown	unknown	Published by? Boston, Massachusetts William J. Halligan, editor Merged into Amateur Radio June 1924
Ye Brass Pounder	Feb. 1930	Unknown	Published by Vincent T. Kenney, W2BGO 1836 Hone Ave., Bronx, New York 4 pages, newspaper style Published twice monthly
73	Unknown	Unknown	Published by Federation of Radio Clubs of the Southwest ARRL Monterey Park, California C. H. Haas, W6EAH, editor Vol. 6, No. 5 dated Feb. 1937 No connection with present 73
73	May 1932	Unknown	Published by United Radio Operators Assoc. as their "Official Organ" Portland, Oregon F. W. Reeves, editor No connection with present 73

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Precision E-400 Signal Generator	125
Electro Impulse Spectrum Analyzer	395
Dyna/Sciences Model 330 Digital Multimeter	195
Hewlett Packard 4905A Ultra Sonic Detector	550
Hewlett Packard 120A Scope	250
TS-323/UR Frequency Meter	175
Hewlett Packard 4910B Open Fault Locator	650
Bird Mod 43	80
General Radio 650A	150
Measurements Mod 80	195
Nems Clark 1400	495
Ballantine 300H	175
PACO Scope Mod-S-50	75
Singer FM-10C	3495
Simpson 260 V.O.M.	49.50

Allied

AX-190 Receiver	$159

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PV-50	$ 9
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CN-144	39
TX-62	79
621 VFO	45

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670 SSB Adaptor	39
Co-Dax Keyer	95

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20-A SSB Adaptor	79

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All Bander	69
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FM-27-B Xcvr	325

Collins

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R4 Receiver	289
R4-B Receiver	349
R4-C Receiver	399
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2NT Transmitter	125
2NT Transitter	99
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GTX-200 2M FM	149

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Chief Transmitter	39
Galaxy III Xcvr	159
Galaxy V Xcvr	189
Galaxy V Mk II	239
GT-550 Xcvr	279
GT-500A Xcvr	329
AC-400 Supply	79
FM-210 2M FM	95

Gonset

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Com IV 2M	129
GC-105 2M	115
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G-50 Xcvr	149

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HT-32B Transmitter	269
SX-99 Receiver	79
SX-115 Receiver	349
HT-37 Transmitter	159
HT-40 Transmitter	49
SX-99 Receiver	99
SX-117 Receiver	189
SR-150 Xcvr	259
SR-160 Xcvr	159
SX-146 Receiver	175
HT-44 Transmitter	159
SX-111 Receiver	149
SX-122 Receiver	249
S-36 UHF Receiver	125

Hammarlund

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HQ-110C Receiver	119
HQ-110AC Receiver	149
HQ-145X Receiver	169
HQ-170C Receiver	159
HQ-180 Receiver	379
HQ-215 Receiver	259
SP-600 Receiver	179
HX-50 Transmitter	169

Heathkit

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SB-301 Receiver	229
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SB-303 Receiver	269
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SB-102 Trivcvr	379
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SB-100 Transceiver	299
SB-401 Transmitter	249
SB-101 Transceiver	349
SB-650 Digital Freq. Display	149
HW-30 Twoer	29
Also Sixer	29
H-10 Monitor	69
VHF-1 Seneca	79
HW-12 Transmitter	75
HP-23 AC Supply	49
HP-23B AC Supply	59
HW-202 2M FM Xcvr	159
SB-620 Spectrum Analyz	120
SB-102 Xcvr	369
SB-610 Scope	95
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SB-634 Console	175
SB-604 Spkr	29.50
SB-644 VFO	129.50
SB-230 Linear	359
SB-104 Transceiver	625

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IC-30A 432 MCFM	269

Johnson

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Ranger II Transmitter	139
Valiant I Transmitter	129
Invader 2000 Xmitt	495

Kenwood

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R-599 Receiver	289
TS-520 Tranc	429
QR-666	259
QR-666 Receiver	239
TV 502 Transvertor	179

Knight

T-60 Transmitter	$ 39
r-100 Receiver	59
TR-108 Trancur 2M	79

Lafayette

HA-800 Receiver	$ 89
HP-350 Receiver	149
HE-45 Transceiver	49

Midland

509 H.T.	$149

Millen

92200 Transmatch	$149
90651-A Grid Dipper	95

National

NC-270 Receiver	$119
NC-300 Receiver	129
NCX-5 Transceiver	279
NCX-5MKII Transcvr	299
NC-303 Receiver	199
AC-500 AC Supply	69
NCX-500 Transceiver	199
NCX-3 Transceiver	169
NC-190 Receiver	149
NC-105 Receiver	69

Regency

HR-2B 2M FM	$169
HR-220 FM 220 MC	185
AR-2 2M Amplifier	85
HR-25 2M FM	225
HR-6 Meter FM	189

SBE

SB-34 Transceiver	$249
SB-33 Transceiver	189
SB-144 2M FM	175
SBZ-LP Linear	179

Standard

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826 M Trnscvr	195
SRC-144	395
SRC-851T	250

Swan

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260 Cygnet	289
279 Cygnet	329
500 Xcvr	299
500 CX Xcvr	389
117-XC AC Supply	95
14X DC Module	39
MK II Linear	475
KK VI 6 Meter	550
250 C 6M Xcvr	349
FM 2X2M Xcvr	169
FM-1210A 2M	249
350 Transceiver	269
350C Xcvr	299
600R Receiver	339
600T Transmitter	399
410 VFO	79

Tempo

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Name Of Magazine	Date Of Issue First	Last	Remarks
Amateur Radio Review	Unknown	Unknown	Published by Amateur Radio Review Ankeny, Iowa G. Edwin Stafford, W9CXL, editor Vol. 2, No. 3-4, dated Oct.-Nov. 1933 Vol. 3, No. 4, dated Dec.-Jan. 1934-35
The Transmitter	Sept. 1926	Unknown	Published by the Transmitter Publishing Co. Tulsa, Oklahoma L. A. Sims, editor Vol. 1, No. 2 dated Oct. 1926
The Radio Amateur	Unknown	Unknown	Publisher? Where published? Editor? Vol. 2, Nos. 11-12, dated Sept.-Oct. 1920
Amateur Work	Nov. 1901	April 1907	Publisher? Boston, Massachusetts Editor? "A monthly magazine of the useful Arts and Sciences" Then merged into Electrician & Mechanic
Mid-West Radio	Nov. 1925	April 1926	Publisher? St. Louis, Missouri Editor? Six issues only
The Amplifier	Unknown	Unknown	Published by W. C. Ripke Portland, Oregon Editor? Mailed free to 7th district amateurs Advertised in Modern Radio, December 1932
Radio Progress	Unknown	Unknown	Published by John F. O'Hara Providence, Rhode Island Horace V. S. Taylor, editor Vol. 1, No. 18 is dated December 1, 1924 Vol. 2, No. 14 is dated October 1, 1925 Published twice a month
Radio Instructor	Unknown	Unknown	Published by Rural Publishing Corp. 802 North Clark St., Chicago, Illinois Editor? The first issue of Radio Instructor was published under the title Radio Digest. Name changed to Radio Instructor to avoid confusion with another magazine called Radio Digest also published in Chicago at the same time. No apparent connection wtih California publication of 1938 (See next item) Vol. 1, No. 2 dated June 1922
Radio Digest	July 1937	Dec. 1938	Published by? Los Angeles, California Editor? Then name changed to Radio Technical Digest No apparent connection with Chicago Publication of 1920s (See previous item)
Radio Technical Digest	Jan. 1939	June 1940	Publisher? Los Angeles, California Editor? Nos. 9-17, Jan. 1939 - June 1940
Radio Broadcast	Unknown	Unknown	Published by Doubleday, Page & Co. Garden City, New York Arthur H. Lynch, editor

Name Of Magazine	Date Of Issue First	Last	Remarks
Podunk News	Unknown	Unknown	Published by the Egyptian Radio Club East St. Louis, Illinois Earl R. Linder, editor Mentioned in R/9, March 1935
The Ham Reporter	Unknown	Unknown	Published by Amateur Radio Publishing Co. Seattle, Washington Editor? "For amateurs in the seventh district" Advertised in R/9, April 1935
Who's Who in Amateur Radio	Unknown	Unknown	Published by Radio Amateur Publishers 1107 Broadway, New York City, New York Editor? Advertised in R/9, April 1935
Listening In	Unknown	Unknown	Published by? Corcoran, California Editor? Advertised in R/9, May 1933
Calls Heard	Unknown	Unknown	Believed to be published by George Walker Winston-Salem, North Carolina Editor? Merged into R/9 beginning July 1935
All-Wave Radio	Sept. 1935	June 1938	Published by Manson Pubs. Corp. New York M. L. Muhleman, editor Merged into Radio News (July 1938)
The Amateur Radio Bulletin	Unknown	Unknown	Published by George D. Tate Forest City, North Carolina Editor? Advertised in Modern Radio, March 1932
Radio Design	Spring 1928	Summer 1930	House Organ of the Pilot Radio Company Where published? Editor?
CQ	March 1931	June 1933	Published by "a group of commercial radio operators" San Marion, California M. R. Rathbone, Jr., editor Then "Com'l Radio" beginning with Vol. 3, No. 5 (July 1933) through Vol. 4, No. 11 (Nov. 1935) No connection with present CQ
Commercial Radio	July 1933	Nov. 1935	Published by? San Marino, California? M. R. Rathbone, Jr., editor? Successor to CQ listed immediately above
Radio Engineering	Unknown	Unknown	Published in 1925 by M. B. Sleeper, Inc., New York City Published in 1931 by Bryan Davis Publishing Co., Inc., New York City Donald McNicol, editor Vol. V, No. 5 dated May 1925 Vol. XI, No. 10 dated October 1931
QTC	Unknown	Unknown	Publsihed by Lower Lakes Executive Radio Council Buffalo, New York A. H. Benzee, Jr., Business Manager Apparently a commercial operator's publication Advertised in Jan. 1922 Oscillator (Pittsburgh)

"I don't really need anything. I' m just going to look." With these thoughts in mind and cash in hand read how the human brain can turn into mush and all will-power dissolve at the sight of a "bargain."

Fleamarket Frenzy

BY ALAN M. DORHOFFER, *K2EEK
* Editor, CQ

The 1978 Dayton Hamvention Fleamarket went a long way to once again demonstrate Brownian movement. Like all large fleamarkets, the amount of visual stimuli becomes overwhelming. The sights, sounds, and smells of bygone treasures combine with hoards of people pouring over themselves in search of a bargain.

In the early morning light, before 6 a.m. in Dayton, the throngs pour in, and in an orderly fashion start going up and down the aisles. The cool air keeps everyone alert and leg muscles are still supple so that one can still feel that his feet are functioning. Morning progresses and the movement increases. The panicked feeling takes over when you are afraid that you will be beaten out on some goodie. Confidence wanes, you forget the cardinal rule about moving your head. Keep your head in one direction going up an aisle and reverse for the return trip. Suddenly your eyes dart to a booth across the way, your head moves in another direction to see what someone else has bought and is carrying away. Did you need that? Could you use it? Maybe he'll sell it?

The sun is up and you're feeling the effects of whiplash. Your head is now moving constantly looking all around. Should you stop for food? No, you might need that extra few bucks, and you can always stop on the way back. Halfway through now and your legs are shot. Just keep those feet moving. Eyes dart back and forth trying to save those precious neck muscles. The pace increases, there's got to be something good just around the bend. Numbness sets in, neck muscles give out and your head droops. You are forced to look down. You pass everyone you know without the slightest recognition. . . they are also looking down. Old lifelong friends and even relatives pass each other without notice. Feet are dragging, knees almost locked, you force your pace to quicken. Just a few more tables to see.

The sun reaches its peak as you near the last table. A low throbbing headache pulsates through what is left of your brain as you take in some 1U4's, the face plate from a Meissner Signal Shifter, two mint copies of a Vocaline instruction manual, thirty or forty dried-out line cords, a Globe Scout 680 and two DX-100s in dubious condition. The is what it's all about.

Where did I see that great bargain that I didn't want to carry around? People all around are mumbling the same question. Milling around is the order of the day, the time for walking has long since past. Heads are once again forced high as a second pass through the fleamarket is contemplated. Eyes glaze over, feet trip over themselves, stumbling ever onward. Now we all seem to be bumping into each other as crowds of people take part in a human pin-ball game. A ricochet off someone on his first pass through puts you next to a table that you don't remember. That looks interesting, whatever it is. Brains begin to slow down and item-recognition grinds down to a crawl.

With a little luck you can ricochet yourself near some food and a little shade. No luck. You are knocked back into an aisle of what looks like beer can collectors and macrame rig covers. Boing! You're back and fading fast. Boing . . . Boing . . . Boing and tilt. People bounce all around saying "excuse me", "pardon me", "I'm sorry" and finally can only nod in the general direction of the infringement.

From the lofty view on high, the scene as witnessed from a helicopter is of thousands of molecules colliding with each other. Grouping hands fight each other for ownership rights to artifacts from a different age. Who cares what it does as long as the price is right. The sun moves downward and last minute buying takes place. If your eyes can focus on it you want it. You have to spend money on something. How can you go through this experience without buying anything?

Suddenly you are doubled up in pain as you discover yourself draped over a 2-meter long-john carried by two other glazed eyed shoppers. It's too much of an effort to shout out and so you are carried out of the fleamarket and dumped into the back of a '72 Chevy van. It's cool and quiet there and sort of restful. A bag of Taco-Chips on the floor looms out of the darkness and you start to eat them. The two shoppers get in front and start the engine. You're too tired to stop them as they drive off with you still in the back. Boy, what a terrific day. Who'd believe it if they hadn't seen it for themselves. Can't wait till next year to do it again.

How can I get them to drive me back to the Arena?

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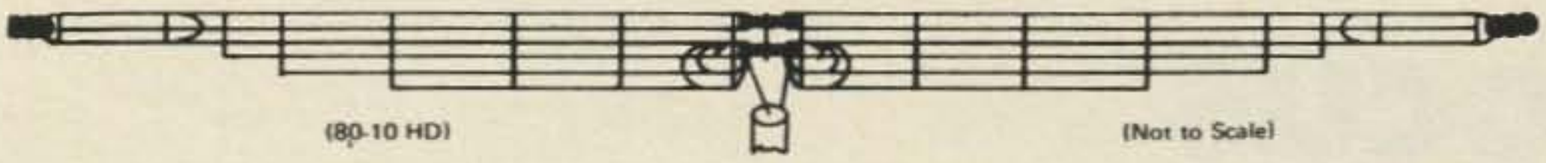

(80-10 HD) (Not to Scale)

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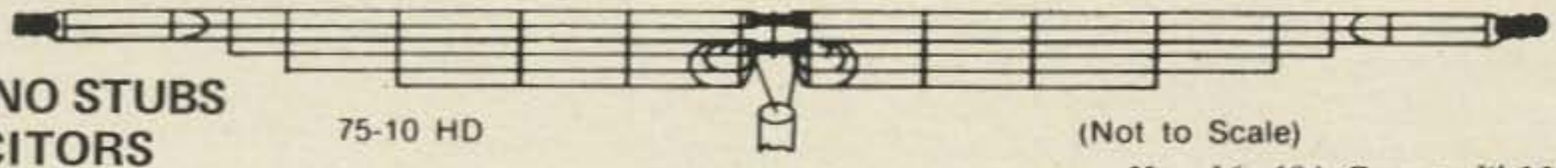
- *There is no better antenna at any price . . . **W9QIO** • I had a Mor-Gain antenna and liked it extremely well . . . **K4JMR** • The antenna has worked out well with very good reports . . . **W2TVK** • I can only give glowing reports about it . . . **WA2IRN** • I have used these fine antennas before and see no reason to change now . . . **W6BF** • It has given me excellent service and results . . . **W6CZS** • I believe I have "sold" your antenna to almost every ham I have talked to . . . **W4AHN** • Its performance here far surpasses any other antenna that I have had . . . **WA5GGS** • For several years I have used the Mor-Gain and have been very satisfied . . . **K2TSD** • Am letting everybody know that it has been doing a good job for me . . . **VE2VW** • The antenna is performing just beautifully . . . **W8WDZ/6** • My 75-40 has performed beautifully and I'm very happy with it . . . **WB8DMB** • Another chap said he had also used it and that it was the greatest . . . **W4NSP** • I do not hesitate to recommend the antennas to others . . . **K0SPR** • I heard a ham extolling the virtues of your antenna . . . **WB0PTM** • I worked a station last night and the Mor-Gain was doing quite a job for him . . . **WA3TCV***

NO TRAPS, NO COILS, NO STUBS NO CAPACITORS



75-10 HD (Not to Scale)

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• All models above are furnished with crimp/solder lugs. • All models can be furnished with a SO-239 female coaxial connector at additional cost. The SO-239 male coaxial cable connector. To order this factory installed option, add the letter 'A' after the model number. Example: 40-20 HD/A. • 75 meter models are factory tuned to resonate at 3950 kHz. (SP) models are factory tuned to resonate at 3650 kHz. See VSWR curves for other resonance data.

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75-20 HD	75/40/20	66.50	44/1.23	66/20.1
75-20 HD (SP)	75/40/20	66.50	44/1.23	66/20.1
75-10 HD	75/40/20/15/10	74.50	48/1.34	66/20.1
75-10 HD (SP)	75/40/20/15/10	74.50	48/1.34	66/20.1
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In Focus

Television on the Amateur bands

Getting started in SSTV

During the three years that this column has existed, by far the greatest proportion of all correspondence received has been related to "getting started in SSTV" Most active amateurs are aware of the Advanced Class license requirement for SSTV transmission on frequencies below the 29 MHz. band but for some who have a General or lower class ticket, the thought of taking another examination becomes a bug-a-boo. This just need not be if you give some thought on *how* to pass examinations. In the following paragraphs, "In Focus" offers those who want to upgrade from *any* level some practice proven methods to make passing that next examination easier!

Make a plan!

Whether you are a novice or the holder of a higher class license, to move up the scale you must consider not only what additional knowledge is needed, but also *how* to acquire it. The learning process takes many forms—what's easy for one person is perhaps difficult for another. Unless you make a plan of attack and then put in some effort on the project, you'll still be talking about taking that next exam a couple of years from now. If you're really serious about the idea, here are some suggestions on how to get started and then make the grade. That doesn't mean drugery—it means application, persistent effort.

*2112 Turk Hill Rd., Fairport, NY 11450

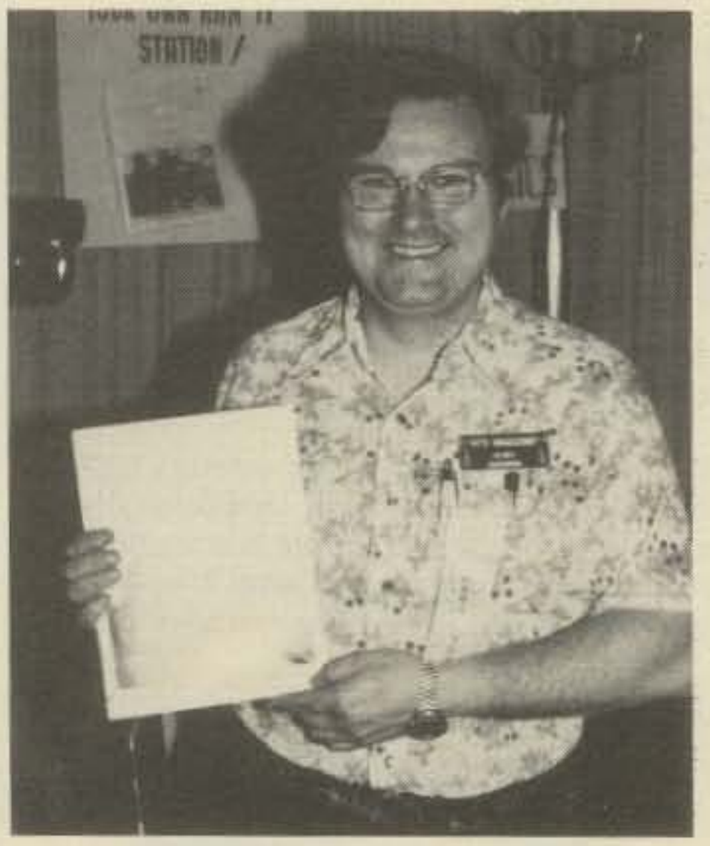

Fig. 1.—A miserable reflection wiped out the cover of Henry Ruh's new book "Amateur Televion In A Nutshell". Sorry about that Henry!

Fig. 2—Tony Pessicki, N3TV (in case you hadn't noticed!) wants everybody to know that he's NOT on CW!

Set time goals!

First of all, set a time goal. This should be consistent with the time you can devote to amateur radio. If you are already encumbered with P.T.A. meetings, are a member of the Volunteer Fire Department, and chairman of a community chest campaign, for example, you can set your site on a date at least several months away. If you are free to spend several hours a week "boning up" on the code and/or theory, then you may be able to schedule your F.C.C. visit much sooner. But DO set a tentative time and set up a study plan that fits.

Secondly, using a manual that covers the subject material for the proper grade license, make a down to earth appraisal of your capabilities versus the requirements for the examination: What is your code copying/writing speed? How well do you understand the regulations? Can you diagram power supplies, amplifiers et cetera from memory? Chances are, you'll find that you are much better prepared on some subjects than others. This shouldn't be discouraging, it points the way to organize your study plan. But, more about this later.

Next consideration: Are you going to work alone? Why not? People have been doing very well with correspondence courses for years! Don't forget that correspondence course material is very well organized. If you're really good at planning and working by yourself—just get going! But don't forget you'll probably learn faster "working" with a group. How about organizing a small study group? Two or three people can work together, each taking a turn at the "professor's chair". When you get two or three people working together on the theory or diagrams required, you'll find that "kicking that subject around" a little bit helps a lot. If you're not familiar with say, classes of amplifiers, admit it, and work up a little discussion on the subject. You'll learn something and remember it better. And remember, the questions on the examinations don't always correspond exactly to those in the manuals. The better your understanding, the better your chances of success.

Join a class

Many radio clubs have organized classes for a more formal approach to group learning. Some clubs have had classes going every year in very suc-

Fig. 3—W5DFU supplied this picture of Ed Arvonio, W3LY taken during the SSTV Seminar at Dayton. Ed's recent move to Vero Beach, Florida will add to that barrage of potent signals emanating from W4-land.

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cessful programs. If your club has such a program, make use of it. Join the group. If your club doesn't have a "license class", why not help organize one? Don't wait for someone else to do it.

What about training aids and study material? There are literally dozens of books and manuals available today. Armed with your choice of books and/or manuals, you can produce a number of training aids for yourself.

Use training cards

Most radio exams requires a knowledge of certain diagrams. If you have trouble with diagrams, get some file cards about QSL card size and write the question for example "Draw a diagram of a push pull class B linear amplifier" on one side. Then draw the diagram on the other side. Make up a deck of cards like this. Then go through the deck testing your ability to reproduce the diagram. A few rounds of this little card game will do wonders for your talents. Hint, don't cheat and go through several cards at once before checking and correcting yourself. This card gambit works very well for the "regular questions" too. Try it, you'll be amazed.

Make a Tape!

Tape recorders are a big help if you have trouble beating a complicated formula into your brain or even if you need help remembering frequencies permissable for various types of emission. Use a tape recorder for repeated play backs to help you learn. If you have even the least expensive portable tape recorder, you can make up tapes with questions and answers of your own choosing and extend your study hours appreciably by playing your own tapes on a portable unit while you're driving back and forth to work. If you ride the subways or happen to be in a car pool with people who question your sanity, occasionally anyway, take your recorder along and run through the tapes on your lunch hour. Why not? You may get sick and tired of your own voice, but you'll learn! Incidentally, when you make a tape for this purpose, why not group questions and answers by subjects such as Regulations, Receivers, R.F. Amplifiers, etc. Then you can go back and review any subject of interest. This is much easier than checking through a manual because they generally have the questions pretty well randomized, following the patterns of the examinations. By the time you make up a tape like this, you will learn quite a bit just in the making. Sounds like a lot of work? It isn't. I made a 30 minute tape with about 80 questions and answers in about 1½ hours. In another tape, made up from the A.R.R.L. License Manual, I grouped questions on Regulations, R. F. Amplifiers, etc. as described above. The result, a 45 minute tape. It took about two hours to make. Get a few people who are interested in passing an exam together and discuss this suggestion. They'll probably come up with five other ideas that are just as good or better.

Dots and dashes?

Meanwhile at the shack, you're saying "yeah, yeah, great but what about the code?" The answer is practice, practice, practice! As the late great pianist Rachmaninoff was often quoted: "If I don't practice one day, I know it—if I don't practice two days, my public knows it." We all know someone (maybe you) who can copy 30 words per minute in his head, but he can't turn his head over to the F.C.C. examiner at the end of those five short minutes. So first get your code speed up and then—equally important, practice writing at the required speed. Copy the WIAW schedules. NAA sends five letter code groups at 25 w.p.m. by the hour on 7455 KCs. They also have occasional press for 15 or 20 minutes. Don't worry about the quotation marks, hyphens, semicolons and apostrophies that NAA sends. You won't get anything more formidable than a comma, period, question mark or fraction bar on the

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amateur examinations. If you have a "long, long wave" or "low, low frequency" receiver, try NSS on about 22 KCs for code groups and occasional weather and press, mostly at 18 w.p.m.—and don't forget, there's still a lot of CW message traffic between 400 and 500 KC. You might even copy an SOS!

Some negativos!

And now, for those who are really interested in making the grade—a few *don'ts*.

1. Don't let someone else "scare you out of" trying to improve your ability. You CAN learn.
2. Don't waste your time crying about how you're too old to learn. Hog wash! A 65 year old doctor friend of mine is studying now for his commercial ticket.
3. Don't moan and groan about how you're not an electrical engineer or an electronics whiz bang, so how can you be expected to pass THAT exam. Oh come on, it isn't really that tough!
4. Don't expect to improve your code speed by working 40 meter rag chew C.W: "FB OM NAME HR IS BOB ETC." Forget it!
5. Don't expect to spend your usual amount of time on the air yakking with your good old friend Harry and the boys on 3829.2864 or what have you. Use the time to STUDY.

What to expect

What should you expect when you actually take an F.C.C. examination? First, the code test consisting of straight language copy with a minimum of punctuation. The text may contain some complete sentences but changes of thought without punctuation to indicate the end of a sentence make it virtually impossible to "anticipate". The examining office in my district uses a tape controlled oscillator piped into a loud speaker. If your F.C.C. district uses a speaker, be sure that you are accustomed to copying from a speaker. The switch from head phones to speaker may otherwise offer a slight mental handicap.

Get your brain in gear!

When you get to the written part of the exam, be sure that you understand each question before you answer it. The wording of the question is not necessarily tricky, but they *are* designed to test your understanding.

You will save time and reduce the mental strain involved considerably if you go right through all of the written questions (other than diagrams) from start to finish and answer those that you are absolutely certain of first. Check the "uncertain" ones and those requiring calculations as you go along. Then return to the questions requiring calculations and answer them on the second time through. Save the puzzlers for last. You can work on them as time permits without jeopardizing your chance to answer the questions you have "solid". At this writing, the diagrams on the Amateur Extra Class examination count one point, just the same as the multiple choice questions, so don't feel that you can pick up "extra points" on those diagram questions. Finally, be sure that you answer *all* questions. Even if you don't know the answer to a question, answer it—you have a 20% chance of being right on 5 part multiple choice questions.

Do these ideas really work?

Proof of the pudding? Another amateur and myself worked up a little program for ourselves and passed the Amateur Extra with no trouble at all. We met on lunch hours, took turns at playing "professor", we made some tapes, copied NAA and W1AW, and we used the "card" idea to check our knowledge of the typical circuit diagrams. Most importantly of all, we set a time goal for ourselves that forced us to get on the ball and "get going". No examination is tough if you are prepared. If the lack of an Advanced Class license is keeping you from the fun of SSTV on bands other than 29 MHz. and up, why not use the methods outlined here and get that needed ticket?

Reflections of Dayton, '78.

Henry Ruh, WB9WWM, publisher of *A5 Magazine* reports that sales of his new book, *Amateur Television In A Nutshell* are going strong. That's good, because it is an excellent book for not only the gung-ho fast scanner but is lucid and worthwhile for anyone who wants to learn about how TV systems work. It covers everything from lens to antenna in terms you can understand. See fig. 1 for a picture of happy Henry at Dayton.

N3TV, Tony Pessicki's new call leaves no doubt as to his principal interest. Formerly W3GKW, Tony was very busy at Dayton helping with the SSTV demonstrations. See fig. 2 for a look at Tony in his "TV-T" shirt.

Thanks to Warren Weldon, W5DFU, "In Focus" has a good picture of Ed Arvonio, W3LY, who did a masterful job of conducting the SSTV Seminar at Dayton. Ed has recently moved into a beautiful new home located at Vero Beach, Florida. Does that mean a call-sign change. Ed?

Pictures, pictures, pictures!

I hope that you get the idea that I am looking for more pictures of slow scanners and their amateur shacks—and of

(Continued on page 95)

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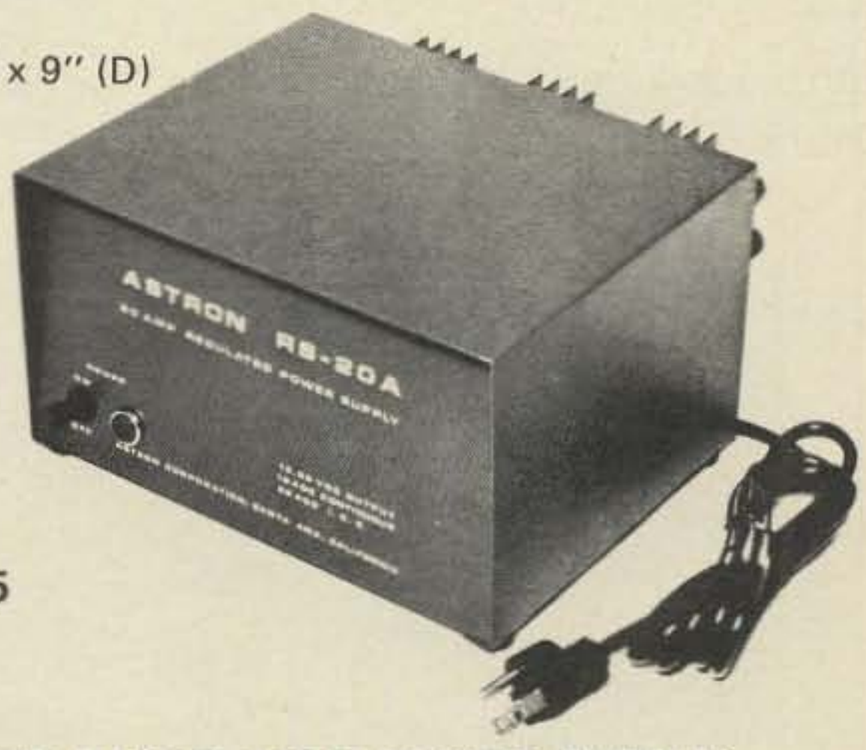

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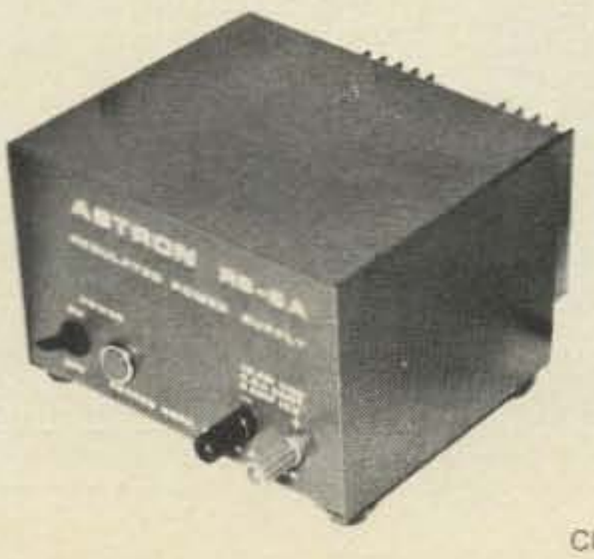

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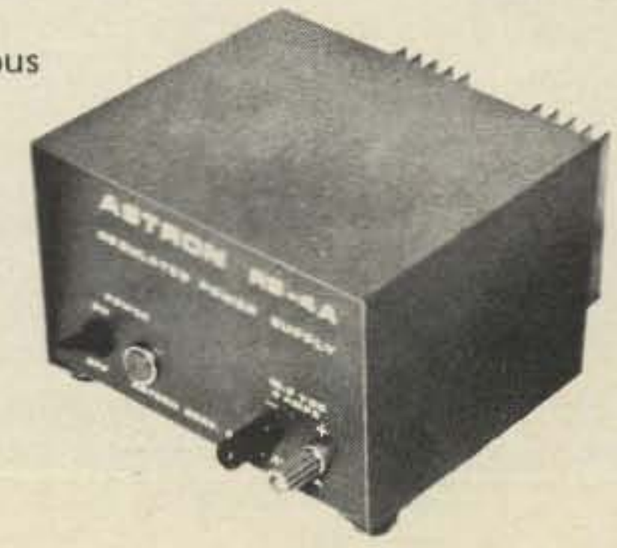

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CIRCLE 18 ON READER SERVICE CARD

a monthly feature by

WILLIAM I. ORR, W6SAI

Antennas

Design, construction, fact, and even some fiction

"Well, laddie-buck, you certainly seemed pleased with yourself these days", I remarked. Pendergast hummed happily to himself as he settled down in his purple imitation lamb's wool operating chair and removed the imported *tru-stereo* earphones from his head. He draped the earphones carelessly over the edge of the table and calmly watched as they slipped to the floor with a clatter. He yawned luxuriously and then said, "Yes. What fun to have ten meters open for DX once again! Have you been listening in these past few days?"

"I certainly have", I replied. "The sunspot cycle is well on its way up by now"

"What do you think the maximum value will be?", Pendergast inquired anxiously, a slight frown sweeping across his handsome features. "Last I heard the prognostication was for the cycle to peak out about 55 or 60".

"No way", I said. "It is passing that estimate right now. From what I read in the tea leaves, I would think that it will peak out at about 150. That makes it just about an average cycle"

48 Campbell Lane, Menlo Park, CA 94025.

Fig. 2 — The "antenna farm" at K3WX. Tony has a modest 160 foot tower at the side of his house which supports antennas for all bands between 80 meters and 2 meters. There are stacked 20, 15 and 10 meter beams in this view, plus assorted v.h.f. antennas atop the structure.

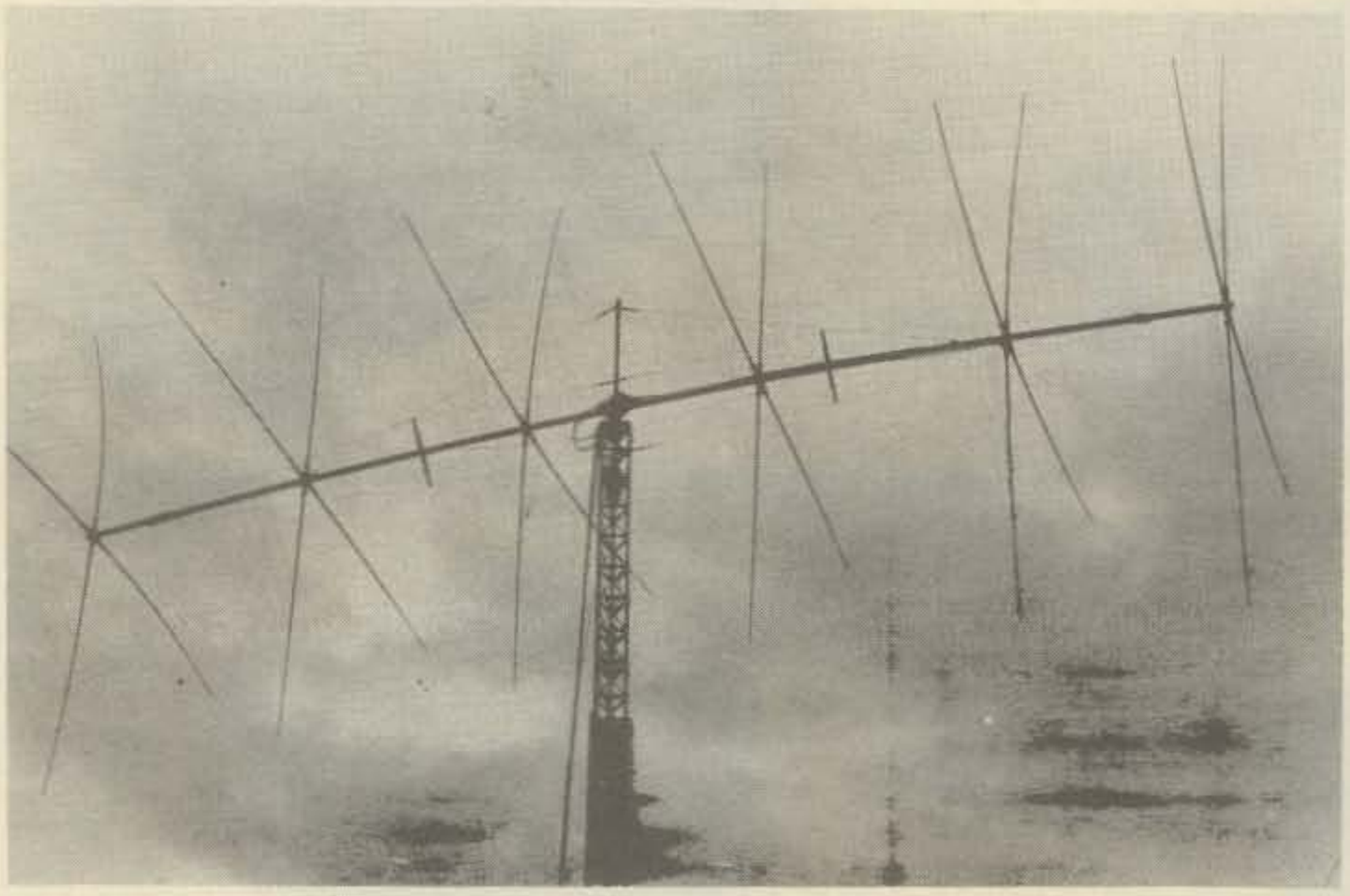

Fig. 1 — The block-buster six element 20 meter Quad of W6MMA. Vern's quad is based upon the design of K6WG which was discussed in the July antenna column. Does the antenna work? You betcha!

"One-fifty", breathed Pendergast. "That sounds like 10 meters will be good for another five or six years!!"

"At least", I replied. "There should be a lot of action on that band this winter. Are you going to join in the fun?"

"I don't know", admitted my friend. "I don't have a good 10 meter beam at this time". He hesitated. "Any suggestions?"

"Yes", I replied. "The quickest and easiest—and cheapest—way to get on 10 meters is to buy a three element Yagi for CB. You can get a real bargain in a three element CB antenna at many of the franchised CB stores. Then to move it in frequency from the 11 meter band to the 10 meter band you merely trim six inches off the tip of each element".

"You mean, the overall length of each element will be a foot shorter than normal?", asked Pendergast as he reached for his ever-present notebook.

"That's right. That will drop the center frequency of the antenna to about 28.7 MHz and you'll get good beam performance from 28.0 MHz up to about 29.4 MHz. Don't worry about changing the spacing, or the matching system. Just trim the elements and you are in good shape. You can't beat that for a quick start on 10 meters".

Pendergast put his notebook aside and reached for a small pile of letters on the operating table. "Let's look over the mail-bag", he said. "The first letter is from Vern, W6MMA. He encloses a snapshot of his *six element* Quad built on the K6WG design that was discussed in the July column (fig. 1). This 20 meter Quad is a *real* monster. Notice that the boom is double-guyed, that is it has a set of top guys, plus a set of intermediate guys on each side of the boom."

"A good idea," I said. "Most amateurs tend to underestimate the force of the wind and you can get into trouble fast with a big Quad on a windy day. And how does it work? Well, just listen to W6MMA in a DX pile-up."

"That antenna should give the gang in 'Cow-Town' an inferiority complex. By the way, what have you heard from those Quad-builders K5DUT and K5JA?"

"Not much," I admitted. "I guess Don and John are too busy working DX to waste time letter writing."

Pendergast pulled a bulky envelope

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CIRCLE 17 ON READER SERVICE CARD

out of the pile. "What's this?" he queried.

I looked at the photographs. "That's the antenna farm at K3WX, Tony. How do you like it? Fig. 2 shows the general situation. Tony has a 160 foot tower at the side of his house. There are stacked 20, 15 and 10 meter beams atop, plus assorted v.h.f. antennas. Here's a closeup of the top of the tower (fig. 3) and another snap showing Tony climbing the ladder that runs to the top of the tower. And look at fig. 4! He's got an inverted-V for 40 meters on the end of the 20 meter beam and also an 80 meter, 2 element log-periodic beam strapped on at the 85 foot level!"

"That 80 meter beam looks interesting," remarked Pendergast as he studied the photographs carefully (fig. 5).

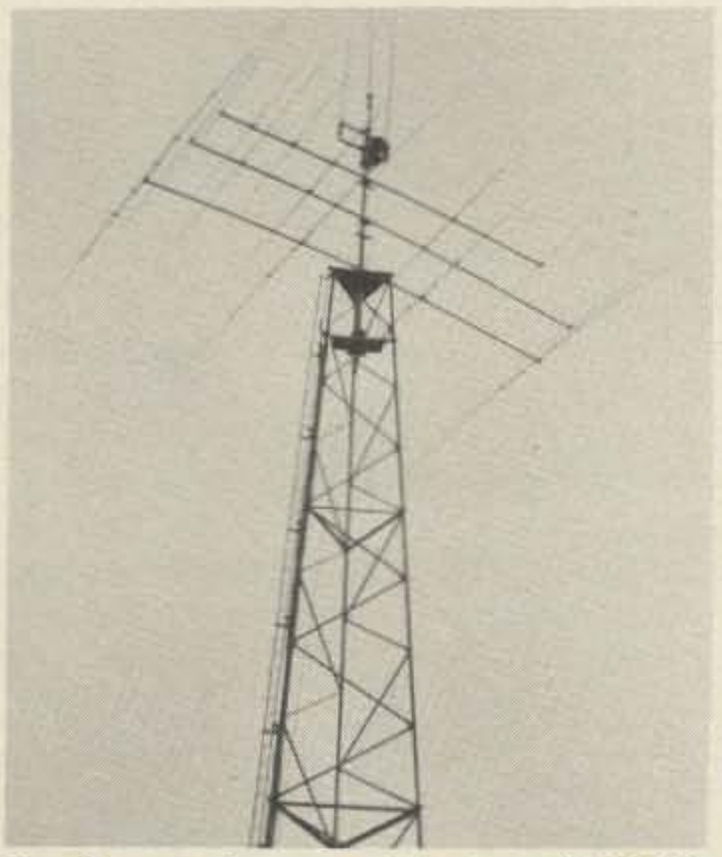

Fig. 3 — A closeup of the top of K3WX's tower. Note the ladder running up the side. Need exercise? How about a sprint up to the 160 foot platform? It looks as if there antennas for 6, 2 and 450 MHz at the tippy-top of the rotating mast. The rotator is on a platform a few feet below the top of the mast.

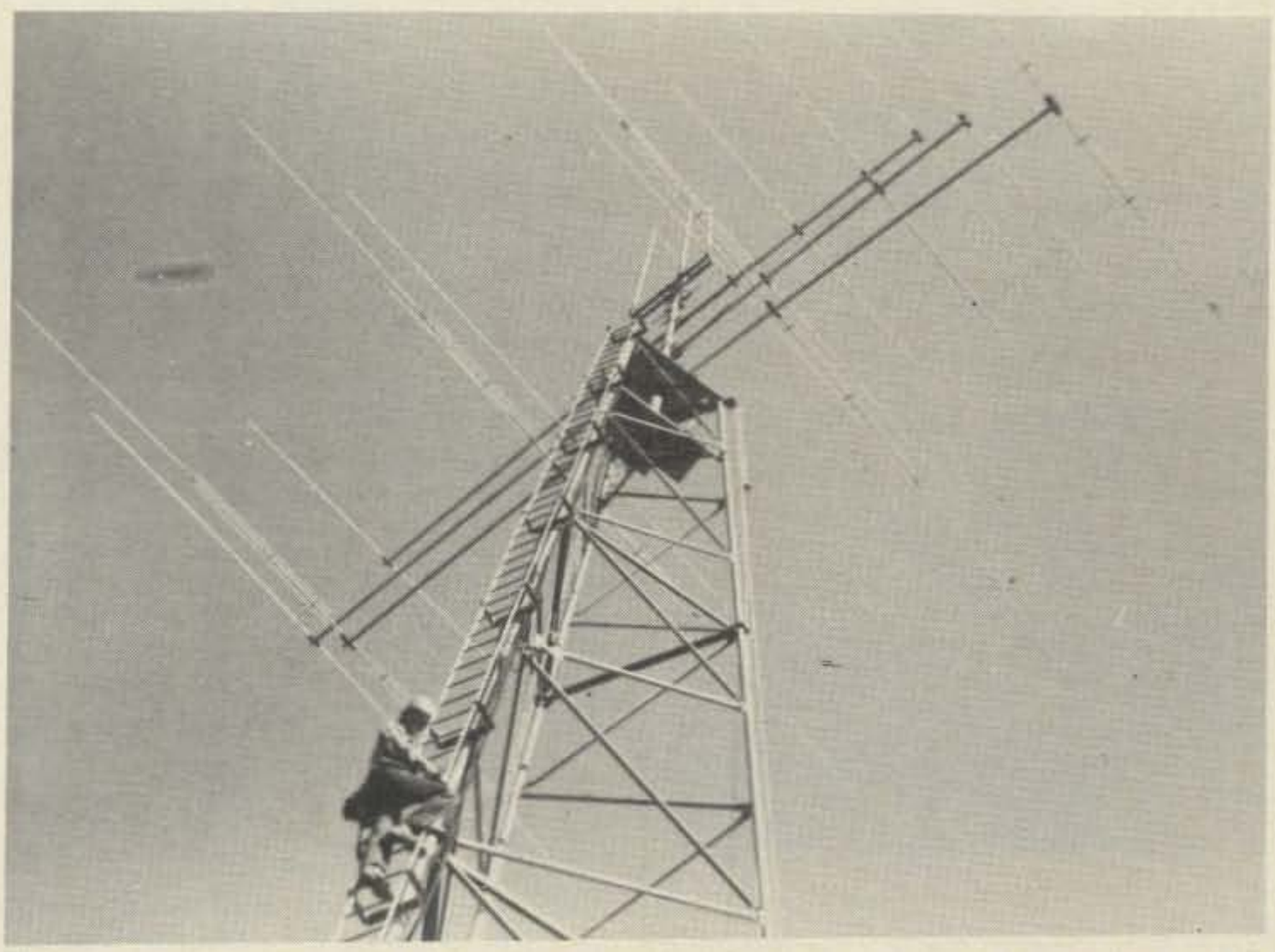

Fig. 4 — Here's K3WX on his way to the top. I'd get a nosebleed if I went that high! It pays to be young.

Fig. 5 — Another view of the K3WX antenna system. In this view Tony has added an inverted-V for 40 meters at the end of the 20 meter boom, plus a two element log-periodic antenna at the 85 foot level for 80 meters.

"Agreed. You can't tell from the picture, but the elements are loaded to reduce overall length," I replied. "Look at fig. 6. This is a shot of the end of one element showing the tapered winding on the fiberglass pole.

"And here's a picture of the 80 meter element mounting plate (fig. 7). You can see the center point of one of the elements. Looks like quite a project, doesn't it?".

Pendergast frowned. I wonder how Tony copes with rust and corrosion with all that aluminum up in the air?"

"He uses a compound especially prepared for aluminum-to-aluminum or aluminum-to-copper joints (fig. 8). It's called *NOALOX*. It comes in a plastic bottle and you just smear some of the good on the mating pieces of metal before the joint is assembled. Tony picked it up in his local hardware store."

Fig. 6 — A tip of one 80 meter element at K3WX. A tapered winding is placed on a fiberglass pole to achieve end-loading. Winding is of copper strap.

Fig. 7 — The center-point and support for an 80 meter element at K3WX. Note the heavy-duty construction.

"Sounds great", agreed my friend. "That stuff should be an asset in any ham's shack".

I reached for the letters on the desk. "Observe the comments from Dave, W7TO. He's been using a short vertical antenna on 160 meters with a very small ground screen. He says he doesn't have room for a full set of 160 meter radials (who does?) and his solution to the problem is a ground screen made of one-inch chicken wire mesh that is 18 feet on a side. His antenna is a 27 foot vertical, top-loaded by a 50 foot wire. Dave says that the ground screen appears to work as well as a previous installation that used 1300 feet of radial wire, laid out like the spokes of a wheel in 70-foot lengths. With about 100 watts, he's managed WAS plus several overseas contacts. He's very happy with the ground screen".

"Speaking of the 160 meters, do you remember the '160 meter beam' antenna

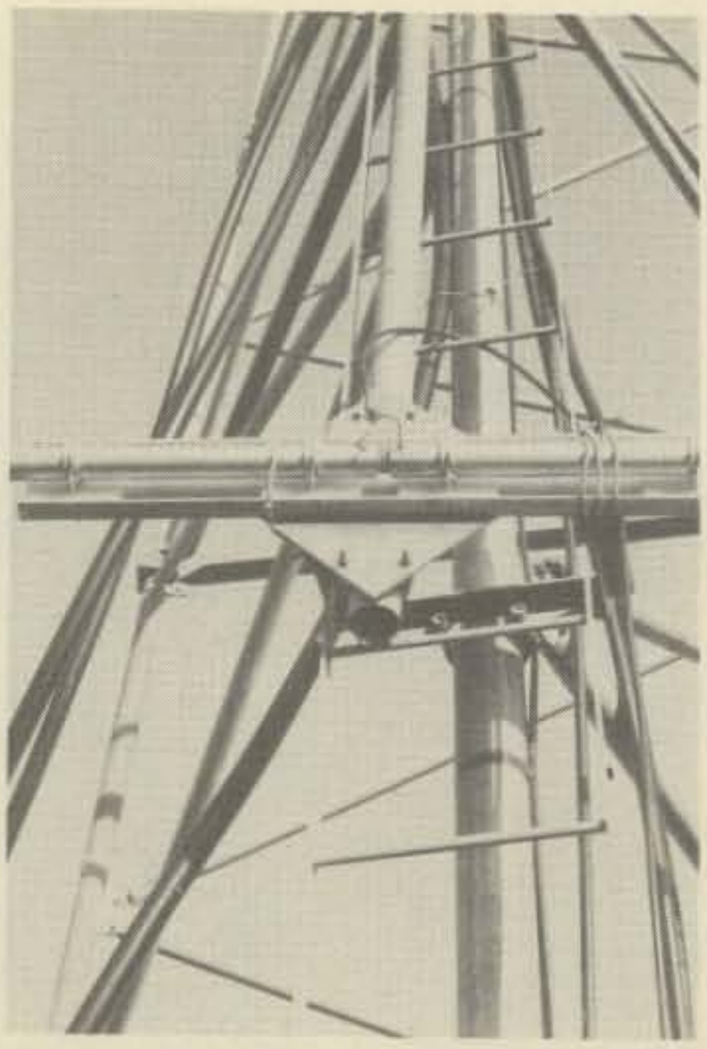

Fig. 8 — The 80 meter beam on its way up the tower, showing the center portion of a driven element. Note the heavy heliax cables coming down the legs of the mast!

of G3XAP that I discussed in the May column? No? Well, it was a top-loaded vertical with the loading wire sloping down towards the ground. Directivity was in the direction of the sloper. Well, the concept was tried independently at VE7BS and he described his antenna in a recent issue of *Radio Communication*, the fine magazine of the Radio Society of Great Britain. Bob started out with an end-fed inverted-V (fig. 9) and then found out that results on long paths of 1,000 to 6,000 miles were improved by dropping the far end vertically, as shown in illustration (b). The latest experimental antenna (c) is a sloping, center-fed dipole with both ends vertical, based on the theory that the current flowing in the same direction in the vertical sections should make the antenna work like a pair of phased verticals. The whole idea is to get a low angle radiator without having to resort to a bunch of pesky radial wires".

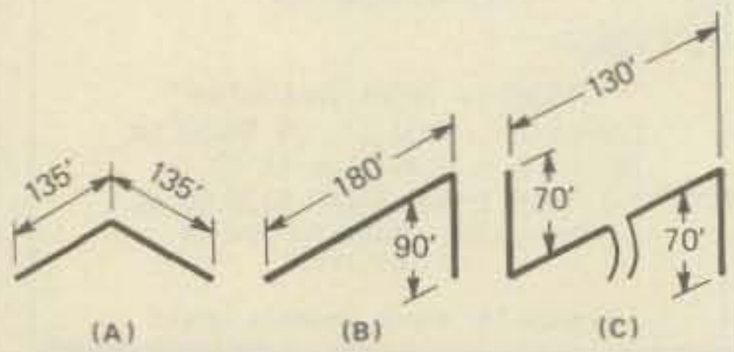

Fig. 9 — The zig-zag sloper antenna for 160 meter DX work at VE7BS. The antenna is designed to provide low-angle radiation without the necessity of laying out a lot of ground radial wires.

"Interesting", replied Pendergast, copying the drawing into his notebook. "And you can divide the dimensions by two and use the idea on 80 meters. That would make a nice, small antenna for DX work".

"You can get a lot of mileage out of simple wire antennas," I admitted. "Look at the Delta Loop that K5WR is using. Byron wrote it up in a recent issue of *Worldradio News*. All it is is a loop 71 feet in length, or 23'9" on a side. It is an equilateral triangle, fed at the apex with a 4-to-1 balun (fig. 10). The top is supported by a 25 foot TV push-up mast. The antenna works on 20, 15 and 10 meters. On 20 meters, the maximum s.w.r. is 1.65-to-1, on 15 meters it is 2.4-to-1 and on 10 meters it is nearly unity across most of the band. You can't ask for a more simple tri-band DX antenna than this. Byron worked 62 countries in the first month the loop was up".

Pendergast tossed a green-covered magazine across the table to me. "Here's another neat idea that was in a recent issue of *Radio Communication* (fig. 11). This is a very simple, wire Yagi beam for 40 meters. It can be supported from 30-foot high poles. Basically, it is an end-loaded beam using the horizontal supporting wires to provide capacitive end-

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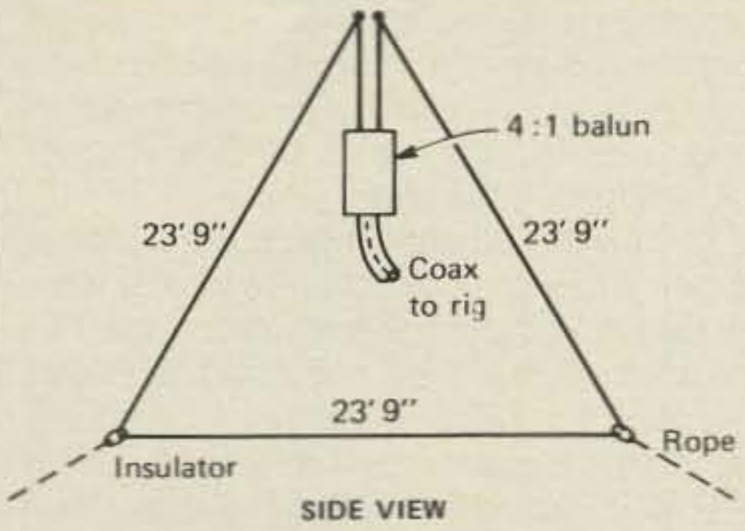

Fig. 10 — The simple Delta loop antenna at K5WR for use on 20, 15 and 10 meters.

loading. Wide spacing is used, the overall space between poles is about 100 feet. The horizontal loading wires can be trimmed for best response. And, of course, a coaxial feed system can be used in place of the open-wire line".

"Interesting", I admitted. "The problem of erecting any kind of beam antenna for either 40 or 80 meters is formidable, and I'm always happy to see a new design".

"Come to think of it, you can do a lot of tricks with a support rope slung between two tie-points", said my friend. "For example, Bruce, WB9SXX, has a rope slung between two tall trees. He wanted to work west to Asia and east to Europe for his two favored directions. So he put up three Delta Loops for 20 meters. He made the inner loop a reflector and then fed each outer loop with a coaxial line. By choosing which loop he fed, he had a two element beam aimed either east or west. The unused loop doesn't seem to influence the other two active loops. Bruce is only using an Atlas 210X transceiver but has had a lot of luck on 20 meters with this simple, cheap beam antenna!"

"Simple—and nice", I remarked. "And if any readers of this column have their pet antenna system, I'd be pleased to hear about it. Photographs are always welcome (black and white preferred) but even a simple pencil sketch will do. The last, new, interesting amateur antenna hasn't been built yet!"

"By the way", remarked my friend as he picked his earphones up from the floor, "How is your new antenna book doing?"

I gave Pendergast a dazzling smile. "I thought you'd never ask", I replied. "It is now in print. The title is *The Radio Amateur Antenna Handbook*. It is a fat 190 pages of good antenna dope for beginner and Old Timer alike. Do you want to know what Roy Neal, K6DUE, the famous Radio and TV News Correspondent has to say about it? Listen: 'I've enjoyed building and experimenting with antennas for many years. That's why I like this new book. It's full of ideas for every ham and . . . let's face it . . . in these days of high prices, antennas are the least expensive way of having a strong signal".

"Amen to that", said Pendergast.

Note: Bill Orr's new Handbook is published by Radio Publications, Inc., Box 149, Wilton, CT. Price: $6.95 plus 50¢ for postage and handling.

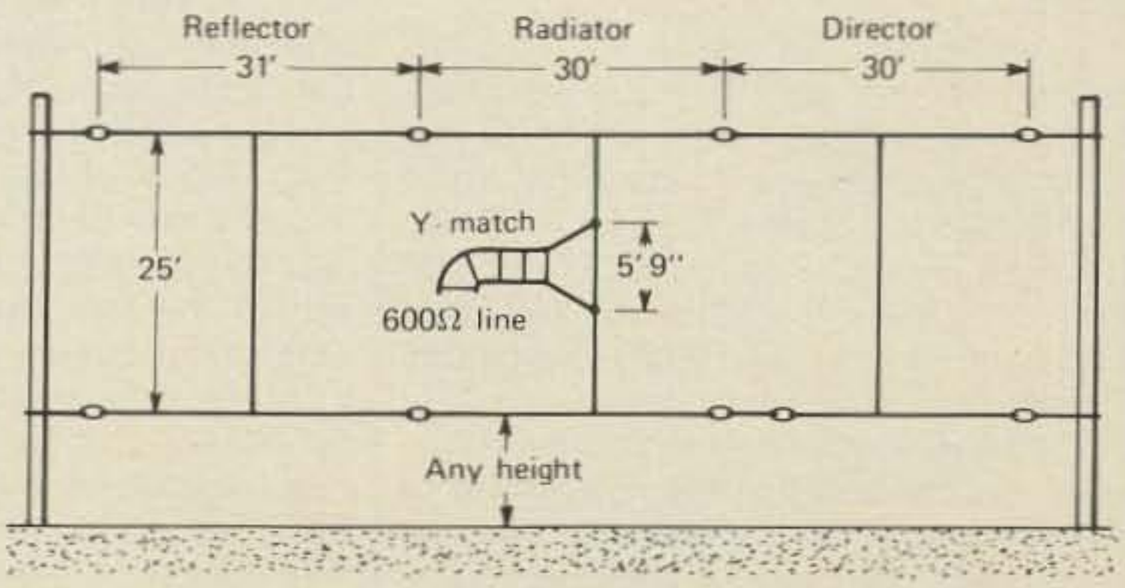

Fig. 11—A low-angle beam antenna for 40 meters using end loading. Antenna may be fed with 4-to1 balun and coaxial line. Directivity is to the right

No -69-70

a regular feature by

THEODORE J. COHEN N4XX

dateline... Washington, D.C.

The ins and outs of the Washington scene

With this issue, we introduce a new feature to CQ . . . a column intended to provide in-depth, background information on activities in Washington, D.C., which affect the Amateur service. The column, to be prepared on an irregular basis by Dr. Theodore J. Cohen (N4XX, ex W4UMF), will not only service to highlight U.S. Government telecommunication activities, but will also provide our readership with insight into the complex Government structure which characterizes the American system of government.

Dr. Cohen has been on the Washington, D.C., scene for over 12 years, and he well knows that the activities in the Federal City have a powerful influence on Amateur Radio. Hopefully, through his writings, we will all gain a better appreciation for the need to have Amateur Radio's voice heard in Washington.

K2EEK

FCC holds open meeting to consider position on RFI

The Federal Communications Commission (FCC), in an Open Meeting on June 8, 1978, in Washington, D.C., decided that while it unanimously supports the objectives of radio-frequency legislation now before the Congress (specifically, Senate Bill S 864 and House Resolution HR 8496), it would prefer that marketplace pressures be relied upon to achieve the objectives of such legislation.

In particular, opposition to radio-frequency interference (RFI) legislation was expressed by the FCC's Office of the General Counsel, the Office of Plans and Policy, and the Safety and Special Radio Services Bureau. Support for RFI legislation came from the Office of the Chief Engineer and the Field Operations Bureau.

Those who opposed legislation, however, recognized that the magnitude of the RFI problem was growing at an ever-increasing rate, and so, they urged that the Commission issue a Notice of Inquiry on the matter as to how the Commission might solve the problem. Field Operation Bureau personnel responded by noting that the information and statistics it had collected during the past thirty years should be sufficient for the Commission's needs.

As a result of the hearing, FCC Chairman Charles D. Ferris directed the Office of Plans and Policy to prepare a Notice of Inquiry for consideration this summer; areas of concern should include not only the technologies involved, but also, the economic impact to be incurred by various courses of action.

* * *

Senate holds hearings on Goldwater's RFI Bill

On June 14, 1978, the Senate Subcommittee on Communications held a hearing of Senate Bill S 864, an RFI bill which had been introduced into the Congress by Senator Barry Goldwater. This legislation, if enacted, would give the FCC the authority to establish standards for electronic home-entertainment devices such that the susceptibility of these devices to strong radio-frequency signals is reduced.

Speaking before the Subcommittee, Congressman Charles A. Vanik, originator of a similar bill in the House of Representatives (HR 8496) noted that we, as a nation, have become increasingly dependent upon electronic equipment for purposes related to business and pleasure. It was vital, therefore, that this equipment be equipped to function in the congested electromagnetic environment in which it must operate.

Mr. Vanik noted that the electronics industry has been very reluctant to correct RFI problems. He further commented on the fact that a survey recently conducted by his office indicated that most television repair personnel contacted did not possess the technical expertise required to address RFI problems. Mr. Vanik concluded with the hope that the Subcommittee would give careful consideration to the legislative initiatives which had been introduced to solve the growing RFI problem.

Countering Mr. Vanik's testimony were statements prepared by a number of individuals and organizations in the consumer electronics industry. The Consumer Electronics Group of the Electronic Industries Association (CEG/EIA) argued that most RFI problems were related to so-called citizens band (CB) radio transmissions, and that better enforcement of existing regulations by the FCC would result in fewer RFI complaints. This theme was echoed by Mr. Leonard Feldman, Technical Director of the Institute of High Fidelity, who also stated that "Governmental action should not be allowed to impose requirements that would degrade the performance and unnecessarily increase the cost of high-fidelity equipment . . .!"

On a more balanced note, the National Association of Broadcasters (NAB) supported a two-pronged attack on the RFI problem. First, they encouraged better designs for CB transmitters, something which the Commission has already taken steps to implement with the introduction of 40-channel transceivers. Second, they supported legislation such as S 864 as but one means of solving RFI problems at the consumer's end.

As noted in the lead story above, the FCC indicated that it would prefer that marketplace pressures be relied upon to resolve RFI problems. This position was countered in the hard-hitting testimony of Mr. Harry J. Dannals (W2HD) President of the American Radio Relay League. Noting the Commissions reluctance to take action, Mr. Dannals stated that he ". . . was extremely disturbed by the inability of the Commission to come forward with a comprehensive set of recommendations for specific legislation and plans for its implementation." He further likened the issuance of the proposed Notice of Inquiry on RFI to "fiddling while Rome burns." Noting that the Commission's own statistics predict that the FCC will receive about 200,000 complaints in

Fiscal Year 1979, Mr. Dannals stated that enactment of S 864 was a necessary supplement to other consumer protection statutes.

Finally, in his testimony before the Subcommittee, Mr. J. Stephen Jarrett (K4FJ) noted that it was the consumer who generally had to bear the burden of resolving interference problems. Further, each manufacturer has a different policy on such problems, and as such, there was no assurance that a manufacturer would even provide assistance in any given case. Mr. Jarrett concluded by stating that only through enabling legislation such as S 864 could the Congress and the FCC insure that the public is offered electronic home entertainment equipment which is capable of operating properly in today's radio frequency environment.

Despite the hearing before the Senate Subcommittee on Communications, hopes for the passage of S 864 in the current Congress are dim. Regardless, there is little question that the matter of radio-frequency interference is receiving significantly more attention by the Congress and the Federal Communications Commission than it has received in the past.

FCC continues to push for mobile allocation in the 220 MHz. band

Despite rumors to the contrary, the matter of a Mobile service allocation in the 220-225 MHz. band, which would probably be used to introduce CB into the band, is very much alive. In the Commission's 8th Notice of Inquiry (NOI; Docket No. 20271), an inquiry relative to preparation for the World Administrative Radio Conference to be held in 1979, the FCC is still proposing to allow the Mobile service to share the 220-225 MHz. allocation with the Amateur and Radiolocation (Radar) services.

The possibility that a new CB service would be introduced into the 200 MHz. band was strongly opposed by the National Capitol DX Association (NCDXA). In the NCDXA's response to the 8th NOI, Stephen K. Thompson (N4TX), President, noted that the 220-225 MHz. band represented the logical scene of expansion for Amateur repeater activity and simplex communications.

Further, Mr. Thompson noted that if a CB service was introduced into the subject band, the ready availability of Amateur equipment, high-power amplifiers, and other devices now in use by Amateurs in the 220 MHz. could only lead tc the type of abuse now observed in the 27 MHz. band.

The NCDXA strongly urged the Commission to delete the proposed 220 MHz. Mobile service allocation, thereby fore-

(Continued on page 94)

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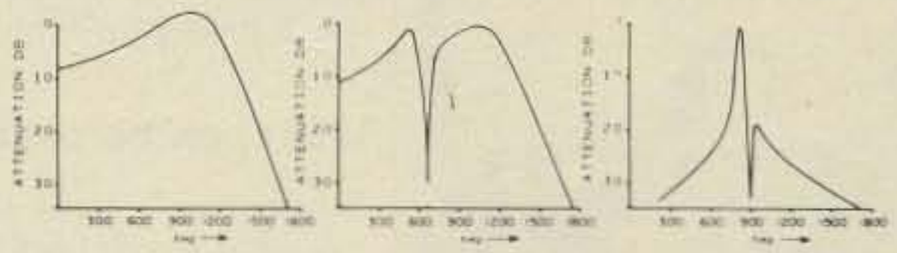

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Novice

"How to" for the newcomer to Amateur radio

Amateur Radio Station Grounding Part II of III

Last month's Novice column provided the first part of a three part article about grounding amateur radio stations. Each part contains information that is useful but all three parts should be read and read again to derive maximum benefit.

Checking station ground effectivity

Poor grounding is usually obvious in an amateur radio station. Some of the symptoms of a poor station ground are discussed at this point for the benefit of new amateurs.

The most obvious indication of improper grounding is that the metal bases of telegraph keys (including bugs and keyer paddles), microphones, receivers, transmitters, transceivers, and other station accessories become "hot" to the touch, particularly when the transmitter is keyed or modulated to produce radio frequency output power. Even the metal skirts of equipment knobs can become so hot with r.f. that one's fingertips are burned as knobs are touched to make adjustments.

If a receiver is not properly grounded, its background noise level will be higher than it has to be, causing weak signals to be difficult or impossible to copy. Even the stronger signals will be interspersed with an unnecessarily high noise level. The receiver chassis must be attached to an effective ground to tie all the a.c. and d.c. reference levels to ground, establishing the chassis as a true zero voltage reference point.

*2814 Empire Ave., Burbank, CA 91520

This is Steven Ryback (WB1ERG) of Salem, Mass. He has been licensed about 9 months and he thanks Horace Snow (W1YYJ) for helping him get started in amateur radio. He runs a Kenwood TS-820S transceiver with a Mosley TA-33 triband beam and a 160-foot longwire antenna.

If a transmitter chassis is not connected to a good ground, the same problems occur as apply to receivers. However, some of the voltages produced in the transmitter are much higher than those related to receiver operation and the transmitter chassis would float at a higher potential than the receiver chassis, if neither is connected to an external ground.

One of the better checks of ground effectiveness is to load the transmitter to the antenna and to observe the final amplifier plate current (tube rig). The transmitter metal chassis should be touched with your hand while the key is held closed and there should be no change at all in the plate current. It is best to make an initial check at a very low r.f. output power level before conducting checks at maximum output. If the ground is not satisfactory, an r.f. burning sensation can be experienced and the plate current will change when you touch the chassis. This touch test should be conducted on each band to be operated.

Another simple way to check the effectiveness of the station ground is with a low power neon bulb. The neon bulb will light up if it is in the vicinity of a strong r.f. field. Naturally, neon bulb r.f. checks should be performed with the transmitter loaded to full power and keyed. The sensitivity of the neon bulb to r.f. can be increased by touching one of the bulb leads with your fingers.

What can be used as a Ground?

You may live in an area where it is possible to connect directly to true earth ground by just attaching your station equipment ground lead to a conductive rod or pipe driven into the soil as close as possible to the station. This situation is possible but it is far from being common. Most of us have to work to establish a good ground.

Salt water oceans and seas provide excellent grounds, which is one reason why shipboard communications systems function so well.

Earth electrical conductivity varies greatly from location to location but it is always better near salt water marshes and in areas where the soil is composed of a high percentage of conductive metal ores.

Dry, sandy, and rocky soil with low conductive mineral content provides the worst natural electrical ground.

Pure water is an insulator. Typical tap water used in most homes is far from being pure and is usually a poor electrical insulator. Tap water can be used to keep an earth ground connection area moist, resulting in a better electrical ground, despite otherwise high ground resistance.

Do not attach your station ground lead to a ground point used for a telephone system. This ground may be suitable for use with the telephone, whereas it is probably ineffective at the much higher frequencies associated with the operation of an amateur radio station. Connecting an amateur station ground lead to the telephone ground point is an almost sure way to cause telephone interference and assure inefficient station operation.

Ground lead connection to cold water systems remains popular despite the fact that the resultant effectiveness is often less than one had hoped to achieve. If you live in a house built before 1960, you should be able to obtain a satisfactory ground by attaching your station ground lead to bare metal on the street side of the pipe connected to your water meter. Homes built after 1960 often have polyvinyl pipe connecting the home water system to the city water mains, thereby disrupting this longtime popular ground point. If you are fortunate enough to have a conductive pipe connecting your cold water system to the city water mains, do not make the mistake of attaching your station ground lead to the nearest convenient section of cold water pipe. House pipe sections are usually electrically insulated from each other by corrosion, dirt, and the sealant used to prevent water leakage at joints. The best place to make this type of ground connection is to the bare metal of the pipe on

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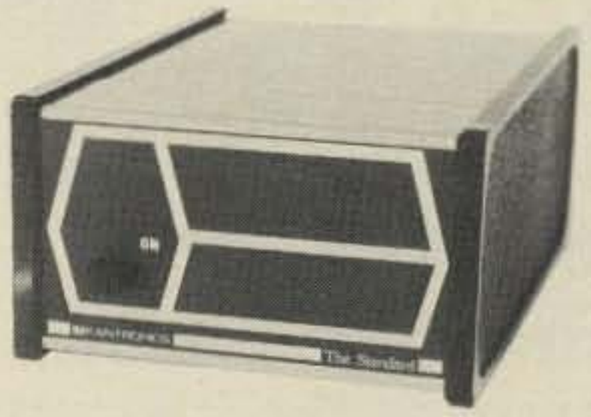

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Amateur station ground leads are connected to the ground portion of the a.c. electric power wiring in some installations. A ground point which is satisfactory at 60 hertz power frequency can be (and usually is) very unsatisfactory at the much higher frequencies associated with amateur radio station operations. It is possible that the house power ground system will provide a satisfactory ground, but it is not likely to happen. It is easy to attach the station ground lead to the house power ground line; just attach it to a nearby switch or receptacle box with the mounting screw used to hold the switch or receptacle cover in place.

Some amateurs living in apartment houses and other structures with steel frameworks find that the mass ground of such structures provide a good electrical ground. The major problem in these cases is gaining access to a nearby girder, but perserverance usually pays off. The station ground line is bolted to a cleaned down bare metal surface of an adjacent girder. It is relatively easy to drill and tap a hole in the girder to accept a large machine screw.

Another usually effective mass ground is the air conditioning ducts in many homes. These ducts are seldom as good as the mass ground provided by steel girders but they occasionally prove to be surprisingly good.

Counterpoise ground systems are used at temporary operating locations and in areas where the terrain does not permit one to bury ground radials, which is a preferred system. The counterpoise is an above-ground version of the popular buried spiderweb radial ground system.

The counterpoise ground point is located at the center of the radials. There can be as few as two and as many as 120, radials in an effective counterpoise.

The end of each radial is insulated above ground and high voltages can be developed at these end points. Consequently, the counterpoise should not be used where children or animals could get shocked when one is transmitting.

Buried ground radial systems are effective even in very bad areas. It is a rule of thumb that a radial ground system composed of 120 quarter wavelength wires provides an earth ground resistance path of less than two ohms, which is very good.

Commercial radio stations further enhance their radial ground systems by adding a ground post at the end of each radial.

Since amateurs normally operate on several bands, their radial ground wires are cut to be resonant at several frequencies. Each pair of radials amounts to a buried dipole antenna and a satisfactory radial ground system for an amateur radio station should have at least one pair of radials for each band to be used.

Bare copper or aluminum wire is used as buried radials. Do not use wire with an insulation covering since the ground contact is desired over the entire length of each radial. Aluminum is impossible to solder well with tools and materials usually available to amateurs and mechanical connections can prove to be less than satisfactory in this highly critical application. Consequently, copper is a better choice than aluminum wire. However, scrap copper wire of different sizes is acceptable.

The radials should be buried 6 to 12 inches below the earth surface and it can be a tough job burying a lot of radials, particularly those for 80 and 160 meters. The inside end of each radial should be soldered to a center ring which also serves as the connection point for the station ground lead.

Automatic lawn sprinkler systems made of copper pipe or tubing can provide a very good electrical ground. The station ground lead should be soldered to the copper water line before water is in the tubing or piping. If water is already in the system, it may be necessary to mechanically attach the ground lead to the copper water line.

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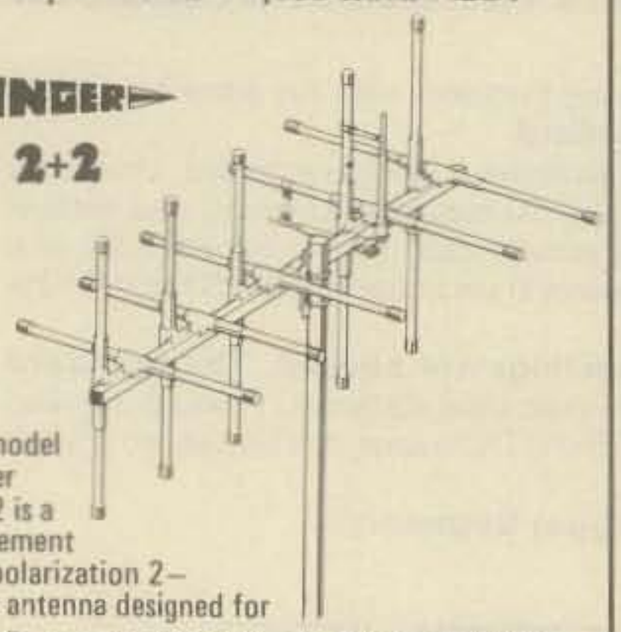
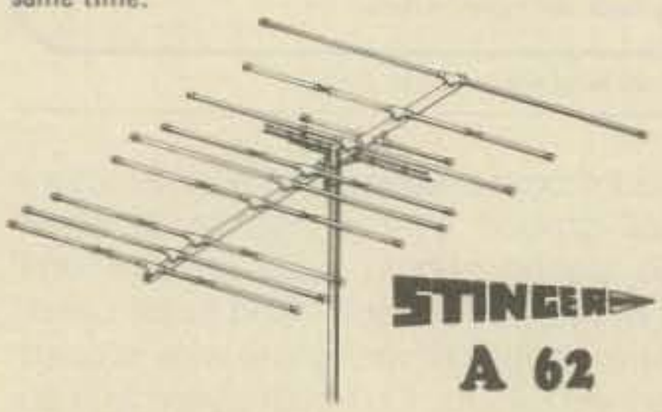
STINGER A 2+2



The model Stinger A 2+2 is a ten-element dual polarization 2–meter antenna designed for OSCAR communications or where switching from horizontal to vertical polarization is required. The A 2+2 can even be phased to operate on both horizontal and vertical polarization at the same time.



STINGER A 62

The model Stinger A 62 is a truly remarkable combination 6 and 2-meter beam designed for optimum performance on both bands yet only requiring ONE transmission line. This is accomplished through the use of exclusive phasing elements to accomplish dual band operation with no sacrifice to either band – NO SWITCHING REQUIRED!

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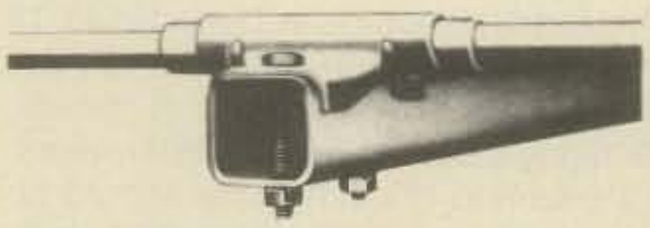
Features



Exclusive Stinger square boom construction is used on all amateur antennas. The 1 1/4" square booms are of .064 wall high tensile strength aluminum which is many times stronger than its round counter part. Special bracket assemblies have been developed to allow instant element to boom alignment – plus they stay aligned in the highest wind and ice loads.

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CIRCLE 20 ON READER SERVICE CARD

Ground rods (including grounding pipes) are commonly used by amateurs as station grounds.

The better ground rods have enough rigidity to permit them to be driven thru extremely tough surface layers of earth. They must also provide good conductivity to the surrounding soil. Steel rods with copper outer plating (Copperweld) are typical of good ground rods. A long single section of brass pipe can also serve as a good ground post.

Some ground rods are made so that they can be threaded together to provide extra length where earth electrical ground is far below the surface, and it is not unusual for this point to be 16 to 20 feet below the surface. Amateurs usually install a 5 to 8 foot gorund rod, which is often not long enough to do the job. Even the ground rods that can be extended by threading sections together are not easy to install becuase their driving caps loosen with each hammer blow and the threads become damaged. Sectionalized ground rods have also become uncoupled underground where it is almost impossible to thread them back together.

Since very few of us live in areas where the soil is highly conductive, it is normally necessary to increase the electrical conductivity of the soil surrounding the ground rod. Copper sulfate is often recommended for this purpose and it will do the job but a better choice is common table salt (sodium chloride). Table salt is readily available, it provides a long-lasting improvement in the electrical conductivity of the earth it permeates, and it cannot harm people or animals.

Do not use copper sulfate (Cu SO4) in any area where well or stream water is used for drinking purposes by people or animals. Copper sulphate is highly poisonous and it will contaminate the underground water supply over a large area. Large amounts of copper sulfate can prove fatal in the water supply. Another name for copper sulfate is Blue Viriol and this is a prime ingredient in insect sprays such as Bordeaux.

If you use table salt, rock salt (the kind used to melt ice from streets), or copper sulfate to increase ground conductivity, it is wise to continue using it to maintain good conductivity. A simple way to sustain good electrical conductivity near a ground rod is to sink a water pipe near the ground rod and to leave it there. The hollow pipe should be filled with salt or copper sulfate two or three times each year. A large funnel should be left inserted in the open end of the pipe to catch rain and other moisture needed to dissolve the salt or copper sulfate into the surrounding soil. The funnel should be secured to the pipe to prevent it from being blown off. The pipe will do this job much better if the bottom (buried) end is capped and small holes are drilled about every four inches along its length. These holes should be drilled completely through the pipe to provide either one of two pairs of holes at each depth below ground. The first holes should be about six inches below the surface to minimize the possibility of destroying nearby plants. The pipe also is used to moisten the ground rod area by simply running tap water into it.

Be aware that your ground rod installation should be isolated from plant life. A simple way to avoid killing nearby plants is to surround your ground rod with metal lawn edger buried several inches into the ground.The metal edging usually forms about a one foot diameter enclosure surrounding the ground rod. Failure to enclose the ground rod or to restrict dispersal of salt or copper sulfate to several inches below the surface can destroy the roots of nearby plants. I have seen cases where large bushes were destroyed because these precautions were not observed.

Incidentally, do not use water purifying salt as an agent to increase electrical conductivity of soil. It has been my experience that this material acts more like an insulator than a conductor.

If you must remove a ground rod, soak the area around it for several days to let water loosen the clamping action of the surrounding soil. Two people with pipe wrenches should then be able to twist the rod while pulling it up and out. Frankly, it is my best advise to sink a new ground rod if one is needed and to leave the old one where it is.

A source of inexpensive ground clamps is the copper-plated pipe-clamp strips sold in hardware stores. These are useful when making ground connections to pipes and rods. Naturally, the mating surfaces of the pipe or rod and the strip should be cleaned down to bare metal and the completed connection should be protected from oxidation and electrolysis as previously described.

I sometimes notice buried pipes in the yards of amateurs and they have occasionally proven to provide satisfactory grounding. Take a very good look for possible grounds both in and around your home. We are seldom lucky enough to find an existing good ground but I can assure you from personal experience that it does happen, even in the worst ground areas.

Hardpan and layers of rock may bar you from easy access to true (zero potential) earth ground, which can be 15 to 20 feet below the earth's surface. Hardpan is often as tough as concrete and it even resists penetration by plant roots.

If the ground rod (or pipe) is to be installed close to the house, I have often been able to overcome installation difficulties by using a long section of pipe to drill the required hole. I simply attach a garden hose to the top of the water pipe

and have the water drill the hole. It is simple to stand on the roof or a ladder while drilling this hole. If you have sunk a conductive (copper or brass) pipe into the ground, it will serve as your connection to earth ground. If the pipe is a poor conductor of an insulator, it can be extracted and the ground rod should be installed immediately while the hole is open. As stated previously, if a pipe is left installed at (or as) your ground, it should have holes drilled at about four inches intervals along its length, starting below the level of plant roots. The bottom of such a pipe should be capped to provide maximum fluid flow thru the holes drilled in the side of the pipe, rather than having the water just run out the bottom of the pipe. If you plan to leave the same pipe installed as your ground connection after you have used it to water drill the required hole, do not cap the bottom end or drill the side holes until the ground hole has been drilled. However, have the pipe cap and drill ready to avoid any delay in preparing the pipe for permanent installation after it has been used to drill the hole and has been extracted. If you have two pieces of pipe available, prepare one for permanent installation before you use the other to drill the hole.

Well Point Use. I have never used a well point to drive a ground hole through tough earth surfaces. However, I have been told that well points can be used to drill holes through the worst possible layers of material. This is a tedious way to drill a hole but it works. The well point can be driven to any required depth by attaching pipe extensions. A one and one half inch well point is suitable in this application. A hole is drilled through the top pipe section and a heavy weight is attached at this point to help drive the well point down. Two buckets filled with dirt and water (mud) should suffice to provide the desired weight. A cut-off three-eighths inch hose is inserted into the assembly and water is trickled through as the well point is driven down. A pair of chain tongs can be used to drive down the well point. Three or four driving turns should be followed by a single back off turn and this sequence should be repeated until the required depth has been reached. It takes about four driving turns to attain each inch of hole depth, so this is a major effort which requires patience and determination.

Well Casings. Older well casings include a lot of metal and one can obtain a good ground by attaching the station ground lead to such a casing. However, nonconductive plastic casings and pipes are used in most newer installations and they do not provide good ground connections.

Slab Ground. If you are going to have a home built, you could have a very good copper wire ground system encased in the concrete base (slab) when it is poured. It helps to sink a few ground rods before the slab is poured and to permanently solder ground braid to interconnect the ground rods and the copper wire mesh before it is encased in concrete. Suitable ground connections are established so that they will protrude out of the slab where they are needed. I have helped a few ex-students make this type of installation and it is a very good approach. We added a "salting" pipe to a recent installation; it was installed in a corner of the laundry room where it deposits salt very close to one of the buried ground rods.

Miscellaneous. It helps to have a ground rod or pipe that is larger in diameter because it provides more contact surface to the surrounding earth. However, it is more important that the ground rod be driven deep enough to reach the true zero voltage ground potential and that it have a highly conductive outer surface. Improving the electrical conductivity of the soil surrounding the ground is essential when one is unable to drive down to the true ground level. When operating in a temporary location which does not warrant establishing a good permanent ground, satisfactory results can usually be obtained by attaching the station ground lead to a variety of different external ground points. If you have a single excellent ground point, there is nothing to be gained from attaching to other less effective ground points. However, one can achieve a relatively

(Continued on page 94)

BEWARE!!

Aluminum towers are not usually as strong as steel towers — ask for engineering facts before purchasing any tower. Aluminum towers, in most cases, are one-half as strong as steel towers within the same price range.

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a monthly feature by

JOHN A. ATTAWAY, K4IIF

DX

News of communications around the world

The CQ DX Department staff is especially pleased this month to announce the election of Don Wallace, W6AM, to the DX Hall of Fame.

Don Wallace is a true giant in the world of DX, a man who was breaking new ground in DX long before many of us were born. He literally pioneered the use of 20 meters as a DX band at a time when 14 MHz. was considered u.h.f., and has probably done more to promote DX operation and encourage new DXers than any other single individual.

Don has been on the air *for 68 years*, and a top DXer and promoter of DX activities for over a half-century. In 1910, at the age of 12, he went on the air officially as WU, and in 1912 he became 60C. Fifty-five big ones ago, in 1923, he received the Hoover Cup from the Department of Commerce for constructing the best all-around homebrew amateur station in the United States.

In 1927, when the conventional wisdom—those facts known to all educated and well-read persons—dictated that consistent DX could only be worked on 40 meters, W6AM disagreed. Don advised all who would listen that 20 meters would be the premier DX band if we would only use it. The conventional wisdom had blown it again.

Possibly Don's greatest contribution to the DX world has been the personal help and encouragement he has given to hundreds of budding DXers in the U.S., and his inspiration to thousands of DX oriented amateurs the world over. One of the most prominent amateurs started down the DX trail by the efforts of Don Wallace is DX Hall of Fame member Lloyd Colvin, W6KG. Lloyd writes that when he was only 12 years old he bought his first *QST* and read an article by 6AM exhorting more amateurs to use 20 meters in their DX activities.

W6AM is world famous for his antenna farm on the Palos Verdes peninsula of California, which has been visited by DX and antenna enthusiasts from all over the globe. The original farm included 13 rhombics covering 26 directions. Even after encroachment of the burgeoning population of southern California, there are still 9 rhombics which use 61 poles, 10 of which are 140 feet high, and an estimated 45 miles of wire. Don holds yearly open houses to exhibit his antenna system, and gatherings of over 300 amateurs at these events is not unusual.

Since 1922, Don Wallace has appeared at radio clubs in the U.S. and 89 other countries, speaking as many as 12 times per year. The topic is always DX. He has distributed country sheets and DX tips to literally thousands of DXers, many of whom learned of the DX chase for the first time from the old master. In most of the countries he has visited, Don has operated and frequently confirmed a new one for a lucky DXer at the other end. The countries he has visited include Pakistan, Formosa, China, Andorra, the Bahamas, Chile, Cuba, Bolivia, Macao, Uruguay, Germany, the Philippines, Iran, France, St. Pierre and Miquelon, England, Scotland, Hungary, Switzerland, Ecuador, Panama, Honduras, Thailand, the Vatican, Italy, Japan, Jordan, Guantanamo Bay, Guam, the Hawaiian Islands, Alaska, Midway Island, Puerto Rico, American Samoa, the Virgin Islands, Wake Island, Canal Zone, Norway, Argentina, Bulgaria, Peru, Lebanon, Austria, Finland, Denmark, New Guinea, Netherlands, Netherlands Antilles, Brazil, Surinam, Sweden, Egypt, Crete, the Dodecanese, Greece, Turkey, Guatemala, Russia, Kaliningradsk, Ukraine, Georgia, Armenia, Kazakh, Moldavia, Canada, Australia, Belize, Hong Kong, India, Mexico, Syria, Nicaragua, Rumania, Yugoslavia, Venezuela, Albania, New Zealand, Paraguay, Monaco, the Fiji Islands, Israel, Cyprus, Nepal, Trinidad and Tobago and the Deleted country of Labrador.

Don has also served as a club officer many times over the years. Among the offices he has held are the presidency of the Southern California DX Club, one of the country's largest and most active DX and Contest groups. He has also been

P.O. Box 205, Winter Haven, FL 33880.

It is CQ's honor to honor a great amateur radio pioneer, Don Wassace W6AM with election to the DX Hall of Fame. On the left above is Don exhibiting his 6AM Hoover Award Cup station in 1926, while on the right Don is operating his modern 1978 version W6AM station 52 years later. Don first operated in 1910 as WU and be came 60C in 1912. As W6AM he has been one of the world s major DX figures for over half a century. (Photos via W6QL.

Chairman of the Fresno DX Convention.

W6AM holds every major DX operating award in the world, and has even worked almost 250 countries from his one kilowatt *mobile* rig. Now in his 8th decade going on 9, Don Wallace is still on the top rung of the DXCC Honor Roll and can be heard in all the pileups.

Congratulations to Don Wallace, W6AM—DX Hall of Fame!

More on Five Band WAZ

In the opening paragraph of last month's column we announced that the CQ DX Award's Advisory Committee would almost certainly approve a proposal for a 5-Band WAZ award, but that the effective date was still uncertain. The matter is now fully resolved, with the chase to begin on Jan. 1, 1979.

There were 3 schools of thought on starting the award. Some members of the WAZ Subcommittee felt that contacts back to Nov. 15, 1945 should be accepted. Others were in favor of Jan. 1, 1973 which was the beginning date for Single Band WAZ, but the majority voted for making a completely fresh start.

Good luck 5-Band DXers. Jan. 1, 1979 touches off a real horse race. Complete rules will appear in the December issue of *CQ*.

Another Bargain Bites the Dust

The certificate fee for WAZ and WPX has held at $1.00 for the past 25 years, but inflation has finally caught up with the DX Department and we must raise the certificate fee to $2.00., effective Jan. 1, 1979. IRC's can now be redeemed at the postoffice for 20¢ each, so 10 IRC's will be acceptable in lieu of $2.00.

There is still time to get in at the old rate if you are ready to apply. Hurry your application to the appropriate Award Manager before Jan. 1, 1979. The WAZ Manager is Leo Haijsman, W4KA, 1044 Southeast 43rd. St., Cape Coral, FL 33904. The WPX Manager is Bob Huntington, K6XP, 5014 Mindora Drive, Torrance, CA 90505, and the CQ DX Award's Manager is Assistant DX Editor, Rod Linkous, W7OM, 5632 47th. Ave., S.W., Seattle, WA 98136.

Contestpeditions

Despite the disadvantage of a July deadline for the October DX column, we decided to try something new this year by listing DXpeditions scheduled for the October and November contest weekends. To see if we could bring it off, we transmitted a call for information through the major DX bulletins, such as the *West Coast* and *Long Island Bulletins*, the *DX'ers Magazine*, *DX 'Press*, *Long Skip* and Geoff Watts *DX News Sheet*, with the hope that some groups would have their plans sufficiently firmed up to provide us

The WPX Honor Roll

The WPX Honor Roll is based on the current confirmed prefixes which are submitted by separate application in strict conformance with CQ master prefix list. Scores are based on the current prefix total regardless of an operator's all time count. Honor Roll must be up-dated annually by addition or to confirm present total. If no up-date, file will be placed in "inactive" until next up-date.

Mixed

1725	W4WV	1346	W4BQY	1081	N6JV	908	WØSFU	793	W6ANB
1630	K6JG	1302	PAØSNG	1070	K6ZDL	906	W3YHR	791	IT9AGA
1625	K6XP	1300	K2VV	1062	DL1MD	902	K7NHG	782	K8LJG
1608	F9RM	1290	N4MM	1055	I6SF	872	DL1CF	782	K2ZRO
1501	YU2DX	1250	WB4KZG	1030	W8CNL	859	W4BYU	782	YU4EBL
1477	VE3GCO	1239	K5UR	1028	W6ISQ	849	G3DO	758	PY4OD
1476	ON4QX	1200	N6AV	1025	N4NO	848	I3ANE	750	K8UDJ
1433	W9DWQ	1184	W9FD	1020	IØJX	844	WØSD	749	WA5LOB
1431	W3PVZ	1181	W8ROC	1016	SM7TV	831	JA1AG	749	CT1LN
1425	YU1BCD	1162	N6CW	1008	WA1JMP	827	JH1VRQ	735	PY4AP
1424	W2NUT	1152	WB4SIJ	1000	SM6DHU	811	W9WHM	733	KØBLT
1390	W2NC	1123	N2AC	960	K4KQB	811	YU3EY	713	WA6EPQ
1380	W7LLC	1123	I2PHN	950	W4IC	811	W6NJU	706	PAØVB
1368	W8LY	1120	YU2OB	949	WA6TAX	807	W9ZTD	705	UA3FT
1358	W4CRW	1107	WØAUB	923	K5DB	807	WA2AUB	622	OE6RP
1350	DJ7CX	1089	YU1AG	918	YU1ODS	803	N6JM	600	WB9CGL

S.S.B.

1540	W4UG	1124	PAØSNG	923	CT1PK	818	W3DJZ	702	IØMBX
1506	F9RM	1086	HP1JC	916	IT9JT	817	OK1MP	702	CX2CN
1432	IØAMU	1050	K2VV	913	N4NO	808	PY3BXW	686	JH1VRQ
1374	IØZV	1033	DL9OH	904	F2MO	800	W4IC	670	N2AC
1357	K6JG	1031	DK2BI	900	WB4KZG	794	YU1AG	654	W4BQY
1263	I8KDB	1022	ZL3NS	896	DJ7CX	783	K8SQE	653	I4LCK
1200	I8YRK	1005	K5UR	889	OE2EGL	765	G3DO	613	CR7IK
1158	I4ZSQ	1000	WB4SIJ	884	WØYDB	747	WA5LOB		
1150	K2POA	975	WA6TAX	881	W3YHR	750	W2NC		
1149	N4MM	967	I2PHN	863	N4UU	720	W6YMV		
1142	W9DWQ	948	DL1MD	850	N2SS	719	YU1ODS		
1137	YU1BCD	941	WB2NYM	822	W6RKP	708	WB6DXU		

C.W.

1383	W8KPL	1091	W9FD	972	W2AIW	809	VK3AHQ	676	SMØGMG
1350	W8LY	1044	W4BQY	953	K6ZDL	800	VO1KE	660	DL1MD
1297	ON4QX	1040	N6JV	941	K5UR	790	SM5BNX	649	KH6HC
1253	K6JG	1031	G2GM	905	N4MM	768	W4BYU	649	K2ZRO
1232	DL1QT	1031	DJ7CX	900	K2VV	754	W4IC	646	PY4OD
1224	W2NC	1012	VO1AW	885	YU1AG	716	YU1ODS	629	K1LWI
1205	K6XP	1006	WA2HZR	829	I6SF	703	I5IZ	604	LZ1XL
1165	YU1BCD	990	W3ARK	825	IT9AGA	700	WB4KZG	600	OK2QX
1126	W2HO	976	WAØKDI	824	W6ISQ	698	OK2BLG	600	VE4OX
1104	N4UU	976	N2AC	812	K7ABV	693	OK2DB		

Otto Nieser, DK8NM, of Nuernberg is an active DXer on both c.w. and R.T.T.Y. He has qualified for 21 different DX awards. (Photo courtesy Bob, K6XP)

Many new DXers get their first Portugal QSL from this man, Cesar Vieira, CT1WB, of Porto. Cesar is an active participant in the CQ DX Award Programs.

Baruch Sheinberg, 4Z4TT, has emerged as the premier, solo DX operator of 1977-78. This photo shows Baruch operating from Funafuti, Tuvalu Island in April, 1977. His most recent Pacific DXpedition activated rare ZK2, Niue Island. (photo via Jack, W2LZX)

Milan Drlic, "Daki", YU2REO, DX'es from Zagreb using a W3DZZ antenna for 80 and 40 meters and a trap groundplane for 10, 15 and 20 meters. His operation is chiefly via the c.w. mode.

some useful information.

Unfortunately, a great many who have been on the other end in past contests were not able to say where they would be operating this year so far in advance. We can appreciate their dilemma because we don't know ourselves. K4IIF will be at the DX end but several countries are possible and we probably won't know until the last minute. Business travel demands will play a major role. However, by contacting many contest regulars personally we did find an encouraging number with tentative plans in the works, so we decided to proceed with this section of the column which is divided into 3 parts. One part for those operating in both contests, the phone weekend in October and the c.w. weekend in November. A second for those DXpeditions only in the phone weekend in October and a third for those only in the c.w. weekend in November.

Both Contest Weekends

Lloyd, W6KG, and Iris, W6QL, Colvin, the dynamic DX duo from California, have advised us by letter that they will be active from some remote DX location during both test weekends in 1978. Their present plans call for an operation from a rare spot in the Middle East, but political conditions may result in their appearing from an entirely different part of the world. Based on past experience they will hand out multipliers to several thousand eager DXers from wherever they may land.

The Colvins are on the DX program for the A.R.R.L. National Convention in September, after which they will leave immediately on their next major worldwide DXpedition.

The *Long Island DX Association Bulletin* advises us that Mata, YU1NYP, plans to return to Iraq and will operate from that exceedingly rare location during both the phone and c.w. contest weekends. The call will probably be YI1BGD, but this is not certain. Needless to say, *CQ* is delighted that Mata will make the YI multiplier available during the CQ Worldwide Tests for the first time in many, many years.

The CQ Worldwide DX Phone Contest, Oct. 28-29, 1978

de John, N4MM/W4WSF—"A large group of Potomac Valley Club members plan an all band operation from PJ9, Curacao in an effort to reclaim the multi-operator, multi-transmitter record which we held from 1974 until last year. Our goal is 12,000 QSO's and 25 million points in 1978. The operation will take place from the Coral Cliff Hotel in Curacao, and the operators will include, Jack, N4RV; John, N4MM; Bob, K3EST; Eric, K3NA; Don, W3AZD; Paul, WA3ZAS; Lew, K4VX; Bob, K3RT; plus several PJ2's from the local area. Listen for PJ9JR and PJ9KK on c.w. both before and after the contest."

de Austin, N4WW/K4YFQ—"K1MM and myself are working toward putting CE0X, San Felix, on the air during the CQ Worldwide Phone weekend, plus a short period just before and after the contest. We plan to be on the air from Oct. 25-30, 1978 using the callsign CE0XX. Our contest frequencies will be 3695, 7095, 14195, 21245, 21295, 28495 and 28595 kHz. Prior to the contest we will be on c.w. using frequencies 5 and 25 khz above the band edges, for example 7005 and 14025 kHz."

de Billy, N4UF—"The North Florida DX Association contest operators will be in the Caribbean again for the CQ Worldwide Phone weekend. Mario, HH2MC, has invited us to operate from his QTH and we will probably use his call. A second group from the club may possibly operate from VP5, Turks and Caicos, to make sure that multipliers are readily available from that country as well."

The CQ DX Awards Program

S.S.B.

577 . . . WA1TPR
578 . . . W5RBO
579 . . . DK2BL
580 . . . DJ3ND
581 . . . GI4FUM
582 . . . WB9VWI

C.W.

315 . . . N6CW
316 . . . K1RH

S.S.B. Endorsements

310 . . . WA2RAU/318
310 . . . K6YRA/314
300 . . . DK2BL/303
300 . . . K6XP/300
275 . . . W9SS/298
275 . . . DJ7CX/289
275 . . . K8LJG/281
200 . . . WA2FKF/202
150 . . . WA1TPR/166
150 . . . W5RBO/165

C.W. Endorsements

300 . . . K6JG/304
275 . . . N6CW/281
275 . . . DJ7CX/280
200 . . . K6DSK/200
150 . . . WA8LWK/151

Complete rules and application forms for the CQ DX Awards Program can be obtained by sending a business size, No. 10, envelope, self-addressed and stamped to: "CQ DX AWARDS", 5632 47th Avenue S. W., Seattle, Washington 98136 U.S.A.

Working DX on 160 meters with only 10 watts is doing it the hard way, but Rosti, OK2PGU, is at the 50 country mark and climbing with all continents comfirmed on 160. He uses homebrew equipment to a 125 ft. vertical antenna. (Photo courtesy Stew, W1BB)

The WAZ Program

Single Band WAZ

20 Meter C.W.

51 . . . SM0CCE
52 . . . K8DYZ
53 . . . K8LJG

20 Meter Phone

134 . . . KL7HKE
135 . . . W0SF
136 . . . WA2OQM
137 . . . 9H4G
138 . . . EA5TD
139 . . . W8CY
140 . . . KL7IAK
141 . . . W8ILC***
142 . . . W2LZX
143 . . . N3UN
144 . . . N4CC
145 . . . ZL1PN
146 . . . JA3DGC
147 . . . I2LPA

***QRP ONE WATT

All Band S.S.B.

1480 . . . UNASSIGNED
1481 . . . W0SF
1482 . . . W7AE
1483 . . . JH7DNO
1484 . . . K8SMC
1485 . . . G4DYO
1486 . . . EA5TD
1487 . . . K9KB
1488 . . . N3RT
1489 . . . DK9KT
1490 . . . K9MD
1491 . . . VE2YU
1492 . . . E9TEI
1493 . . . WD8DIV
1494 . . . I2ZGC
1495 . . . LU7MAL

C.W. Phone/Mixed

4296 . . . YU2CRS
4297 . . . W5RBO
4298 . . . JA1VE
4299 . . . DK8SR
4300 . . . W2HAZ
4301 . . . W0VKF
4302 . . . WA7KLK
4303 . . . K9EVB
4304 . . . W8UVZ
4305 . . . DX7NL
4306 . . . K5VT
4307 . . . K5VNJ
4308 . . . W0NB
4309 . . . W6TC
4310 . . . W3UJ
4311 . . . DM3WMJ
4312 . . . YV5BPG

All Phone

(NONE)

The complete rules for all WAZ awards are found in the May, 1976 issue of *CQ*. Application blanks and reprints of the rules may be obtained by sending a self-addressed, stamped envelope to the WAZ Award Manager, Mr. Leo Haijsman, W4KA, 1044 Southeast 43rd. St., Cape Coral, FL 33904.

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de Terry, N6CW—"I am working on several possibilities for a multioperator station with N6KA and N6ND as possible cooperators. The first choice at present is VP2E, Anguilla, and if that fails to materialize it will probably mean back to VP2VDH, British Virgin Islands. Whichever it may be, QSLs go to N6CW."

de Terry, W4GSM—"I hope to be on St. Brandon and Rodriguez during the months of October and November, 3B9 for the phone weekend and then on to 3B7 *if* transportation permits. I don't have the callsign yet, but the QSL Manager will be Joe, W3HNK. C.w. operation is

CQ DX Honor Roll

The CQ DX Honor Roll recognizes those DXers who have submitted proof of confirmation with 275 or more countries for the mode indicated. The top SSTV DXers are also listed. The ARRL DXCC Country List, LESS DELETED COUNTRIES, is used as the country standard. Total number of current countries on the DXCC list as of this listing is 318. Honor Roll listing is automatic when submitting application or endorsement for 275 or more countries. To remain on the CQ DX Honor Roll, annual updates are required. Honor Roll updates may be submitted anytime, in any number. Updates indicating "no change" will be accepted.

C.W.

W6PT 318	DL7AA 312	N6AV 303	DL3RK 296	WA8DXA 291
K6EC 315	W8KPL 309	W9DWQ 303	N6FX 296	N6CW 281
ON4QX 315	W2GT 306	W4BQY 301	K9MM 291	DJ7CX 280
W6ID 313	K6JG 304			

S.S.B.

WA2RAU 318	SM6CKS 311	K6EC 307	N4MM 298	N6FX 284
W2TP 317	W2QK 311	K9MM 307	W9SS 298	K3EH 283
IØAMU 316	W4UG 311	OE2EGL 307	WØSD 298	N6AW 282
G3FKM 315	K6WR 310	W4DPS 307	F9MS 296	OK1MP 282
K2FL 315	WA2EOQ 310	ZS6LW 307	WØSFU 296	W7JYX 282
K6YRA 314	I8YRK 309	I4ZSQ 305	N6AV 295	K8LJG 281
XE1AE 314	IØZV 309	YV1KZ 304	DL6KG 294	WB2RLK 281
W4SSU 313	K6JG 309	DK2BL 303	JH1EIG 294	VE7HP 280
W9DWQ 313	W9QLD 309	VE2WY 303	K9RF 292	W7OM 280
I8KDB 312	ZL3NS 309	EA4LH 302	W6FET 291	9H4G 280
K4MQG 312	K8DYZ 308	VE3GMT 302	DJ7CX 289	DJ2AA 277
VE3MJ 312	OZ3SK 308	I5WT 301	SP5BSV 288	K9PPY 277
W6EL 312	SM5SB 308	K6XP 300	YS10 287	I6PLN 275
W6EUF 312	SM6CWK 308	WB6DXU 300	W8ILC 286	JH1VRQ 275
W9JT 312	W6YMV 308	XE1KS 300	OE2WWB 285	K4LP 275
F9RM 311	F2MO 307	VE3GCO 299		

S.S.T.V.

W8YEK 108	G3IAD 101

The WPX Program

Mixed

662 ... JA3ANW	665 ... DL9ID
663 ... K2PF	666 ... DK7BJ
664 ... W5RBO	667 ... WA4LOF

S.S.B.

1064 ... DK5AD/W3	1067 ... VK3AKK
1065 ... OY5NS	1068 ... K3MWV
1066 ... GI4FUM	

C.W.

1713 ... VE3CKF	1715 ... K2PF
1714 ... OY5NS	1716 ... W1IHN

WPNX

119 ... WB3DCA	121 ... WD4MDW
120 ... WD9EKC	122 ... WD4LAH

VPX

147 ... OE1-105370

Endorsements

Mixed: 400 K2PF, WA4LOF. 500 JA3ANW, DL9ID, W2VAV, GM4DKO. 550 W5RBO, DK7BJ. 750 VE7DP, N6AN. 800 W4HHN, N6AN. 850 JH1VRQ. 1000 SP9CTW, SM7TV. 1500 ON4QX.

SSB: 300 DK5AD/W3, GI4FUM, VK3AKK, K3MWV. 450 WB4QFH. 500 OK1AGN. 550 OY5NS. 600 VE7IG. 750 DK2BL. 800 WA1KYW. 1000 F2YT. 1550 W4UG.

CW: 300 VE3CKF. 350 OY5NS, K2PF. 400 W1IHN, W3OGY. 650 SMØGMG. 750 OK1DH. 850 W5MCO, K4RDU. 1000 VO1AW. 1350 ON4QX.

10 meters: I8YRK, W4BQY, ON4XG.

15 meters: I8YRK, VE7IG.

20 meters: I8YRK.

40 meters: ON4XG.

80 meters: I8YRK, ON4XG.

Africa: VO1AW, W4BQY, ON4XG.

Asia: JA3ANW, ON4XG.

Europe: JA3ANW, K2PF, ON4XG, EP2TY, LZ1KAB.

No. America: K2PF, W4BQY, ON4XG.

So. America: WA2AUB, W4BQY, ON4XG.

Complete rules can be found in the May 1976 issue of *CQ* Magazine for the WPX Program. Application forms may be obtained by sending a business-size, self-addressed, stamped envelope (foreign stations send extra postage if air-mail desired) to "CQ WPX AWARDS", 5014 Mindora Dr., Torrance, Calif. 90505, U.S.A.

planned for the period before and after the phone test."

de Fernando-Juan, EA8CR—"I will be working single operator, all band during the Phone Test weekend in October."

de Peter, SM0GMZ—"Hawk, SM5AQD, and myself will be on the air from Morokulien during the Phone Test in October using either the callsign SJ9WL or LG5LG. It will be an all band operation."

de Steve, AA4V/WB4SJG—"Plans are still indefinite, but N4IJ and myself tentatively plan to operate from Grand Cayman as ZF2BB. This will be a multi-operator, single transmitter effort with the names of additional operators to be announced later."

The CQ Worldwide DX C.W. Contest, Nov. 25-26, 1978

de Fernando-Juan, EA8CR—"The EA8/OH group who set the new world record in the multioperator, multitransmitter class during the 1977 CQ Worlwide Phone Contest with 21,351,898 points, plan a return trip to the same QTH for a run at the world record for the mulitoperator, multitransmitter class during the 1978 CQ Worldwide C.W. Contest. They plan to use the same operating site at Izana, 9000 feet above sea level."

de John, W4UY—"Present plans call for an operation from Sint Maarten as PJ8JM during the CQ Worldwide C.W. Test in November. We will use the same location, Mary's Boon on Juliana Beach, that we have used for the past 4 years. During the 8 days of our stay we will make short excursions to French St. Martin as FG0BLO/FS7 and to Anguilla, VP2E.

Walter Geyrhalter, DL3RK, has been the official German checkpoint for all CQ DX Awards for 10 years. Walter is also Editor of the German DX Newsletter, DX-MB, *and is Awards Manager for D.A.R.C., the German Amateur Radio Club. He has 352 countries confirmed including over 300 for the CQ C.W. DX Award, and holds WPX. He teaches at a technical training school near Kaufbeuren.*

Hopefully, Frank Jerome, W5AT, and Gil Wood, W5NUT, will make the trip again this year. We will be using a TH6DXX for 10, 15 and 20 plus dipoles and a vertical for the lower frequency bands.

"On a side note, I still have logs and QSLs left from KR6JM, DL4IQ, W4YCQ/HI8, PJ8YCQ, PJ8JM and FG0BLO/FS7. An s.a.s.e. to W4UY at 11461, S.W. 186th. St., Miami, FL 33157, will bring results."

de Randy, N0TG—"An 8 man group, largely from the midwest, with support from the Northern California DX Foundation, has Coast Guard permission for a Navassa Island operation from Nov. 26 - Dec. 4, 1978. This is not a Contestpedition, but we hope to be on the air starting Nov. 26 to give out contest multipliers on the last day of the Test. Operators will be W0RJU, W0ZH, WB0RSL, N0WL, N0TG, K2KA, W2PAU and W6OIG. QSLs go to N0TG/W0TGB."

de Carl, WB4ZNH—WB4ZNH and WN4FVU hope to be on from Africa during their vacation, Nov. 18 - Dec. 3, including the c.w. test Weekend. "Be patient in the pileups, we are 15 w.p.m. ops."

(Continued on page 93)

Alex, VP2MBC/W1CDC, operating from the Beverstein home at Spanish Pointe, Montserrat. A special effort was made to work JA stations on c.w. as the VP2 countries are very hard to work from Japan. (Photo courtesy Ruby, VP2MGB)

a monthly feature by

GEORGE JACOBS, W3ASK

Propagation

The science of predicting radio conditions

DX Contest Special

The 1978 *CQ* World Wide DX Contest will be held on the following dates:

Phone Section:
0000 GMT Saturday, October 28-
2400 GMT Sunday, October 29

C.w. Section:
0000 GMT Saturday, November 25-
2400 GMT Sunday, November 27

See page , *CQ* September, 1977 for complete details concerning the Contest.

For the *28th* successive year, this month's Propagation column contains a special forecast for use during the Contest sections, both Phone and C.w.

Incredible Conditons!

Unless nature plays a last minute trick, propagation conditions during this year's Contest should be better than they have been for the past nine years. Sunspot activity is increasing rapidly, with a level in the upper 90's now forecast for October, and it could well climb over the 100 mark by November. Compared to the past several years of low solar activity, DX conditions on the h.f. bands during the 1978 Contest period should sound incredibly good.

The Swiss Federal Observatory reports a monthly mean sunspot number of 94.1 for June, 1978. This results in a *smoothed sunspot number* of 55.4 centered on December, 1977.

Band-By-Band Conditions

The following is a band-by-band summary of DX propagation conditions expected from mid-October through mid-December, and centered on the 1978 Contest period.

10 Meters: Good, solid openings are expected to just about every corner of the world during the daylight hours, and the band may remain open to southern and tropical regions into the early evening. Openings towards Europe and in a generally easterly direction should peak an hour or two *before* noon, while those towards South America and Africa are expected to peak during the *early afternoon* hours. Optimum conditions towards the Far East, Australasia, Southeast Asia, etc., are forecast for the late afternoon and early evening hours. If conditions rise to HIGH or ABOVE NORMAL during the Contest period, expect new Contest DX records to be established on this band this year!

15 Meters: Excellent DX propagation conditions are expected from shortly after sunrise through the early evening hours. Look for a peak on *15* meters towards a particular geographical area about an hour or so after the peak has occurred to the same geographical area on *10* meters. Openings are expected to all areas of the world, and exceptionally strong signals should be possible most of the time. *Fifteen* meters should be the *best* DX band during the daytime hours, but it could be a toss-up between *10* and *15* meters during the early afternoon, particularly if conditions should be HIGH NORMAL, or better.

20 Meters: Expect good-to-excellent openings almost around-the-clock. DX conditions should peak an hour or two after sunrise, and again during the late afternoon and early evening hours. It should be possible to work into most areas of the world between sunrise and sunset. Excellent openings are expected to many southern and tropical areas well into the hours of darkness, and when conditions are HIGH NORMAL, or better, the band should remain open for DX during most of the night. Expect exceptionally strong signal levels during peak periods, with openings possible in almost all directions. Look for *long-path* openings for about an hour or so *after* sunrise and again for an hour or so *before* local sunset. If you plan to operate on a *single* band during the Contest, this should be it!

40Meters: DX openings towards Europe and the east should first be possible during the late afternoon hours and steadily improve towards evening. Good openings are forecast to all areas of the world during the hours of darkness. Expect a peak in signals from an easterly direction about Midnight, and from a westerly direction just after sunrise. Excellent conditions towards the south should exist throughout most of the nighttime period. *Forty* meters should be the best DX band during the night, but when conditions are HIGH NORMAL, or better, it may be nip and tuck with *20* meters for this honor.

80 Meters: Good DX openings are forecast to most areas of the world during the hours of darkness and into the sunrise period. For openings towards Europe and the east, peak conditions, often with very strong signals, are expected around Midnight. For openings in a westerly direction, check for a peak just before sunrise. The band should remain open most of the night towards the north and south. Propagation on this band is similar to that expected on *40* meters, except signals will be a bit weaker, noise levels somewhat higher, and the period for band openings a particular direction a bit shorter.

160 Meters: DX openings to some

*11307 Clara St., Silver Spring, MD 20902.

LAST MINUTE FORECAST

Day-to-Day Conditions Expected for October, 1978

	Expected Signal Quality			
Propagation Index	*(4)*	*(3)*	*(2)*	*(1)*
Above Normal: 6,18	A	A	B	C
High Normal: 1, 5, 14, 19, 23, 27-28	A	B	C	C-D
Low Normal: 4, 7, 9-10, 13, 15, 17, 20, 22, 25-26, 29	B	C	D	D-E
Below Normal: 2-3, 8, 12, 16, 21, 24, 31	C	D	D-E	E
Disturbed: 11, 30	C-E	D-E	E	E

Where *expected signal quality is:*

A—Excellent opening, exceptionally strong, steady signals greater than S9+30 dB.

B—Good opening, moderately strong signals varying between S9 and S9+30 dB, with little fading or noise.

C—Fair opening, signals between moderately strong and weak, varying between S3 and S9, with some fading and noise.

D—Poor opening, with weak signals varying between S1 and S3, and with considerable fading and noise.

E—No opening expected.

HOW TO USE THIS FORECAST

1. Find *propagation index* associated with particular band opening from Propagaion Charts appearing on the following pages.
2. With the *propagation index*, use the above table to find the expected signal quality associated with the band opening for and day of the month. For example, an opening shown in the charts with a *propagation index* of 3 will be good (B) on October 1st, poor (D) on the 2nd and 3rd, fair (C) on the 4th, etc. Conditions look good for the Contest period (October 28-29).

For updated information dial Area Code 516-883-6223 for DIAL-A-PROP, subscribe to bi-weekly MAIL-A-PROP, P.O. Box 1714, Silver Spring, MD 20902.

areas of the world are forecast for the hours of darkness and the sunrise period. Signals tend to peak at local sunrise at the more *easterly* terminal of a particular path. Because of relatively high signal absorption and the lower power levels used on this band, openings will often be weak and noisy, but some good ones should be possible. Best bets are for openings towards Europe and towards the south from the eastern half of the country, and towards the south and to the Fat East, Australasia and the South Pacific from the western half of the country. Other DX openings may also be possible. The best propagation aid for this band (and for *80* and *40* meters as well), is a set of sunrise and sunset tables. For exampl,e the best time for an opening between New York City and London would be a few minutes before the sun is expected to rise at the eastern end of the path, or in this case, at London. This time can be found easily in tables of sunrise and sunset. For peak conditions between Los Angeles and New Zealand, check the band just before sunrise at the eastern, or Los Angeles end of the path. Conditions on *80* meters can also often serve as an indicator of conditions on *160* meters, since both bands tend to peak towards a particular area at about the same time.

For a more detailed circuit-by-circuit forecast refer to the *DX Propagation Charts* appearing on the following pages. Instruction for the proper use of these *Charts* are given elsewhere in this column.

Table 1
Sample Multi-Band Work Plan
Eastern USA QTH

Time EST	Optimum Band (Meters)	Areas To Which Band Is Expected To Be Open
00-02	40	Most of Europe, Eastern Mediterranean and Middle East. Most of Central and South America. A few Africans and possibly Antarctica.
02-04	20	Some South Pacific, New Zealand and Australasia. A few Far East and Asians. Some South American and Antarctica.
04-06	40	South Pacific, New Zealand, Australasia. Many South Americans. A few Far Eastern and Asians. Possibly Antarctica.
06-08	20	Most of Europe. South Pacific, New Zealand and Australasia. Most of Central and South America. A few Africans. Some Far East and Asians.
08-10	15	All of Europe, Eastern Mediterranean and Middle East. Some African. Most of Central and South America. South Pacific, New Zealand and Australasia. A few Asians.
10-12	10	Most of Europe and Africa. Most of Central and South America. A few Asians, New Zealand, South Pacific and Australasia.
12-14	15	Some Europeans and most of Africa. Most of Central and South America. A few South Pacific, New Zealand and Australasia.
14-16	15	Most of Africa, Central and South America. Some South Pacific, New Zealand and Australasia. A few Asians.
16-18	20	Most of Europe, Eastern Mediterranean and the Middle East. All of Africa, Central and South America. A few Australasians.
18-20	15	Lots of South Pacific, New Zealand and Austrlasia. Some Far East and Asians. Most of Central and South America. Possibly Antarctica.
20-22	20	Most of Africa, Far East, South Pacific, New Zealand, Australasia, Central and South America. A few Europeans and Middle East. Some Antarctica.
22-00	20	Lots of Far East, South Pacific, New Zealand, Australasia, Central and South America. A few Africans and Asians. Antarctica.

Contest Work Plans

The *DX Propagation Charts* on the following pages show the times when each amateur band from *10* through *160* meters is expected to open from the United States to the major areas of the world.

The information contained in the *Charts* can easily be reorganized into more convenient types of operational work plans, or schedules, which can serve as valuable propagation guides during the Contest. Experience gained during previous Contests has shown that such plans can be extremely useful in piling up contacts and points with a minimum of wasted time.

The following is an example of one of several type plans that can be devised. It is a *multi-band* operational work plan, which shows the times and bands when propagation conditions are expected to be optimum to various areas of the world, for each two hour period throughout the day. An Eastern QTH has been chosen for this example, but similar plans can be devised for Central and Western locations.

Similar work plans can be devised for single band operation, or for openings to specific DX areas.

Up-Dated Contest Propagation Info

In order to meet printing and publication deadlines, the "Last Minute Forecast" appearing in this column was made more than two months before the beginning of the Contest, and is subject to inaccuracy. For more accurate, updated propagation data, specially tailored for the radio amateur and availalbe just before the Contest begins, check MAIL-A-PROP and DIAL-A-PROP (516) 883-6223).

A special MAIL-A-PROP forecast will be issued for both the Phone and C.w. sections of the Contest. MAIL-A-PROP forcasts, issued biweekly in newsletter form, contain day-to-day descriptions of expected conditons and openings on each h.f. band. Regular MAIL-A-PROP subscribers will automatically receive the Contest forecasts. An annual subscription to MAIL-A-PROP is $25 for 26 biweekly issues, postpaid. A special two month trial subscritpion, including the Contest forecasts, is available for $6 postpaid. Checks should be sent to MAIL-A-PROP, 11307 Clara Street, Silver Spring, Md. 20902, before October 10 in order to receive this special subscription.

National Bureau of Standards Radio Station WWV broadcasts geomagnetic and solar data at 18 minutes past *each* hour on 2.5, 5.0, 10.0 and 15.0 MHz. Geomagnetic activity is given in terms of the latest K- index measured at Boulder, Colorado. The previous day's A-index of geomagnetic activity and level of 10.7 cm solar flux are also given, as well as a forecast of geomagnetic and solar conditions given in subjective terms.

Table 2 relates the indices and terms

Geomagnetic Activity	K	A	Solar Activity Range Low	Moderate	High
Range			S.F=90-100	S.F=110-140	S.F=140-180
Quiet	0-2	0-7	High Normal	Above Normal	Above Normal
Unsettled	2-3	7-15	Low Normal	High Normal	High/Above Normal
Active	3-4	15-30	Low/Below Normal	Low Normal	High/Low Normal
Minor Storm	4-5	30-50	Below Normal	Below Normal	Below Normal
Major Storm	5+	50+	Disturbed	Disturbed	Below Normal Disturbed

given on these broadcasts with probable propagation conditions on the h.f. amateur bands.

Table 2- Solar flux(S.F.) and geomagnetic data (K and A indices) broadcast hourly on WWV, related to probably H.F. propagation conditions.

For example, a solar flux of 138 and an A- index of 9 should result in High Normal conditions. A forecast in the range of High Solar Activity and Minor Store Geomagnetic Activity would probably result in Below Normal conditions.

The hourly forecasts broadcast on WWV, along with the latest solar flux and geomagnetic indices, also may be obtained by telephoning Area Code 303-499-8129. This *is not* a toll free number, but there is no other charge for this service and it is available at any time.

Radio Store

If a radio storm should develop during the Contest, expect conditons to drop to BELOW NORMAL or DISTURBED to many areas of the world, depending upon its severity. Under such conditions, expect considerably fewer openings on *10*, *15* and *20* meters. During periods of radio storminess propagation conditions on *40*, *80* and *160* meters also become very erratic, with poorer conditions during certain phases, but with improved conditions at other times, particularly on paths to southern and tropical areas.

If a storm should devleop, circuits passing through or near polar regions will become weak, fade considerably, or many even blackout completely. Concentrate on working the higher frequency bands, and paths to the northeast, north and northwest during the daylight hours, and the lower bands, and the paths to the east, south and west during the evening and early morning hours. A "Last Minute Forecast" for the Phone section of the Contest, made at press time, appears at the beginning of this column. A similar forecast for the C.w. section will appear in next month's column.

V.h.f. Ionospheric Propagation

Solar activity is now just about at the level for 6 meter DX propagation to occur. Check for openings from the eastern half of the USA towards Europe *before* Noon, and towards Africa an hour or so *after* Noon. Best chance for 6 meter DX openings towards Central and South America from *all* areas of the USA should be during the afternoon hours. Check for openings towards the Far East, the South Pacific area, New Zealand and Australasia from the western part of the country during the last afternoon hours. There could be some DX surprises in store for the 6 meter band this fall and winter.

ORIONIDS, a major meteor shower is expected to last for about two days, peaking at mid-day on October 21 (1 p.m. EST). Expect an hourly count of up to apprximately 25 meteors during this shower, which should make possible some fairly good meteor-type ionospheric openings on the v.h.f. bands. Peaks in minor meteor shower activity are also expected on October 3 and 12.

There is usually an increase in auroral activity during October, and some auroral-scatter type v.h.f. openings should be possible. There is also the chance for some short-skip sporadic-E propagation during periods of auroral activity, particularly on *10* and *6* meters. Best time to check for such openings is when conditions on the h.f. bands are expected to be BELOW NORMAL or DISTURBED, as shown in the "Last Minute Forecast" appearing at the beginning of this column.

C.w. Contest Forecast

This month's *DX Propagation Charts* are valid for *both* the Phone and C.w. sections of the 1978 Contest. *Be sure to keep them handy for use during next month's C.w. section as well.* Short-Skip propagation forecasts for October appeared in last month's column.

Past experience has shown that DX Contests are excellent periods in which to test the accuracy of the prediction methods used in the forecasts appearing in this column. Contests generate a large amount of activity in every corner of the world and on all h.f. bands. Observations made during previous Contest periods have helped considerably in improving the accuracy of these forecasts over the 27 years that they have been appearing in this column.

Comments concerning the accuracy of this year's Contest forecasts would be appreciated, and should be sent directly to W3ASK, the Editor of this column.

Good luck in the 1978 Contest!

73, George, W3ASK

October 15 - December 15, 1978
Time Zone: EST (24-Hour Time)
EASTERN USA TO:

	10 Meters	*15 Meters*	*20 Meters*	*40/80 Meters*
Western & Central Europe & North Africa	07-08 (1) 08-09 (2) 09-11 (4) 11-13 (2) 13-14 (1)	06-07 (1) 07-08 (2) 08-09 (3) 09-12 (4) 12-14 (2) 14-15 (1)	06-07 (3) 07-09 (4) 09-10 (3) 10-12 (2) 12-13 (3) 13-15 (4) 15-16 (3) 16-21 (2) 21-00 (1) 00-02 (2) 02-04 (1) 04-06 (2)	16-17 (1) 17-18 (2) 18-20 (3) 20-01 (4) 01-02 (3) 02-03 (2) 03-04 (1) 19-21 (1)* 21-23 (2)* 23-01 (3)* 01-02 (2)* 02-03 (1)*
Northern Europe & European USSR	07-08 (1) 08-10 (2) 10-12 (1)	07-08 (1) 08-11 (3) 11-12 (2) 12-13 (1)	03-06 (1) 06-07 (2) 07-09 (3) 09-11 (2) 11-13 (3) 13-14 (2) 14-20 (1) 20-22 (2) 22-00 (1)	17-19 (1) 19-02 (2) 02-04 (1) 20-03 (1)*
Eastern Mediterreanean & Middle East	07-08 (1) 08-10 (2) 10-11 (1)	07-08 (1) 08-09 (2) 09-10 (3) 10-11 (4) 11-12 (3) 12-13 (2) 13-14 (1)	06-10 (1) 10-13 (2) 13-14 (3) 14-16 (4) 16-19 (3) 19-21 (2) 21-23 (1) 23-01 (2) 01-03 (1)	18-20 (1) 20-22 (2) 22-00 (3) 00-01 (2) 01-02 (1) 20-00 (1)*
Western Africa	07-10 (1) 10-12 (2) 12-14 (4) 14-15 (3) 15-16 (2) 16-17 (1)	07-10 (1) 10-12 (2) 12-13 (3) 13-16 (4) 16-17 (3) 17-18 (2) 18-19 (1)	04-05 (1) 05-07 (2) 07-13 (1) 13-15 (2) 15-16 (3) 16-18 (4) 18-22 (3) 22-00 (2) 00-02 (1)	18-22 (1) 22-01 (2) 01-03 (1) 00-03 (1)*
Eastern & Central Africa	08-09 (1) 09-11 (2) 11-13 (3) 13-15 (2) 15-16 (1)	07-11 (1) 11-13 (2) 13-14 (3) 14-16 (4) 16-17 (3) 17-18 (2) 18-19 (1)	07-14 (1) 14-16 (2) 16-17 (3) 17-18 (4) 18-21 (3) 21-01 (2) 01-03 (1)	19-22 (1) 22-00 (2) 00-01 (1) 22-00 (1)*
Southern Africa	08-09 (1) 09-10 (2) 10-12 (4) 12-13 (3) 13-14 (2) 14-15 (1)	07-10 (1) 10-12 (2) 12-13 (3) 13-15 (4) 15-16 (3) 16-17 (2) 17-18 (1)	07-13 (1) 13-15 (2) 15-17 (3) 17-19 (4) 19-23 (3) 23-01 (2) 01-02 (1)	18-19 (1) 19-22 (2) 22-23 (1) 19-21 (1)*
Central & South Asia	08-10 (1) 17-19 (1)	07-08 (1) 08-10 (2) 10-11 (1) 17-18 (1) 18-20 (2) 20-21 (1)	06-07 (1) 07-09 (2) 09-12 (1) 18-20 (1) 20-23 (2) 23-02 (1)	18-21 (1) 06-08 (1)
Southeast Asia	09-10 (1) 10-12 (2) 12-13 (1) 17-20 (1)	09-10 (1) 10-12 (2) 12-14 (1) 14-16 (2) 16-18 (1) 18-20 (2) 20-21 (1)	06-07 (1) 07-09 (2) 09-13 (1) 18-23 (1)	18-20 (1) 05-07 (1)
Far East	08-10 (1) 17-18 (1) 18-19 (2) 19-20 (1)	08-10 (1) 17-18 (1) 18-20 (3) 20-21 (1)	16-18 (1) 18-21 (2) 21-23 (3) 23-04 (2) 04-07 (1) 07-09 (2) 09-12 (1)	04-06 (1) 05-07 (1)*

HOW TO USE THE DX PROPAGATION CHARTS

1. Use Chart appropriate to your transmitter location. The Eastern USA Chart can be used in the 1, 2, 3, 4, 8, KP4, KG4 and KV4 areas in the USA and adjacent call areas in Canada; the Central USA Chart in the 5, 9 and 0 areas; the Western USA Chart in the 6 and 7 areas, and with somewhat less accuracy in the KH6 and KL7 areas.

2. The predicted times of openings are found under the appropriate meter band column (10 through 80 Meters) for a particular DX region, as shown in the left hand column of the Charts. An * indicates the best time to listen for meter openings.

3. The *propagation index* is the number that appears in ( ) after the time of each predicted opening. The index indicates the number of *days* during the month on which the opening is expected to take place as follows:

(4) Opening should occur on more than 22 days
(3) Opening should occur between 14 and 22 days
(2) Opening should occur between 7 and 13 days
(1) Opening should occur on less than 7 days

Refer to the "Last Minute Forecast" at the beginning of the Propagation column for the actual *dates* on which an opening with specific propagation index is likely to occur, and the signal quality that can be expected.

4. Time shown in the Charts are in the 24-hour system where 00 is midnight; 12 is noon; 01 is 1 A.M., 13 is 1 P.M., etc. Appropriate *daylight* time is used *not* GMT. To convert to GMT, add to the times shown in the appropriate chart 7 hours in PDT Zone, 6 hours in MDT Zone, 5 hours in CDT Zone, and 4 hours in EDT Zone. For example, 14 hours in Washington, D.C. is 18 GMT. When it is 20 hours in Los Angeles, it is 03 GMT, etc.

5. The charts are based upon a transmitter power of 250 watts c.w. or 1 kw, p.o.p. on sideband, into a dipole antenna a quarter-wavelength above ground on 160 and 80 meters, and a half-wave above ground on 40 and 20 meters, and a wavelength above ground on 15 and 10 meters. For each 10 db gain above these reference levels, the *propagation index* will increase by one level; for each 10db loss, it will lower by one level.

6. Propagation data, contained in the Charts has been prepared from basic data published by the Institute For Telecommunication Sciences of the U.S. Dept. of Commerce, Boulder, Colorado, 80302.

South Pacific & New Zealand	11-13 (1) 13-15 (2) 15-17 (1) 17-19 (2) 19-20 (1)	07-08 (1) 08-10 (2) 10-15 (1) 15-17 (2) 17-19 (3) 19-20 (2) 20-21 (1)	17-19 (1) 19-22 (2) 22-00 (4) 00-02 (3) 02-04 (2) 04-06 (1) 06-07 (2) 07-09 (4) 09-11 (2) 11-13 (1)	00-03 (1) 03-05 (3) 05-07 (2) 07-09 (1) 03-04 (1)* 04-06 (2)* 06-07 (1)*
Austral-asia	08-09 (1) 09-11 (2) 11-12 (1) 14-16 (1) 16-18 (2) 18-19 (1)	08-10 (1) 10-13 (2) 13-15 (1) 15-17 (2) 17-19 (3) 19-20 (2) 20-21 (1)	06-07 (2) 07-10 (3) 10-12 (2) 12-15 (1) 15-17 (2) 17-19 (1) 19-21 (2) 21-23 (3) 23-03 (2) 03-06 (1)	03-05 (1) 05-07 (2) 07-08 (1) 05-07 (1)*
Caribbean, Central America & Northern Countries of South America	07-08 (1) 08-09 (3) 09-11 (4) 11-13 (3) 13-15 (4) 15-16 (3) 16-17 (2) 17-18 (1)	06-07 (1) 07-08 (2) 08-10 (4) 10-14 (3) 14-16 (4) 16-18 (3) 18-19 (2) 19-20 (1)	07-09 (4) 09-11 (3) 11-14 (2) 14-16 (3) 16-21 (4) 21-01 (3) 01-03 (2) 03-05 (1) 05-07 (2)	18-19 (1) 19-21 (3) 21-03 (4) 03-05 (2) 05-06 (1) 19-21 (1)* 21-03 (2)* 03-05 (1)*
Peru, Bolivia, Paraguay, Brazil Chile, Argentina & Uruguay	07-08 (1) 08-13 (2) 13-15 (3) 15-17 (4) 17-18 (2) 18-19 (1)	06-07 (1) 07-08 (2) 08-10 (3) 10-14 (2) 14-17 (3) 17-18 (4) 18-19 (3) 19-20 (2) 20-21 (1)	06-09 (2) 09-11 (1) 14-16 (1) 16-17 (2) 17-19 (3) 19-00 (4) 00-02 (3) 02-04 (2) 04-06 (1)	20-23 (1) 23-04 (2) 04-06 (1) 23-04 (1)*
McMurdo Sound, Antarctica	17-19 (1)	06-09 (1) 15-17 (1) 17-20 (2) 20-21 (1)	16-18 (1) 18-21 (2) 21-02 (3) 02-04 (2) 04-06 (1) 06-08 (2) 08-09 (1)	00-06 (1)

October 15 - December 15, 1978
Time Zones: CST & MST (24 - Hour Time)
CENTRAL USA TO:

	10 Meters	*15 Meters*	*20 Meters*	*40/80 Meters*
Western & Southern Europe & North Africa	07-08 (1) 08-09 (2) 09-11 (3) 11-12 (2) 12-13 (1)	06-07 (1) 07-10 (2) 10-12 (3) 12-13 (2) 13-14 (1)	05-06 (1) 06-08 (3) 08-12 (2) 12-15 (3) 15-19 (2) 19-22 (1) 00-02 (1)	17-18 (1) 18-20 (2) 20-22 (3) 22-00 (2) 00-02 (1) 19-20 (1)* 20-22 (2)* 22-00 (1)*
Northern & Central Europe & European USSR	08-10 (1)	06-07 (1) 07-08 (2) 08-10 (3) 10-11 (2) 11-12 (1)	00-02 (1) 06-07 (1) 07-09 (2) 09-11 (3) 11-12 (2) 12-14 (1) 16-18 (1) 18-20 (2) 20-22 (1)	18-20 (1) 20-23 (2) 23-01 (1) 20-23 (1)*
Eastern Mediter-ranean & Middle East	07-08 (1) 08-10 (2) 10-11 (1)	07-08 (1) 08-09 (2) 09-10 (3) 10-11 (2) 11-12 (1)	06-08 (1) 08-11 (2) 11-13 (3) 13-15 (2) 15-17 (1) 17-19 (2) 19-22 (1) 22-01 (2) 01-03 (1)	17-19 (1) 19-22 (2) 22-23 (1) 20-22 (1)*
Western Africa	07-09 (1) 09-12 (2) 12-14 (4) 14-15 (3) 15-16 (2) 16-17 (1)	06-10 (1) 10-12 (2) 12-14 (3) 14-16 (4) 16-17 (3) 17-18 (2) 18-19 (1)	06-12 (1) 12-14 (2) 14-16 (3) 16-19 (4) 19-22 (3) 22-01 (2) 01-04 (1) 04-06 (2)	17-19 (1) 19-21 (2) 21-22 (1) 19-21 (1)*
Eastern & Central Africa	09-10 (1) 10-12 (2) 12-14 (3) 14-16 (2) 16-17 (1)	08-10 (1) 10-13 (2) 13-16 (3) 16-18 (2) 18-19 (1)	06-14 (1) 14-17 (2) 17-20 (3) 20-21 (2) 21-22 (1)	20-00 (1) 21-23 (1)*
Southern Africa	07-08 (1) 08-10 (2) 10-12 (3) 12-14 (2) 14-15 (1)	06-10 (1) 10-12 (2) 12-13 (3) 13-15 (4) 15-16 (3) 16-17 (2) 17-18 (1)	07-13 (1) 13-15 (2) 15-17 (3) 17-19 (4) 19-21 (3) 21-23 (2) 23-02 (1)	18-19 (1) 19-21 (2) 21-22 (1) 19-21 (1)*
Central & South Asia	07-10 (1) 18-20 (1)	07-08 (1) 08-10 (2) 10-11 (1) 18-19 (1) 19-21 (2) 21-22 (1)	06-07 (1) 07-09 (2) 09-11 (1) 17-18 (1) 18-21 (2) 21-23 (1)	06-08 (1) 18-20 (1)
Southeast Asia	09-10 (1) 10-12 (2) 12-13 (1) 15-16 (1) 16-18 (2) 18-19 (1)	08-09 (1) 09-12 (2) 12-16 (1) 16-18 (2) 18-20 (1)	06-08 (1) 08-11 (2) 11-14 (1) 18-19 (1) 19-21 (2) 21-22 (1)	04-07 (1)
Far East	16-17 (1) 17-19 (2) 19-20 (1)	08-10 (1) 15-16 (1) 16-17 (2) 17-19 (3) 19-20 (2) 20-21 (1)	06-07 (1) 07-08 (2) 08-10 (3) 10-12 (1) 16-18 (1) 18-20 (2) 20-22 (1)	02-03 (1) 03-06 (2) 06-09 (1) 02-04 (1)*
South Pacific & New Zealand	11-13 (1) 13-15 (2) 15-17 (3) 17-18 (2) 18-20 (1)	08-09 (1) 09-10 (2) 10-12 (3) 12-16 (2) 16-17 (3) 17-19 (4) 19-20 (3) 20-21 (2) 21-22 (1)	11-17 (1) 17-18 (2) 18-20 (3) 20-23 (4) 23-02 (3) 02-04 (2) 04-06 (1) 06-07 (2) 07-09 (4) 09-10 (3) 10-11 (2)	23-01 (1) 01-06 (3) 06-07 (2) 07-08 (1) 00-02 (1)* 02-06 (2)* 06-07 (1)*
Austral-asia	08-09 (1) 09-11 (2) 11-15 (1) 15-16 (2) 16-18 (3) 18-19 (2) 19-20 (1)	07-08 (1) 08-09 (2) 09-11 (3) 11-13 (2) 13-15 (1) 15-16 (2) 16-18 (3) 18-19 (2) 19-20 (1)	07-08 (2) 08-10 (3) 10-12 (2) 12-14 (1) 21-23 (1) 23-02 (2) 02-04 (3) 04-05 (2) 05-07 (1)	02-04 (1) 04-07 (2) 07-08 (1) 03-04 (1)* 04-06 (2)* 06-07 (1)*
Caribbean, Central America & Northern Countries of South America	06-07 (1) 07-08 (2) 08-10 (3) 10-15 (4) 15-16 (3) 16-17 (2) 17-18 (1)	05-06 (1) 06-07 (2) 07-14 (3) 14-16 (4) 16-18 (3) 18-19 (2) 19-20 (1)	06-07 (2) 07-09 (4) 09-11 (3) 11-13 (2) 13-15 (3) 15-19 (4) 19-23 (3) 23-02 (2) 02-06 (1)	18-19 (1) 19-21 (2) 21-02 (3) 02-04 (1) 04-05 (2) 05-06 (1) 19-21 (1)* 21-02 (2)* 02-05 (1)*

(Continued on page 94)

CIRCLE 45 ON READER SERVICE CARD

a monthly feature by

A. EDWARD HOPPER, W2GT

Awards

News of certificate and award collecting

The "Story of The Month" for October, as told by Charles, is:

Charles M. Miller, W2QKJ
All Counties #171, 7-26-77

"I was born in Atlantic City, N.J. in 1910. My family consists of my wife Emma, and two sons. Ronald, a Methodist Minister, his wife Barbara and their daughter Kimberley. Russell, a switchman for Ma Bell, his wife Alvina and their son Matthew and daughter Elizabeth. My mother is still living at the age of 88, and I have a sister living in Pennsylvania.

"I became interested in radio when I was about ten years old. My uncle put together broadcast receivers such as Atwater Kent and Freshman kits. I next met W3UT (now second call area) and became very interested in ham radio. I know his parents got tired of looking at me every night.

"My first license was received in 1932 while attending Bliss Electrical School in Washington, D.C.

"The first transmitter I built was a 50 watt tube from a local broadcast station in a TG TP circuit. I powered this with Bell Telephone B batteries to the tune of 1000 volts pure d.c. My first receiver was the famous National SW3.

"My first a.m. phone transmitter on ten meters was a real monster, it took up one quarter of the cellar. Everything was going along fine until people started to buy TV sets. I was threatened every time I went on the air. I was invited to watch football games on TV on Saturdays at various homes to keep me off the air.

"The first time I came across the County Hunters was when I started calling CQ on a quiet frequency, I thought. I was informed that the frequency was the County Hunters Net. I listened and became interested and started collecting Counties on April 22, 1972. My last County was scheduled for me by Bob Dietz, WA2GPT with K4IUO/M on his way home to Florida. Glenn rolled into Scott, Tennessee on schedule at 1659 GMT on July 18, 1977. Reports were exchanged and thus ended five years and three months of chasing Counties.

I retired from the Atlantic City Electric Company on September 1, 1972, where I was supervisor of meters. I am also a stage hand and in the summer, I run a spot light for the Ice Capades and the Miss America Beauty Pagent.

I have also chased DX and have over 303 Countries confirmed. Another one of my prized Awards is my two-way S.S.B. Worked All Zones.

Many thanks for all the wonderful help from all the other County Hunters".

*P.O. Box 73, Rochell Park, NJ 07662

Special Honor Roll
All Counties

#187-George R. Vermilyea, K2PBU 6-6-78
#188-Ralph G. Alley, W9JR 6-20-78
#189-John W. Lord, KØPFV 6-23-78
#190-Robert Ford, WE1RQ 6-26-78

USA-CA Honor Roll

3000		2000		1000	
K2PBU	206	K2PBU	310	WBØMIX	484
W9JR	207	VE1DI	311	SM4BNZ	485
KØPFV	208	VE3IR	312	W9JB	486
K7CLO	209	W9JR	313	KØPFV	487
VE1RQ	210	KØPFV	314	VE1RQ	488
2500		VE1BQ	315	500	
K2PBU	261	W4MNZ	316	W5KNZ	1253
VE1DI	262	1500		WB2RBG	1254
WA6WCG	263	K2PBU	364	JR1JFO	1255
W9JR	264	W9JR	365	G3FXB	1256
KØPFV	265	KØPFV	366	WD9BCG	1257
VE1RQ	266	VE1RQ	367	SM4BNZ	1258
				KØPFV	1259
				VE1RQ	1260
				I8YRK	1261

Awards Issued

George Vermilyea, K2PBU was one of the four to make them All this month. He started back in 1963 but obviously lost interest several times over the years.

Ralph Alley, W9JR (ex W9JQE) made #1 All Counties While Operating Mobile. He also started chasing them back in 1963.

John Lord, KØPFV waited tc apply until he had them All. He was issued USA-CA-500 endorsed All S.S.B., All Mobiles, All 14, All 3.9. USA-CA-1000 and 1500 endorsed All S.S.B., All Mobiles and All 14. USA-CA-2000 and 2500 endorsed All S.S.B., All Mobiles.

Robert Ford, VE1RQ received All Counties, endorsed All S.S.B. and USA-CA-500 through 3000, endorsed All S.S.B., All 14, All Mobiles. This was #5 All Counties issued to Canada and #1 to VE1. The others were VE3CBY, VE7ATI, VE4QZ and VE4EL.

Mike Gilmore, K7CLO added USA-CA-3000 to his collection.

Harvey Epton, VE1DI acquired USA-CA-2000 and 2500 endorsed All S.S.B.

Don Ronk, WA6WCG picked up USA-CA-2500 endorsed All S.S.B., All Mobiles.

Bob Rennie, VE3IR obtained USA-CA-2000.

Ron Toller, W4MNZ claimed USA-CA-2000 endorsed All 2X S.S.B.

Jim Roberts, WBØMIX applied for USA-CA-1000 endorsed All S.S.B.

Rolf Arvidsson, SM4BNZ qualified for USA-CA-1000, as well as USA-CA-500 Mixed USA-CA-500 Certificates went to:

J. E. Rehler, W5KNZ.

Howard Sherer, WB2RBG.

Al Slater, G3FXB who had a most interesting and unusual story on TVI on page 41 of June 1978 *QST* magazine.

Kunihiko Yamamoto, JR1JFO gained USA-CA-500 endorsed All C.W. Pat

Southeastern DX Club Award.

Japanese Canadian Centennial Award.

Creapo, WD9BCG won USA-CA-500 endorsed All C.W. and All States. Gennaro Casaburi, I8YRK sent for USA-CA-500 endorsed All 2X S.S.B.

Awards

Japanese Canadian Centennial Award: 1977 was Centennial Year for Japanese Canadians. To celebrate this event, the Canadian Department of Communications has authorized the use of prefix "CJ" in lieu of VE for Japanese Canadian Amateur Radio Operators and their immediate family. The Japanese Canadian Centennial Society is happy to issue a special certificate for working: 3 (three) CJ Prefix stations for VE/W and 2 (two) Prefix Stations for DX. No QSLs are necessary, but applicant must submit the usual log data. There will be no charge for this Award. All correspondence to be directed to: Richard Matsumoto, CJ3BLU/VE3BLU, 7 Nelson Avenue, Ajax, Ontario, Canada L1S 1Z4.

Southeastern DX Club Award: To further the ideals and purposes of amateur radio, to foster international friendship and good will and in recognization of individual operating skill, this certificate of achievement will be awarded to DX stations who submit evidence of two-way contacts with ten members of the Southeastern DX Club. Contacts may be made on any band and any mode. Applications for the Award must include the date, time, call, band and mode of each contact. It is not necessary to submit QSL cards. Applications must include five (5) IRCs and be submitted to: Matt Blender, W4MGX, 2541 Lakebrook Court, Doraville, Georgia 30360.

ALL Awards Program:

Rules:

1. JARL awards will be issued to any amateur or listener on payment of eight IRCs.
2. Each claim must be accompanied by a list showing the data of the two-way communications achieved for the award concerned.
3. Each list must be accompanied by documentary proof in the form of letters or cards showing that two-way communication has taken place, or by a statement from the applicants national society or from any two amateurs other than the applicant himself, that the necessary cards have been checked (this is popularlily known as GCR - general certification rule).
4. Cards will be returned by registered mail at no additional cost.
5. Contacts with maritime or aeronautical mobile stations will not be accepted.
6. Cards dated on and after July 30, 1952 only, may be submitted as proof of contact.
7. Endorsements will be added upon request for earned operating distinctions as follows: for AJD, SWL-AJD, WAJA, HAJA, JCC, SWL-JCC, WACA, HACA-1.9MHz, 3.5MHz, 7MHz, 14MHz, 21MHz, 28MHz, 50MHz AND c.w., a.m., s.s.b., f.m., SSTV, RTTY and ATV.

For HAC, ADXA, SWL-ADXA endorsements of 1.9 MHz, 3.5MHz, SSTV, RTTY.

8. Contacts may be made from any location in the same call area, or if no call area exists, then from the same country.
9. Contacts with KA stations will not be accepted. They are considered military, not amateur and in the past they have had their own Awards program.
10. All correspondence should be sent to Awards Manager, Japan Amateur Radio League, P. O. Box 377, Tokyo Central, Japan.

All Japan Districts (AJD): This award may be claimed by any amateur (or listener) who can produce evidence of having made two-way communications with amateur stations in all ten (1 through Ø) Japanese call districts.

Worked All Japan (WAJA):

Heard All Japan (HAJA): This award may be claimed by any amateur (or listener) who can produce evidence of having made two-way communications

"Ad", CT1RM, showing a few of his nice Awards and equipment.

with amateur stations located in all forty-seven Japanese prefectures.

Japan Century Cities (JCC): This award may be claimed by any amateur (or listener) who can produce evidence of having made two-way communications with amateur stations located in at least one hundred Japanese cities. JCC-100, 200, 300, 400, 500, 600 will be issued as separate awards.

Heard All Continents (HAC): This award may be claimed by any listener who can produce evidence of having heard signals from amateur stations in all six continents.

Asian DX Award (ADXA): This award may be claimed by any amateur (or listener) who can produce evidence of having two-way communications with amateur stations located in at least thirty Asian countries (according to DXCC rules) including Japan.

Worked All Cities Award (WACA):

Heard All Cities Award (HACA): This award may be claimed by any amateur (or listener) who can produce evidence of having made two-way communications with amateur stations located in all existing Japanese cities.

Chas Miller, W2QKJ, the man we would like to trade places with during the Miss America Beauty Contest:

Note: Cities list together with countries list available for three IRCs. (Thanks to JH4HYW and Bill, W6DDB for the latest data on the JA AWARDS).

Notes

As this is being written, many of you are enjoying the 10th Annual County Hunters Convention in the Holiday Inn in Bridgeton, MO. I am sure that Art, WØBK and Jim, WØFF saw that you all enjoyed yourselves. I'll be happy to use any data on the event, if I receive it and some photographs. (I am sure you all missed Jack, WØSJE but I'm sure he will be looking forward to next year).

Final Results of the 1978 MARAC Counters S.S.B. Contest. (Courtesy WØQWS)

Fixed Station Scores

*N7TT/2	1,898,642	+K9BG	168,041
+N7SU	986,206	+K9GTQ	135,080
+W7JYW	451,875	+WB4ERM	127,200
+W9WT	394,350	VE1RQ	110,464
+WA5DXI	385,382	WD4FGW	96,750
+WA9MSW	332,450	WA9BTY	87,230
+WB4UPW	283,024	VE3BMR	73,260
+WBØJUS	171,120	WA5IPS	59,204

(Continued on page 93)

Hosts for the Mini Oct. 13,14, 15 1978 at Holiday Inn, Wausau, Wisc. K9GTQ L to R,Jolene, Tom, K9GTQ, Wife, Kristi and Ruth in front.

No 87-88

a monthly feature by

FRANK ANZALONE, W1WY

Contest Calendar

News/views of on-the-air competition

Rules for this year's CQ World Wide DX Contest will be found on page 41 of this issue.

As stated in last month's column the rules are the same as last year, with the addition of a QRPp category, and eight new Trophies.

In the Phone Contest the following trophies will be donated: USA, 3.8 MHz. donated by Arnold Tamchin, W2HCW, Oceania, 21 MHz. donated by Lee Wical, KH6BZF, South America, all band donated by Adrian Weiss, K8EEG/0.

In the CW section the following trophies will be donated: Oceania, 21 MHz. donated by the Pacific Radio Amateur Transmitting Society, South America, all band donated by Rafael Ponce de Leon, CX3BR, World QRPp donated by Gene Walsh, N2AA.

Johnny Knight, W6YY is donating a Trophy in a new category, highest single operator combined phone/c.w. world score. His vacated multi-single phone award has been picked up by Don Wallace, W6AM. And in turn Jim Neiger, N6TJ will sponsor the Carib./C.A. phone and c.w. awards formally donated by W6AM.

That now makes a total of 48 Trophies awarded in our World Wide Contest. Keeping in mind that the same award may not be won by the same station within a three year period, therefore giving the "runner-ups" a crack at it the following year.

If you have not already read the Phone Results in the August issue I would strongly recommend that you closely review the paragraph on duplicate contacts. By closely observing the recommended procedure you will not only make life easier for the log checkers but it can make the difference between winning or losing the contest.

As we have always emphasized, it is your responsibility to check your log for duplicate contacts. This does not mean that you should recopy your log. The original copy with duplicates crossed out and no credit taken, and a cross-check sheet should accompany your entry.

As Larry, N6AR indicated, if we have to do all the work of duping your log you just might end up in the disqualified column.

That was a nice job of reporting the Phone results fellows. It was nice to see that I made "honorable mention."

73 for this time, Frank, W1WY

*14 Sherwood Rd., Stamford, CT 06905

Calendar of Events

Oct.	7-8	California QSO Party
Oct.	7-9	ARCI QRP QSO Party
Oct.	7-8	VK/ZL/Oceania RTTY
Oct.	7-8	VK/ZL/Oceania Phone
Oct.	14-15	VK/ZL/Oceania C.W.
Oct.	11-12	YLRL Anniv. C.W. Party
Oct.	14-15	NINE Land QSO Party
Oct.	15	RSGB 21/28 MHz. Phone
Oct.	14-16	Manitoba QSO Party
+Oct.	21-22	WADM Contest
Oct.	21-22	Boy Scouts Jamobree
+Oct.	21-22	RSGB 7 MHz. Phone
Oct.	**28-29**	**CQ WW DX Phone Contest**
Nov.	1-2	YLRL Anniv. Phone Party
Nov.	3-6	CHC/FHC/HTH Party
Nov.	4-5	RSGB 7 MHz. CW Contest
Nov.	4-5	ARRL C.W. Sweepstakes
Nov.	11-12	Int. Police Assoc. Party
Nov.	**12**	**Czechoslovakian Contest**
Nov.	18-19	ARRL Phone Sweepstakes
Nov.	**25-26**	**CQ WW DX C.W. Contest**
Dec.	2-3	Telco. Pioneers QSO Party

+Not officially announced.

California QSO Party

Starts: 1800 GMT Sat. October 7
Ends: 2400 GMT Sun. October 8

This year's party is again sponsored by the Northern California Contest Club.

Operating time is limited to 24 out of the 30 hour contest period for single operator stations, the full 30 hours for multi-operator. Off time must be at least 15 minutes and shown on log.

The same station may be worked once per band and mode, portables and mobiles each county change. Cal. stations may work each other for QSO points but only one multiplier. DX stations for QSO points only, v.h.f. on simplex only.

Exchange: QSO no. and QTH. County for Cal., state, province or country for others.

Scoring: Two points per QSO. The multiplier for Cal. is the number of different states and VE call areas worked. (max. of 8 VE) Others use Cal. counties for their multiplier. (max. of 58)

Frequencies: c.w.—1805, 3560, 7060, 14060, 21060, 28060. s.s.b.—1815, 3895, 7230, 14280, 21355, 28560. Try 10 on the hour, 15 on the half hour between 1800 and 2200 GMT.

Awards: Certificates to the top scorers in each Cal. county, state, VE province and country, 2nd and 3rd place awards if justified. Also to the top scoring mobile, portable, multi-operator, and club with the highest aggregate score. (min. of 20 QSOs for mobiles)

Indicate each new multiplier on log as worked. Include a summary sheet showing the scoring, type of entry and etc. A large s.a.s.e. will get you a copy of the results.

Mailing deadline is October 31st. This year they go to: Northern California Contest Club, c/o George Varvitsiotes, WB6DSV, 801 Inverness Way, Sunnyvale, CA 94087

ARCI QRP Contest

Starts: 2000 GMT Sat. October 7
Ends: 0200 GMT Sun. October 9

This is the Fall edition of the Amateur Radio Club International QRP contest. It's open to all, both members and non-members. Stations may be worked once per band for QSO and multiplier credit.

Exchange: RS(T) and state, province or country. Members will include their QRP number, non-members their power input.

Scoring: Contacts with a member counts 3 points, with a non-member 2 points. Stations other than W or VE 4 points.

Multiplier: One for each state, province and country worked on each band.

There is also a power multiplier.

Over 100 watts input	×1.
25 to 100 watts input	×1.5
5 to 25 watts input	×2.
1 to 5 watts input	×3.
Less than 1 watt input	×5.

Final Score: QSO points from all bands × states, provinces and coun-

tries worked on each band × your power multiplier.

Frequencies: C.W.—1810, 3560, 7060, 14060, 21060, 28060, 50360. S.S.B.—1810, 3985, 7285, 14285, 21385, 28885, 50385. Novice—3710, 7110, 21110, 28110.

Awards: Certificates to the highest scoring station in each state, province and country. Additional awards depending on activity. And a certificate to the station showing three "skip" contacts using the lowest power.

Include a summary sheet with your entry showing the scoring, equipment and power used, and a signed declaration. Also include a large s.a.s.e. if results are desired.

Logs must be received by October 31st and go to: E. V. "Sandy" Blaize, N5BE, 417 Ridgewood Drive, Metairie, LA 70001

VK/ZL/Oceania RTTY Contest

Starts: 1000 GMT Sat. October 7
Ends: 1000 GMT Sun. October 8

This is a new one run during the same time period as the phone contest, but with different rules as given below.

There are three operating classes. Single operator, multi-operator and s.w.l.

Exchange: RST, Zone number (CQ) and time in GMT.

Scoring: QSO points as per CARTG zone chart, multiplied by number of countries worked, and multiplied again by continents worked. (max. of 6) Stations other than VK/ZL can add an additional 100 points to above score for each VK/ZL station worked.

The same station may be worked on each band for QSO points and multiplier credit.

The ARRL country list and each call area in VK/ZL, Japan and the USA determine the multiplier. (Own country cannot be counted)

Awards: Attractive coloured certificates to the 1st, 2nd and 3rd places on a world basis and in each "country multiplier" as shown above.

S.w.l.s must show both number sent and received by the logged station.

Logs are set-up in the same order as shown in the phone/c.w. contest.

Entries must be received by the RTTY Committee by January 1st and go to: S. E. Molen, VK2SG, 13 Pendle Way, Pendle Hill, Sydney, N.S.W., Australia 2145

VK/ZL/Oceania DX Contest

Phone: Oct. 7 - 8 C.W.: Oct. 14 - 15
Starts: 1000 GMT Saturday
Ends: 1000 GMT Sunday

Stations in the rest of the world will be concentrating on working stations in Oceania, with the emphasis on VK/ZL for their multiplier.

Following rules apply to stations other than VK/ZL.

Exchange: RS(T) plus a progressive QSO number starting with 001.

Scoring: *For Oceania:* 2 points for VK/ZL contacts, 1 point with rest of world.

Outside Oceania: 2 points for VK/ZL contacts, 1 point for other Oceania contacts.

Final Score: Total QSO points from all bands multiplied by the sum of VK/ZL call areas worked on each band. (Single band logs also accepted.)

Awards: Attractive coloured certificates to the top all band scorers, both phone and c.w., in each country and call areas of Japan, USA and the USSR. Single band awards if returns warrant.

Logs: Date/time in GMT, station worked, number sent/rec'd, band, QSO points. Underline each new VK/ZL call area worked on each band. Use a separate sheet for each band. Include a summary sheet showing the scoring, name and address in BLOCK LETTERS, and a signed declaration that all rules and regulations have been observed.

There is also a s.w.l. section. Only VK/ZL stations are to be logged. Include call of station being worked and serial number sent. Scoring same as above. Phone and c.w. scores are combined.

Logs must be in the hands of the Committee no later than January 31, 1979. This year they go to: NZART Contest Manager ZL2GX, 152 Lytton Road, Gisborne, New Zealand.

YLRL Anniversary Party

C.W.: Oct. 11 -12 Phone: Nov. 1 - 2
C.W.: 1800 to 1800 GMT Wed./Thurs.
Phone: 1800 to 1800 GMT Wed./Thurs.

This is strictly a YL only affair, open to YL's around the world. It's the 39th annual party run by the YL Radio League.

All bands may be used. Phone and c.w. are separate contests and require separate logs.

Exchange: QSO no., RS(T) and ARRL section, country for DX stations.

Scoring: One point per QSO between stations within a ARRL section, and between DX stations. Two points if it's between DX and ARRL section stations. The same station may be worked once only regardless of the band.

Multiplier: Is derived from the number of ARRL sections and DX countries worked. There is also a low power multiplier of 1.25 if power input is 150 watts or less on c.w., 300 watts p.e.p. if on s.s.b.

Final Score: Total QSO points, times ARRL sections and countries worked, times the power multiplier if any.

Awards: 1st, 2nd and 3rd place certificates to winners in each call district and DX country. And two gold cups, phone and c.w., to the top YLRL member in the world. There are also three special plaques for YLRL members. The Corcoran for the highest combined phone/c.w. score in a ARRL area, the Hager for the highest combined score for North and Central America and Caribbean areas, and one for rest of the world.

Logs must be received before December 18th and go to: Phyllis Shanks, W2GLB, 3 Honey Lane West, Miller Place, N.Y. 11764

NINE Land QSO Party

Starts: 1800 GMT Sat. October 14
Ends: 2359 GMT Sun. October 15

This is a new one organized by the Ill Wind Contesters of Indiana.

Operating time is limited to 24 out of the 30 hour contest period. The same station may be worked once per band and mode, mobiles and portables each county change.

Exchange: RS(T) and QTH. County and state for NINE stations, state, province or country for others.

Scoring: Each QSO is worth 2 points. NINE Land Stations multiply total QSO points by the states + provinces + DX countries + NINE Land counties worked for their final score. Others multiply total QSO points by NINE Land counties worked. (Max. of 266 possible)

Frequencies: c.w.—1805, 3560, 7060, 14060, 21060, 28060. s.s.b.—1815, 3895, 7230, 14280, 21355, 28600. Novice—3725, 7125, 21125, 28125. Also v.h.f. simplex.

Awards: Certificates to top score in each NINE Land county, state, province and DX country, 2nd and 3rd place awards if justified. Also top mobile, portable, multi-operator, novice and club.

Indicate each new multiplier as worked, and include a summary sheet and s.a.s.e. with your entry to: Ill Wind Contesters, c/o John W. Sikora, WB9IWN, 8155 Woodlawn Street, Munster, Ind. 46321

RSGB 21/28 MHz. SSB Contest

0700 to 1900 GMT Sun. October 15

It's the world working the British Isles on 21 and 28 MHz. in this one. There are 7 country prefixes, G, GD, GI, GJ, GM, GU, GW. (A total of 42 when the numerical is included, G2, GD3, GI4 and etc.)

The same station may be worked once on each band for QSO and multiplier credit. Entries are limited to single operator only. Use a separate log sheet for each band.

Exchange: The RS report plus a progressive contact number starting with 001.

Scoring: Each contact with a British Isle station is worth 3 points. Multiply total QSO points from each band by the sum of prefixes worked on each band. (a maximum of 42 possible on each band. The GB prefix does not count.)

There is also a s.w.l. section. Only British Isles stations are to be logged. Scoring is the same as indicated above.

Awards: There are two Trophies for the British. Overseas will settle for 1st, 2nd and 3rd place certificates for world winners.

Logs must be received no later than December 4th. This year they go to: P. A. Miles, G3KDB, 28 Scotch Orchard, Lichfield, Staff. WS13 6DE England.

Manitoba QSO Party

Starts: 2200 GMT Sat., October 14
Ends: 0200 GMT Mon., October 15

This is the 5th QSO party sponsored by the Amateur Radio Clubs of Manitoba. The same station may be worked on each band and mode, and VE4 to VE4 contacts are permitted as are 2 meter simplex. You may also work VE4 mobiles and portables each time they change municipalities.

Exchange: RS(T), name and QTH. Municipalities for VE4; state, province or country for others.

Scoring: VE4's multiply total QSOs by number of U.S. states, VE provinces and DX countries worked, and times the number of bands used.

All others multiply total QSOs by the number of Manitoba municipalities, local districts, provincial parks and forest reserves worked, (maximum of 134) and times the number of bands used.

There is a separate complicated scoring system for VE4 mobiles and portables. Since it only applies to VE4's it will not be given here.

Frequencies: C.W.—3705, 7105, 14060, 21105, 28105. S.S.B.—1810, 3770, 3895, 7190, 7230, 14190, 14290, 21245, 21395, 28590.

Awards: Certificates to the top scorers in each province, state and DX country. Plaques to the top scoring VE4 and out of province station. Additional awards if warranted.

Mailing deadline for your log and a signed declaration is November 13th and go to: Doug Bowles, VE4QZ, 1104 First Street, Brandon, Manitoba, Canada R7A 2Y4

WADM Contest

Starts: 1500 GMT Sat. October 21
Ends: 1500 GMT Sun. October 22

No official word from the GDR but their contest has always been held on the third full week-end in October.

Following rules were used last year and as far as we know it's still a c.w. only contest.

All bands 3.5 thru 28 MHz. but 20 kHz. in from low end of each band. The same station may be worked on each band for QSO and multiplier credit.

There are three classes, single operator, multi-operator (max. of 3 operators) and s.w.l.

Exchange: Signal report plus a 3 figure QSO number starting with 001. The DM stations will send a signal report plus 2 figures denoting their district. (Kreiskenner)

Scoring: Three points for each DM contact. Multiply total by sum of DM districts worked on each band. A district is identified by the last letter in the call, not by the number in the prefix, A thru O, a maximum of 16 on each band. The extra district may be substituted by working a DM7, DM8 or DM0.

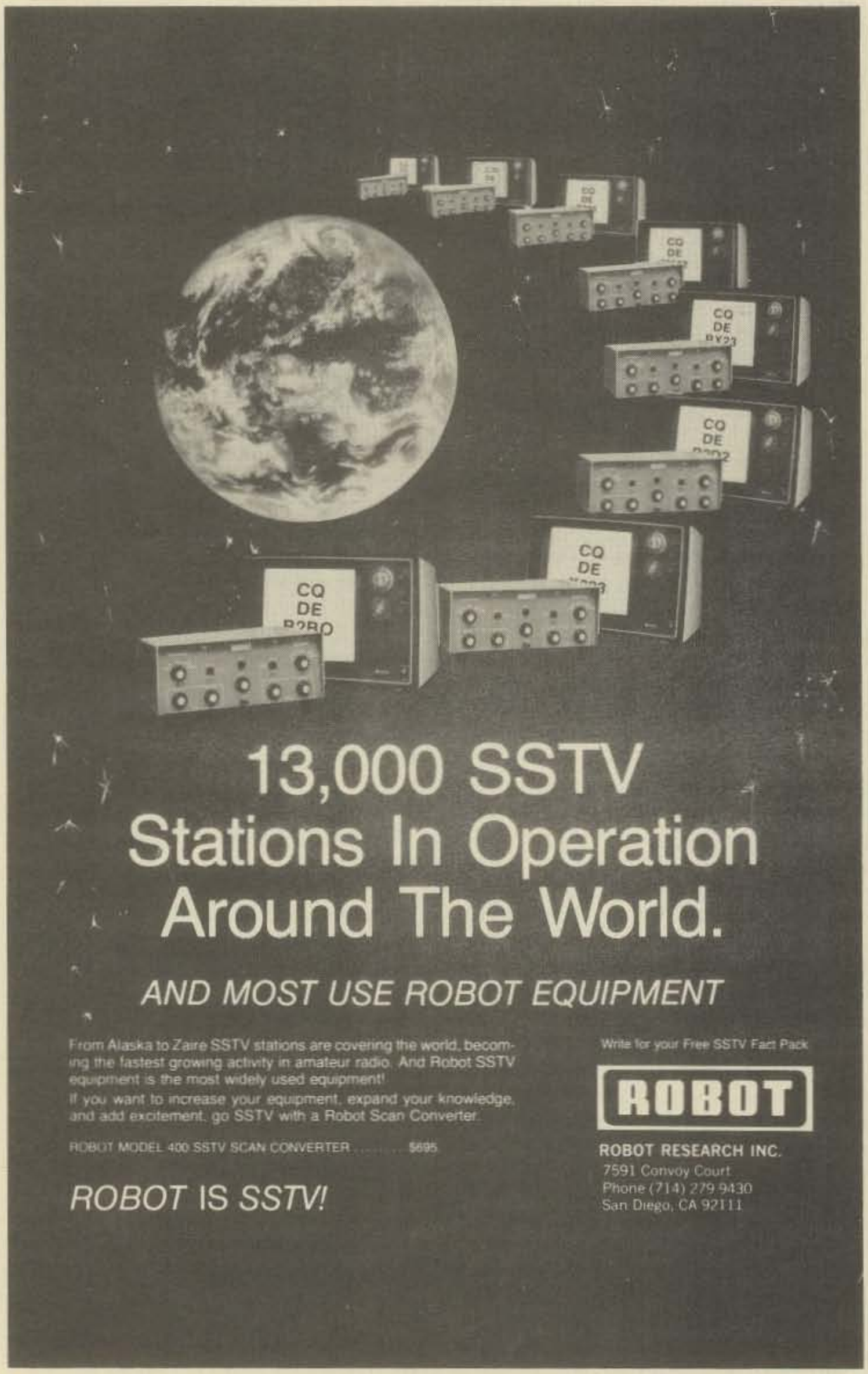
Awards: Certificates to the top three scores in each country, additional awards if returns warrant.

Use a separate log sheet for each band and a summary sheet showing the scoring, name and address and the usual information.

Entries must be postmarked no later than 30 days after the contest. They go to: The Radio Club of the DDR, Att: Contest Manager, DM2ATL, P.O. Box 30, DDR 1055 Berlin, German Democratic Republic.

Scouts Jamboree-on-the-Air

Starts: 0001 Saturday, October 21



CIRCLE 41 ON READER SERVICE CARD

Ends: 2359 Sunday, October 22
(Suggested Local Times)

This is the 21st annual worldwide Jamboree in which Scout Amateurs promote worldwide friendship on the air. It is also a fine opportunity to introduce amateur radio to newcomers. Individual amateurs and radio clubs are encouraged to invite scouting groups to their shacks to QSO other Scouts. Amateurs who are interested should inform their local scout council concerning their availability for the JOTA.

Frequencies: Phone—3940, 7090, 7290, 14290, 21360, 28990. C.W.—3590, 7030, 14070, 21140, 28190. Also 6 meters and SSTV frequencies. (Above are suggested calling frequencies.) Listen especially for K2BSA, the National Headquarters station.

Logging Info.: List all stations worked or heard in JOTA activity. Indicate time in GMT and if other station is a Scout, Scouter or has been either one. Also list how many Scouts or Scouters were present. Tally up the number of JOTA contacts, stations with Scouts or Scouter operators, and number who participated from your station.

Awards: The JOTA Certificate will be awarded to all Participants, amateur Scout Groups and s.w.l.s who submit a report.

Logs and reports for the JOTA and QSLs for K2BSA go to your National Coordinator, In the USA it is Harry Harchar (W2GND) c/o K2BSA, Boy Scouts of America, New Brunswick, N.J. 08902

RSGB 7MHz. Contest

Phone: Oct. 21 - 22 C.W.: Nov. 4-5
Starts: 1200 GMT Saturday
Ends: 1200 GMT Sunday

Like the 21/28 MHz. phone contest this one also is for exchange between the British Isles and the rest of the world. However a different scoring format is used. Only single operator entries are eligible. Phone and c.w. are separate contests.

Exchange: RS(T) report plus a progressive contact number starting with 001.

Scoring: Stations in Europe score 5 points for each QSO with a British Isle station, those outside of Europe score 15 points. In addition, all may claim a bonus of 20 points for each different British Isle country prefix worked. (G2, GC3, GD4, GW4 and etc. a max. of 42 possible. No credit for GB prefix.) There is no multiplier, just add your QSO and bonus points for your score.

There is a s.w.l. section with scoring same as above except that the prefix bonus is 50 points. Overseas listeners to log British Isle stations only.

Appropriate awards will be made.

Since we have not received an official announcement I will have to go along with last year's information.

The phone entries must be received no later than December 22nd, the c.w. January 2nd. Try the RSGB HF Contest Committee, c/o D. Thom, G3NKS, 37 Whittington Road, Glos, GL51 6DB, England

Awards *(from page 89)*

W3ARK	48,925	WA6PXH	15,244
VE3RN	47,385	N5QQ	9,676
WØUM	44,446	K5JZN/3	8,400
W4KMS	38,881	K4ZT	4,640
K9DZG	32,208	WB8MDG	4,257
WAØBMO	23,400	VE3IR	3,900
WA2QZA	20,256	W2PYZ	3,375

Mobile Station Scores

*WAØRJJ	849,176	+WAØYJL	108,186
*K3KX	457,306	+N5BO	43,670
+N4UF	273,819	+W1EXZ	32,844
+W5VQR	216,410	+K9DZG	10,560
+WB5BBS	191,290	+WB8MDG	144
+WØBK	150,600		
WØQWS (Check log)			7,655

DX Station Scores

*CT1BY	19,740	CT1UA	160
+OK1DKS	2,100		

*Plaque awardees
+Certificate awardees.

Despite solar Flares, CD Party Contest and many other hardships, the showing was good. THANKS to John, WØQWS.

Again thanks for all your kind notes, help, etc., and please remember to continue to tell me, How was your month?

73, Ed., W2GT.

DX *(from page 81)*

de Buzz, N5UR—"Will definitely be in the Caribbean for the c.w. weekend, probably with K5PP at either ZF2BJ, VP1UR or something equally interesting."

de Clarke, K1JX—"If job responsibilities don't go awry, I will be at Curacao again this year during the c.w. weekend using the call PJ9CG. I hope there won't be a repeat of my 1977 airline malfunction which put me on the island only hours before the contest, with no sleep and lots of work to do."

de Jim, W8VW/W9VNE—"I am planning a repeat as ZF2AW. Last year we scored 3.1 million points in the c.w. section, but with improving propagation we hope to top that this year."

Again, the above plans were announced July 5. We hope no drastic changes have ensued in the interim.

QSL Information

A35AF—Via R.C. Crawley, WA4NRE, Box 1895, Knoxville, TN 37901
A4XGB—To G4CTQ, 77 Chaucer Drive, Lincoln, England
A6XB—c/o Vern Dameron, Jr., K1DRN, 265 Davis Rd., Bedford, MA 01730
C31MO—Via P.O. Box 53, La Vella, Andorra
CL2XIF—To CM/CO Bureau, P.O. Box 1, Havana, Cuba
DA1BD—c/o Bernie Welch, W8IMZ, 7735 Redbank Lane, Dayton, OH 45424

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- 8047; Message Memory-On-A-Chip IC 39.95
- 8047-1; IC, PCB, RAM, Sockets, Manual . . . 69.95
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- IK-440A; Instructokeyer* (Mar '78 QST) 224.95
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EP2NC—c/o G. De Gasperin, I2YDX, Via Piave 7, I-21040 Caronno Varesino, Italy
FM7AV—Via W1JZ/W1JFL, 79 Plymouth Rd., Bellingham, MA 02019
H5RAC—To J.M. Levine, WA4HNL, 1340 Nerine Circle, Dunwoody, GA 30338
HZ1TA—U.S. amateurs QSL c/o H.E. Heiler, W4UL, 817 Floridatown Rd., Milton, FL 32570
J3AAE—Via M.S. Badolato, Jr., W5MYA, 2 Country Pl., Bedford, TX 76021
JX3P—To LA5NM
KØAX/DU—c/o WA4OSU
KV4KC—To W4KA, Leo Haijsman, 1044 Southeast 43rd St., Cape Coral, FL 33904
OA4ARB—Via J. V. Wetsel, WB5JJD, 2003 Menefee, Arlington, TX 76010
P29NRP—To L. H. Poynter, VK3ZGP, 14 Esther Ct., Fawkner, Victoria 3060, Australia
S79MC—c/o N4NW/WB4OXD, T. L. Gregory, 1252B, Norview Ave., Norfolk, VA 23513
STØRK—Via DL7FT
SV1JG (Crete)—To P.O. Box 564, Athens, Greece
TF6M—c/o TF3CW, P.O. Box 1058, Reykjavik, Iceland
TJ2P—Via G. M. Rose, G4EDH, 4 Conan Drive, Richmond, N. Yorkshire, England
VK9YS & VK9YL—W/K & VE QSL to K4UTE, others QSL to F6CYL
VK9ZM—c/o J. H. Wilson, VK4ABW, 30 Goodfellow Rd., Kallangur, Queensland 4503, Australia
VP1KT—Via P.O. Box 312, Belize City, Belize
VP2EET—To KV4KV, Box 10245, St. Thomas, V.I. 00801
VP2EFZ—c/o H. L. Schoenbohm, KV4FZ, Box 2570, Christiansted, St. Croix, V.I. 00820
VP2MAS (May 11-20, 1978)—Via Larry Koon, WA4AVJ, 915 65th Ave., West, Bradenton, FL 33507
VP5AH—To WA4DRU
VP8JE—c/o Adrian Newman, P.O. Box 174, Port Stanley, Falkland Islands
VP9IR—Via Ron Roden, P.O. Box 151, Hamilton 5, Bermuda
VR4CT—To P.O. Box 59, Honiara, Guadalcanal, Solomon Islands
WB2CHO/VP5—c/o C.J. Harris, WA1SQB, 32 Walker Lane, Bloomfield, CT 06002
WB6MID/8R3—Via A. A. Touchette, P.O. Box 893, Georgetown, Guyana
WDØEHG/HC1—To R. L. Coverston, WDØEHG, Box 82808, Lincoln, NB 68501
YB7ACZ—c/o Box 92, Queen Street Post Office, Singapore 7, Singapore
ZF1KL—Via G. Sawyer, WA6AYA, Box 567, Hemet, CA 92343
ZF2AF—To D. L. Fayman, WØGI, Box 3406, Lawrence, KS 66044
ZK2TT—c/o 4Z4TT, Box 22572, Tel Aviv, Israel
ZL4LR/A—Via N4NX
4DØDU—To PARA QSL Bureau, P.O. Box 4083, Manila, Philippines
4S7EA—c/o WB9OQU
4Z4GH—Via C. C. Aberly, Sr., K5JBC, 105 Cherry Laurel Dr., Covington, LA 70433
5W1BL—To G. B. Oates, K7BFI, 5245 Queenswood Dr., Salt Lake City, Utah 84118
5Z4QS—c/o P.O. Box 44600, Nairobi, Kenya
9H3AM—Via D. Buckley, G3VLX, 16 Wood Ride, Petts Wood, Orpington, Kent, England
9J2LL—To Z. Bettini, I2SB, Via L. Borri 129, I-21100 Varese, Italy
9V1TE—c/o Dean Lewis, WAØTKJ, 609 Otto, Salina, KS 67401

73, John, K4IIF

Novice *(from page 77)*

effective overall ground by connecting to several somewhat poor ground points.

Next month's Novice column will complete this three part article on grounds. It is hoped that readers will bring this information to the attention of newer amateurs who can benefit by reading this article.

I have worked the following stations recently on the Novice bands:

WB1GDY Kurt @ Westford, Mass., WA2GPY Harv @ Englewood, N.J.,

WB3AVV Karl @ Washington, D.C., WD4 Susan @ Clanton, Ala.,

WD5HQQ Lee @ Lutcher, La., KA6AWW Jon @ San Jose, Calif.,

WB7EUF Dave @ Magna, Utah, WD8NVV Pat @ Clare, Mich.,

WD9DUO Bob @ Park Ridge, Ill., WB0WIL Scott @ Jackson, Mo.

Novices are urged to submit good black-and-white pictures of themselves at their operating positions. If your photograph is printed in a future Novice column, you will receive a one year subscription (or renewal) to CQ. A brief description of operating activities and some personal background information are needed with your picture.

73 W6DDB

Dateline *(from page 73)*

closing the possibility of adjacent Amateur and Mobile (i.e., CB) allocations.

Amateur service recognized by CCIR

Mr. Herb Blaker (K4KDY), Chairman of U.S. CCIR Study Group 8, announced, on July 14, 1978, that the "Amateur service" has been added to the Terms of Reference for Study Group 8 (National and International). Heretofore, only the Amateur (Satellite) service was represented in the CCIR. In addition, the CCIR, at its Plenary in Kyoto, Japan, in June, 1978, adopted a Study Program for the Amateur service which addresses preferred frequency bands for the service.

The CCIR is an arm of the International Telecommunication Union (ITU) which advises the ITU on technical matters. Recognition of the Amateur service within the CCIR at this critical period prior to the World Administrative Radio Conference significantly enhances the position of the service in the international telecommunication community.

Zero Bias *(from page 5)*

but the temptation exists to serve two masters. If the mysterious writer's information is correct and current then it is possible for certain individuals within the FCC not to want to hurt their financial picture. Of course this is just conjecture on my part based on uncorroborated information. However, I would *rather* believe that several people have definite reasons, financial or insidious, that satisfy some personal needs for opposing this long awaited legislation than to think that no one in 32 years could make up their minds as to the importance of RFI.

If the present Commission cannot see the need for immediate action on the part of industry, and Commissions in the past also looked past the problem, then perhaps it *is* time for a new agency which *will* take its job seriously.

73, Alan, K2EEK

Propagation *(from page 85)*

Peru, Bolivia, Paraguay, Brazil, Chile, Argentina & Uruguay	06-08 (1) 08-12 (2) 12-14 (3) 14-16 (4) 16-17 (3) 17-18 (2) 18-19 (1)	06-07 (1) 07-09 (2) 09-12 (1) 12-14 (2) 14-15 (3) 15-19 (4) 19-20 (3) 20-22 (2) 22-23 (1)	02-06 (1) 06-08 (2) 08-14 (1) 14-16 (2) 16-17 (3) 17-22 (4) 22-00 (3) 00-02 (2)	19-21 (1) 21-01 (2) 01-03 (1) 03-04 (2) 04-05 (1) 21-04 (1)*
McMurdo Sound, Antarctica	07-09 (1) 16-19 (1)	07-10 (1) 15-17 (1) 17-19 (2) 19-20 (1)	06-08 (2) 08-10 (1) 16-18 (1) 18-20 (2) 20-02 (3) 02-04 (2) 04-06 (1)	23-05 (1)

October 15 - December 15, 1978
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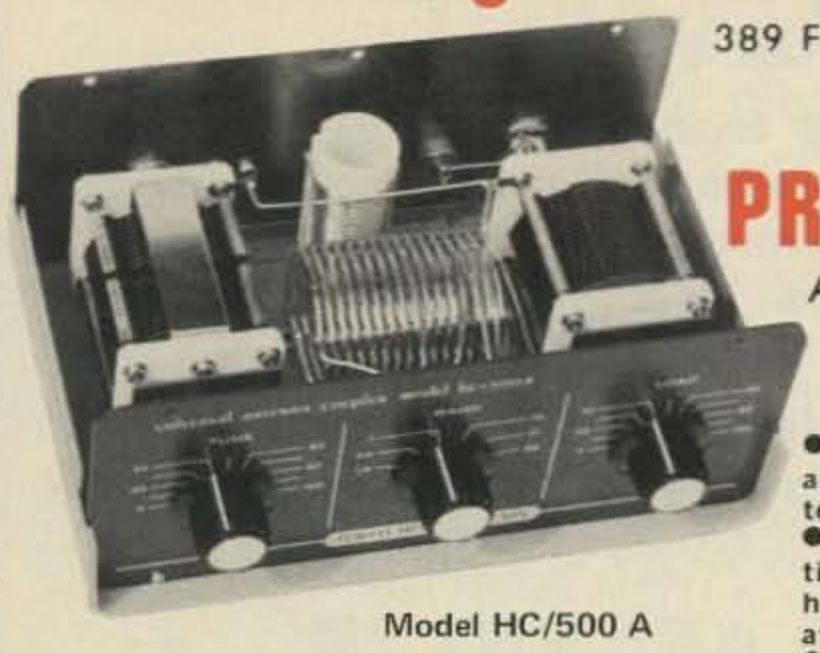

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Input Impedance	50-75	50-75	50-75	50-75
Output Impedance	10-600	10-250	10-600	10-600
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CIRCLE 47 ON READER SERVICE CARD

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Eastern Mediterranean & Middle East	07-10 (1)	07-08 (1) 08-10 (2) 10-11 (1)	06-07 (1) 07-10 (2) 10-14 (1) 14-16 (2) 16-18 (1) 18-20 (2) 20-22 (1) 00-02 (1)	18-22 (1) 06-08 (1)
Western Africa	07-09 (1) 09-11 (2) 11-14 (3) 14-16 (2) 16-17 (1)	06-10 (1) 10-12 (2) 12-14 (3) 14-16 (4) 16-17 (2) 17-19 (1)	06-10 (1) 10-14 (2) 14-16 (3) 16-18 (4) 18-20 (3) 20-22 (2) 22-00 (1)	18-23 (1)
Southern Africa	08-09 (1) 09-10 (2) 10-11 (3) 11-12 (2) 12-13 (1)	06-10 (1) 10-11 (2) 11-12 (3) 12-14 (4) 14-15 (2) 15-17 (1)	06-12 (1) 12-14 (2) 14-15 (3) 15-17 (4) 17-20 (3) 20-21 (2) 21-22 (1) 00-02 (1)	18-19 (1) 19-20 (2) 20-21 (1) 06-08 (1) 18-19 (1)*
Eastern & Central Africa	08-12 (1) 12-14 (2) 14-15 (3) 15-16 (2) 16-17 (1)	08-12 (1) 12-16 (2) 16-17 (3) 17-18 (2) 18-19 (1)	08-13 (1) 13-15 (2) 15-18 (3) 18-19 (2) 19-20 (1)	18-21 (1) 06-08 (1)
Central & South Asia	17-18 (1) 18-19 (2) 19-20 (1) 06-09 (1)	16-17 (1) 17-19 (2) 19-21 (1) 06-09 (1)	06-07 (1) 07-09 (2) 09-11 (1) 16-18 (1) 18-20 (2) 20-22 (1)	04-09 (1) 17-19 (1)
Southeast Asia	09-11 (1) 14-15 (1) 15-16 (2) 16-17 (3) 17-18 (2) 18-19 (1)	08-09 (1) 09-11 (3) 11-12 (2) 12-15 (1) 15-18 (2) 18-20 (1)	06-07 (1) 07-08 (2) 08-09 (3) 09-11 (2) 11-12 (1) 17-19 (1) 19-20 (2) 20-21 (1)	02-03 (1) 03-05 (2) 05-08 (1) 03-05 (1)*
Far East	13-14 (1) 14-15 (1) 15-17 (3) 17-18 (2) 18-19 (1)	11-13 (1) 13-15 (2) 15-18 (4) 18-19 (3) 19-20 (2) 20-21 (1)	06-07 (1) 07-08 (2) 08-10 (4) 10-11 (3) 11-14 (2) 14-16 (1) 16-18 (2) 18-20 (3) 20-21 (2) 21-23 (1) 02-04 (1)	23-02 (1) 02-05 (2) 05-08 (1)*

South Pacific & New Zealand	09-10 (1) 10-13 (2) 13-15 (3) 15-17 (4) 17-18 (3) 18-19 (2) 19-20 (1)	07-08 (1) 08-10 (3) 10-12 (1) 12-16 (2) 16-17 (3) 17-19 (4) 19-20 (3) 20-22 (2) 22-23 (1)	11-18 (1) 18-19 (2) 19-21 (3) 21-23 (4) 23-02 (3) 02-03 (2) 03-06 (1) 06-07 (2) 07-09 (4) 09-11 (2)	21-22 (1) 22-05 (3) 05-07 (2) 07-08 (1) 22-00 (1)* 00-05 (2)* 05-06 (1)*
Australasia	07-08 (1) 08-10 (2) 10-13 (1) 13-14 (2) 14-15 (3) 15-17 (4) 17-18 (2) 18-19 (1)	07-08 (1) 08-10 (2) 10-12 (3) 12-14 (2) 14-17 (1) 17-19 (2) 19-22 (1)	18-20 (1) 20-00 (2) 00-04 (3) 04-06 (2) 06-07 (3) 07-09 (4) 09-10 (3) 10-12 (2) 12-14 (1)	02-03 (1) 03-04 (2) 04-06 (3) 06-08 (1) 03-04 (1)* 04-06 (2)* 06-07 (1)*
Caribbean, Central America & Northern Countries of South America	06-07 (1) 07-08 (2) 08-10 (4) 10-12 (3) 12-14 (4) 14-15 (3) 15-16 (2) 16-17 (1)	05-06 (1) 06-08 (2) 08-10 (3) 10-13 (2) 13-14 (3) 14-16 (4) 16-17 (3) 17-18 (2) 18-19 (1)	07-09 (4) 09-13 (2) 13-15 (3) 15-18 (4) 18-00 (3) 00-01 (2) 01-03 (1) 03-06 (2) 06-07 (3)	18-19 (1) 19-01 (3) 01-04 (2) 04-05 (1) 19-22 (1)* 22-01 (2)* 01-04 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina & Uruguay	06-07 (1) 07-11 (2) 11-14 (3) 14-16 (4) 16-17 (3) 17-18 (2) 18-19 (1)	05-06 (1) 06-09 (2) 09-13 (1) 13-14 (2) 14-15 (3) 15-17 (4) 17-18 (3) 18-19 (2) 19-20 (1)	12-14 (1) 14-16 (2) 16-17 (3) 17-19 (4) 19-23 (3) 23-02 (2) 02-04 (1) 04-07 (2)	20-22 (1) 22-00 (2) 00-02 (1) 22-00 (1)*
McCurdo Sound, Antarctica	07-09 (1) 16-20 (1)	07-08 (1) 08-10 (2) 10-15 (1) 15-17 (2) 17-19 (3) 19-20 (2) 20-22 (1)	16-18 (1) 18-20 (2) 20-02 (3) 02-04 (2) 04-06 (1) 06-08 (2) 02-08 (1)	00-05 (1)

In Focus *(from page 64)*

course, pictures of what amateurs are doing with SSTV. Please drop me a line and send along any photos that you can spare! Same old address, 2112 Turk Hill Road, Fairport, N.Y. 14450.

73 de Bill, W2DD

Announcements *(from page 8)*

Conference, Dept. of Electrical Engineering, Western Michigan University, Kalamazoo, MI 49008.

- **Syracuse, NY** — The Radio Amateurs of Greater Syracuse (New York) will host their 14th Annual Hamfest at the New York State Fairgrounds, Arts and Home Center, on Saturday, October 7, 1978, from 9 a.m. to 6 p.m. There will be exhibitor booths, an indoor and outdoor flea market, awards, films, and ladies programs. Tickets before October 1st are $1.50 or $2.00 at the gate. Under 12 free. For more information, write: R.A.G.S., P.O. Box 88, Liverpool, NY 13088. Talk-in on 90/30-31/91.
- **Orlando, FL** — Former members of the Army and Air Communications Service will hold their second reunion in Orlando on October 13-15, 1978. Contact: Wally Bailey, 4688 Posada Dr., Orlando, FL 32809.
- **Albuquerque, NM** — The Government-Industry Data Exchange Program (GIDEP) will have its annual conference and workshop on October 31st, Nov. 1st and 2nd, at the Four Seasons Motor Inn in Albuquerque. For information, call Dennis Starling, Datagraphix, Inc., Box 82449, San Diego, CA 92138, phone (714) 291-9960, ext. 1266.
- **Cedar Rapids, Iowa** — The Cedar Valley Amateur Club's Annual Hamfest will be held on Sunday, October 8, 1978. Top prize is the new Drake TR7/DR7 xcvr and power supply. Talk-in on 146.16/.76, 146.52, 223.5, and 3.970 MHz. Advance tickets are $1.50 and $2.00 at the door. Write: CVARC Hamfest, Box 994, Cedar Rapids, IA 52406.

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CIRCLE 2 ON READER SERVICE CARD

Contest Rules *(from page 42)*

a local geographic area, (except for DXpeditions especially organized for operation in the contest and manned by members.)

3. To be listed, a minimum of 3 logs must be received from a club and an officer of the club must submit a list of participating members and their scores, both on phone and c.w.

XI. LOG INSTRUCTIONS:

1. All times must be in GMT.

2. Indicate zone and country multiplier only the FIRST TIME it is worked on each band.

3. Logs must be checked for duplicate contacts, correct QSO points and multipliers, and recopied logs must be in their original form with corrections clearly shown.

4. Use a separate sheet for each band.

5. Each entry must be accompanied by a Summary Sheet showing all scoring information, category of competition, contestant's name and address in BLOCK LETTERS and a signed declaration that all contest rules and regulations for amateur radio in the country of operation have been observed.

6. Official log and summary sheets and zone maps are available from *CQ*. A *large* self-addressed envelope with sufficient postage or IRC's must accompany your request.

If official forms are not available, make up your own by following the samples shown, 40 contacts to the page on 8½"x11" paper.

7. All entrants are required to submit cross-check sheets for each band on which 200 or more QSO's were made. All other entrants are encouraged to submit cross-check sheets.

8. For each duplicate contact that is removed from a log by the committee, a penalty of three additional contacts will be exacted.

9. QRP_p stations must indicate same on their summary sheets and state the actual maximum power output used, with a signed declaration.

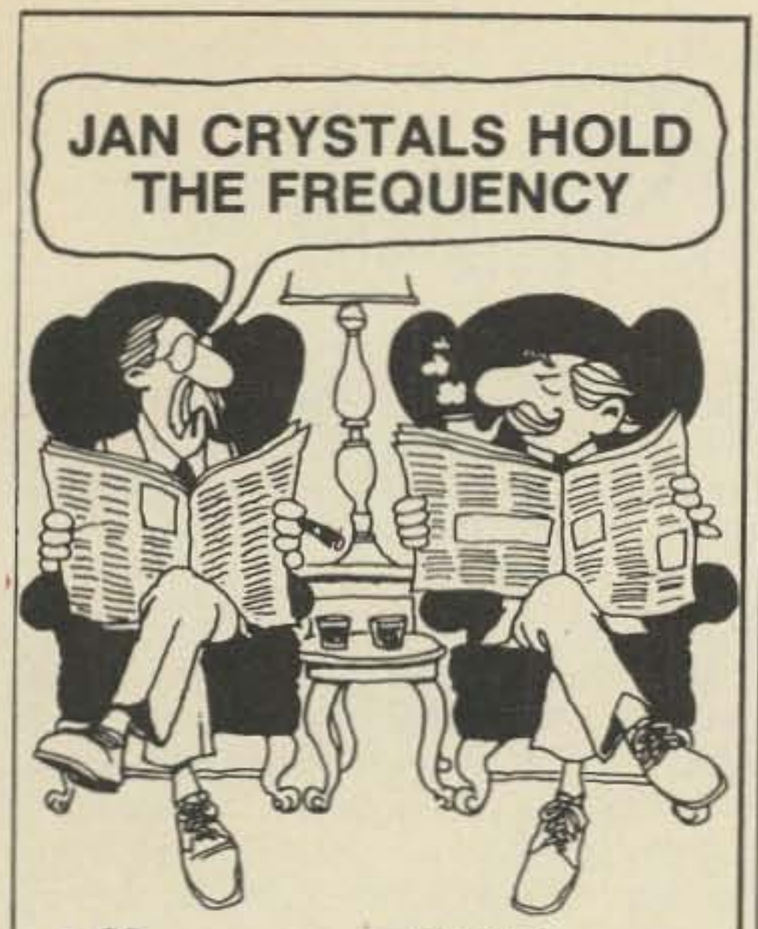
XII. DISQUALIFICATION: Violation of amateur radio regulations in the country of the contestant, or the rules of the contest, unsportsmanlike conduct; taking credit for excessive duplicate contacts; unverifiable QSO's or unverifiable multipliers will be deemed sufficient cause for disqualification. (Incorrectly logged calls will be counted as unverifiable contacts.)

Disqualification can also result in the disqualified operator(s) being barred from competition in all *CQ* contests for a period of up to three years.

Actions and decisions of the *CQ* Contest Committee are official and final.

XIII. DEADLINE: All entries must be postmarked NO LATER than December 1, 1978 for the Phone section and January 15, 1979 for the C.W. section. Indicate phone or c.w. on envelope. Logs go to:

CQ WW Contest Committee
14 Vanderventer Avenue
Port Washington, L.I., N.Y. USA 11050



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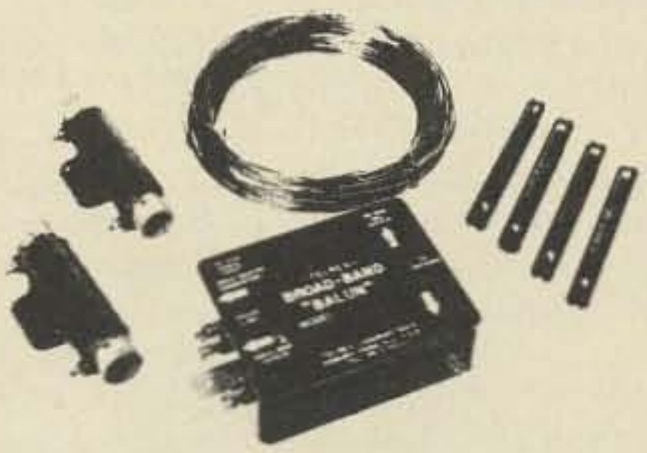

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CIRCLE 44 ON READER SERVICE CARD

Crossbow III *(from page 29)*

feet, nine inches.

Radio Shack's *Crossbow III* beam also can be converted into a two-element, 15-meter antenna utilizing a driven element with either a director or reflector.

My personal preference is the driver-director combination which produced excellent results with QRPp gear putting out about 1.2 watts.

The construction of the two-element, 15-meter beam does require a little scrounging. Both elements must be extended more than the original CB specifications.

You may be able to adapt some of the tubing from the unused element of the CB beam, but four pieces of additional tubing needed for the test antenna came from a used TV antenna that a local TV shop seemed happy to give away.

The 15-meter elements are spaced (see fig. 2) nine feet, four inches apart. After constructing the center boom and the driver and director elements according to Radio Shack instructions, extend each element length by sliding the additional tubing into each end of the already constructed element.

The overall length of the driven element should be 22 feet, two inches. The director is 10 inches shorter. Secure added sections by drilling a starter hole and inserting a sheet-metal screw.

During testing with the 10-meter three-element Yagi, we talked with an east coast station who said he burned out a *Crossbow II* converted to 10 meters with 700 watts.

So a quick call was made to Radio Shack's home office in Fort Worth, Texas, to promotion and publicity manager Hy Siegel, K9CCN/5, who said the antenna should be able to handle about 200 watts.

There is an old saying that power corrupts and that absolute power corrupts absolutely.

The saying seems to be as true in amateur radio as it does with politicans, who were originally the target of the power statement.

A couple of hundred watts of p.e.p. will cover up a multitude of antenna sins. A couple of thousand watts of p.e.p. will hide the sins even better.

However, this antenna was constructed for use with a QRPp rig that was to have five watts input, four watts out in the a.m. mode and 10 watts p.e.p. sideband.

This QRPp rig—a converted Radio Shack TRC-449—and the converted Radio Shack antenna made a good combination because F2YT in France gave an S-5 report and DK6CR in Germany gave an S-9 report.

Even nearby stations worked on groundwave gave S-7 and S-9 reports and even an S-5 report at 50 miles.

During the first six weeks on the air with the QRPp rig and beam combination, I worked countries in Europe, Central and South America, as well as a dozen or so of the states, including Hawaii.

So, I decided that if I could chalk up that kind of a total with no more effort than it took, I was running too much power.

So, back to the work bench and soldering iron. The TRC-449 was detuned to 400 milliwatts d.c. and 900 milliwatts p.e.p. on sideband.

Back on the air, and during the next 30 days, the flea power total went from ground zero to nearly 200 stations worked in 26 states and 15 Central and South American countries.

Right now, my monoband 10 meter outfit is the converted Radio Shack TRC-449 powered by an unconverted Radio Shack regulated 12-volt power supply and the converted Radio *Crossbow III* beam.

And the funniest part about this outfit is that the folks from Radio Shack keep telling me they aren't in the amateur radio business.

Oh yeah? CQ

Speech Filter *(from page 22)*

of speech processing involved:
1. a 1.1 KHz filter with 12 dB/octave roll-off
2. a 1.5 KHz filter with 18 dB/octave roll-off
3. a 2 KHz filter with 6 dB/octave roll-off

The circuit shown in fig. 3 can provide any of these filter characteristics by the proper choice of components as shown in the table. In the case of the 6 dB/octave roll-off two of the stages are redundant and in the case of the 12 dB/octave roll-off, one of the stages is redundant. These stages can be eliminated, of course, but they are all shown in case the builder would like to have the possibility of experimenting with different roll-off rates. Alternatively, one might wish to wire the circuit so one can switch-select for each stage either a 10 μF, .015 μF, .01 μF or .008 μF capacitor. This would allow the selection of a really wide range of roll-off frequencies and roll-off rates.

All of the stages are emitter followers and hence they do not provide any gain. The reason they are used is to isolate the various RC networks and to make sure the RC networks have constant input and output impedances. The "R" part of the RC network between each stage is composed of the resistor forming the bias network and the input impedance of each stage. In the experimental circuits built, this seemed to work out to a total resistance of about 8k. Although, if at all possible, one should check the actual roll-off frequencies using an audio generator and an oscilloscope, one should come reasonably close to the frequencies noted by using standard value components. The use of polystyrene capacitors for the .015 μF, .01 μF and .008 μF values is recommended, if at all possible, because of their tight tolerances.

The circuit should be placed in a shielded enclosure but no other special measures are necessary for construction. Since the circuit does not provide any gain, many of the usual problems that develop with an audio device placed in the microphone lead to a transmitter should not develop. However, the circuit as shown will work well only with a microphone having an amplified output. Using regular types of microphones, some form of preamplifier is usually necessary.

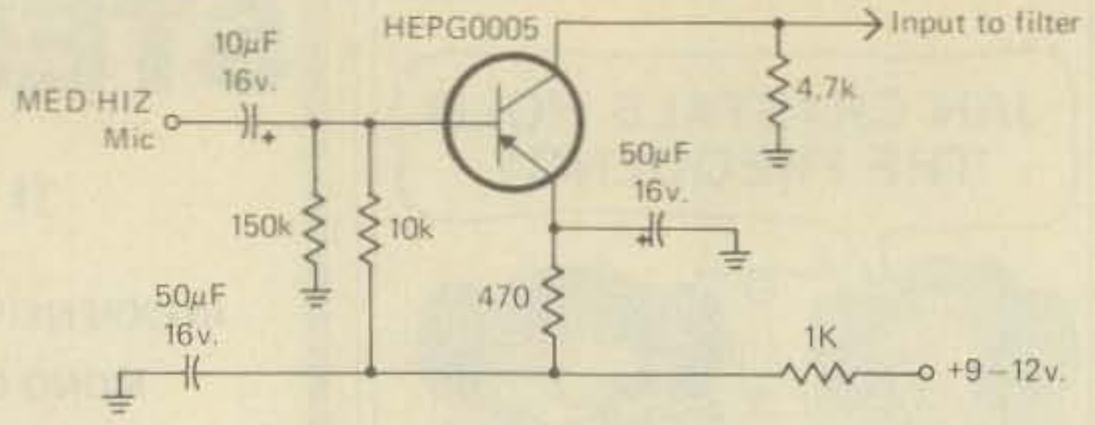
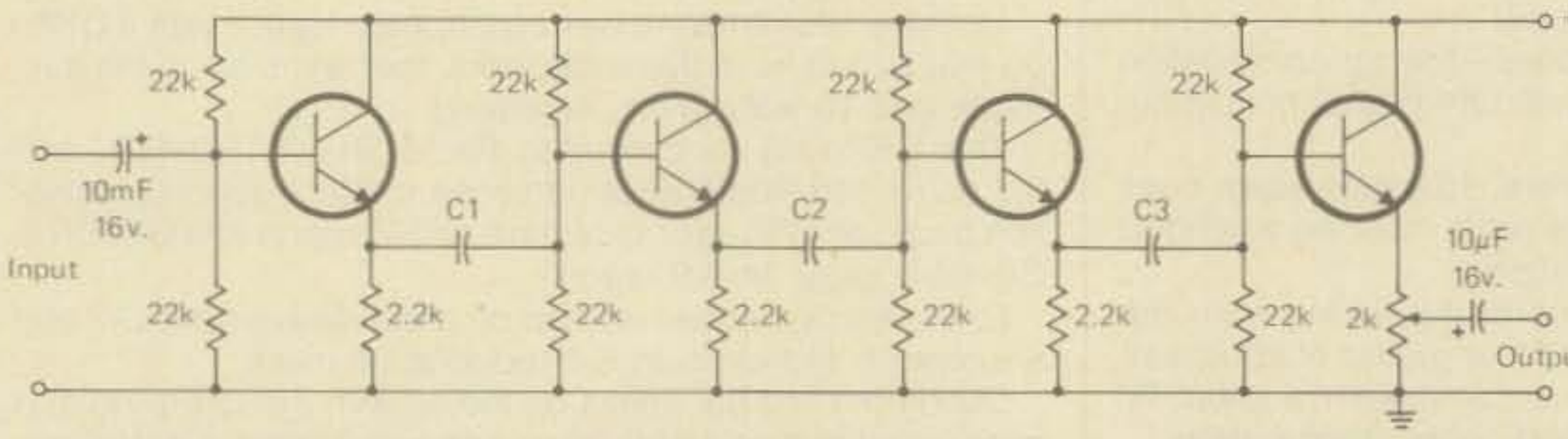


Fig. 4 - Why use an old-fashioned germanium PNP transistor as a preamplifier? There are some valid reasons as explained in the text.

The circuit of figure 4 can serve this purpose very nicely. Some readers may wonder why a seemingly old-fashioned germanium PNP transistor stage is used instead of a simple 741 or similar IC connected as a preamplifier. The reason is that the HEP G0005 transistor has a reasonably good low noise characteristic combined with a low cut-off frequency. The latter in fact is only about 2 MHz. So, many of the problems associated with preamplifiers, such as oscillation and feedback, are greatly alleviated without going through filtering, extra bypassing, etc.

One should not expect any miracles out ot speech filtering. But, if it brings a few dB of improvement when having a QSO under marginal conditions it is well worth the investment as compared to the other methods of gaining that extra few dB. Of course, it should be stressed that the only thing speech filtering will do is provide some apparent improvement under marginal conditions. It will not provide any intelligibility improvement when signals are solid.

Another point that should be stressed when experimenting with speech filtering is to remember that speech from the time the pressure waves hit the microphone until a person at the other end sorts out what is being said goes through all sorts of transformations, frequency shapings, etc. So, on-the-air checks will yield a wide variety of comments. But, most stations will note some improvement, on the average, in reception under marginal conditions once the "optimum" filter for a given transmitting setup has been found. CQ



Rolloff	C1	C2	C3
1.1kHz, 12dB/octave	.015	.015	10µF
2.0kHz, 6dB/octave	.008	10µF	10µF
1.5kHz, 18dB/octave	.01	.01	.01

NOTE:
All transistors are 2N4124 or HEP50014.

Fig. 3 - The optimum filter. By choosing values of the three capacitors, various low frequency rolloffs can be obtained.

Pacemaker *(from page 21)*

been received. Thus a series of at least eight extremely strong magnetic impulses pulsating at a frequency of more than 220 Hz must be received before a program change is produced.

With regard to interference, there are generally two types, both electromagnetic. **Conducted interference** is interference that occurs when the skin comes in contact with the device that produces the source of interference, making the body become a path of current flow. The pacer is activated by the voltage across the electrodes by the current flowing through the body. **Radiated interference** is the effect on a pacemaker caused by electromagnetic fields. The pacer may be effected even though there is no direct contact with the pacemaker. If the interfering signal is larger than the demand set for the pacer, then the modulation of the signal will determine the effect on the pacemaker.

Pulse modulation is most likely to affect the pacer. If the pulse period lies between 25 ms and 840 ms a pacer can be continuosly inhibited. Pulse periods of less than 25 ms usually cause the device to revert. **Amplitude modulation** may cause reversion if the modulating frequency is in the 25 ms to 840 ms range. **Frequency modulation,** as far as is known, does not affect the pacemaker.

In the environment in which a pacemaker patient lives, field intensities exist which approach and even exceed 200 volts per meter. Therefore, avoid close proximity to strong radar or transmitting antennas.

In view of the above, there have been only a small number of documented cases of interference by electromagnetic devices.

Following is a table summarizing date of interfering agents on pacemakers.

Source of Interference	Frequency	Field Strength	Modulation	Pacer Response
Magnetic Field	60 Hz	Above 1.4 gauss	none	fixed rate
Auto ignition (electronic)	Idle to 60 mph; 4 cyc. and 8 cyc.	40 kV at 9 inches	pulsed	no effect
Radar	1.2 GHz	to 224 V/m	10-50 pps	no effect
	3.3 GHz	to 365 V/m	7-400 pps	no effect
	9.0 GHz	to 1200 V/m	25-300 pps	no effect

Not being a physician or surgeon, I didn't delve too deeply into the physiology of the heart. I was primarily interested in the electronics of the pacemaker.

I would be interested hearing from other amateurs who are using pacers.

My thanks to the Cordis Corp. of Miami FL and to Medtronics Inc. of Minneapolis MN for their assistance with the technical information. And my deepest gratitude to Dr. William Batiuchok who implanted my pacemaker.

NC 101X *(from page 33)*

They're Not Making Them Anymore!

The life of the National NC101X was relatively short. Born in the winter of 1936, the receiver achieved quick popularity. It was eclipsed in October, 1940 by the National NC-200, a jazzed-up version of the NC-100 that incorporated both general coverage and bandspread ranges in the moveable coil catacomb.

However, the short life of the NC-101X was a benchmark in receiver technology. It proved that amateurs would accept an amateur-band-only receiver, paving the way for today's modern bandswitching transceiver. The exaggerated dial readout was also accepted in the continuing search for better receiver calibration. The coil catacomb concept, sadly, was soon dropped as being a bulky and expensive way of accomplishing bandswitching. And, more's the pity, the NC-101X—this beautiful mechanical creation—is the last in a long line of products made by master craftsmen for a limited market of discerning individuals who wanted something out of the ordinary.

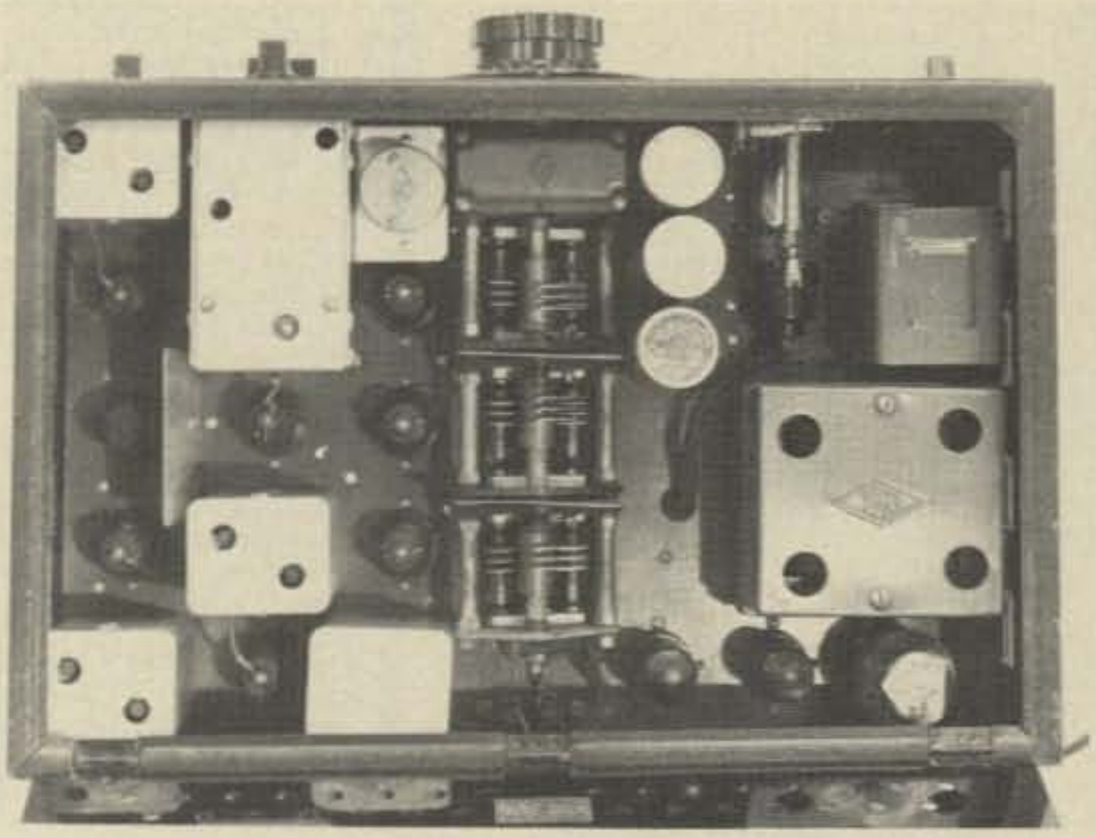


Fig. 5 — Interior view of the NC-101X. Massive, three-gang tuning capacitor is at center, with the crystal filter directly behind the front panel. Power transformer and push-pull audio stage are at right, behind the "magic eye" tuning indicator.

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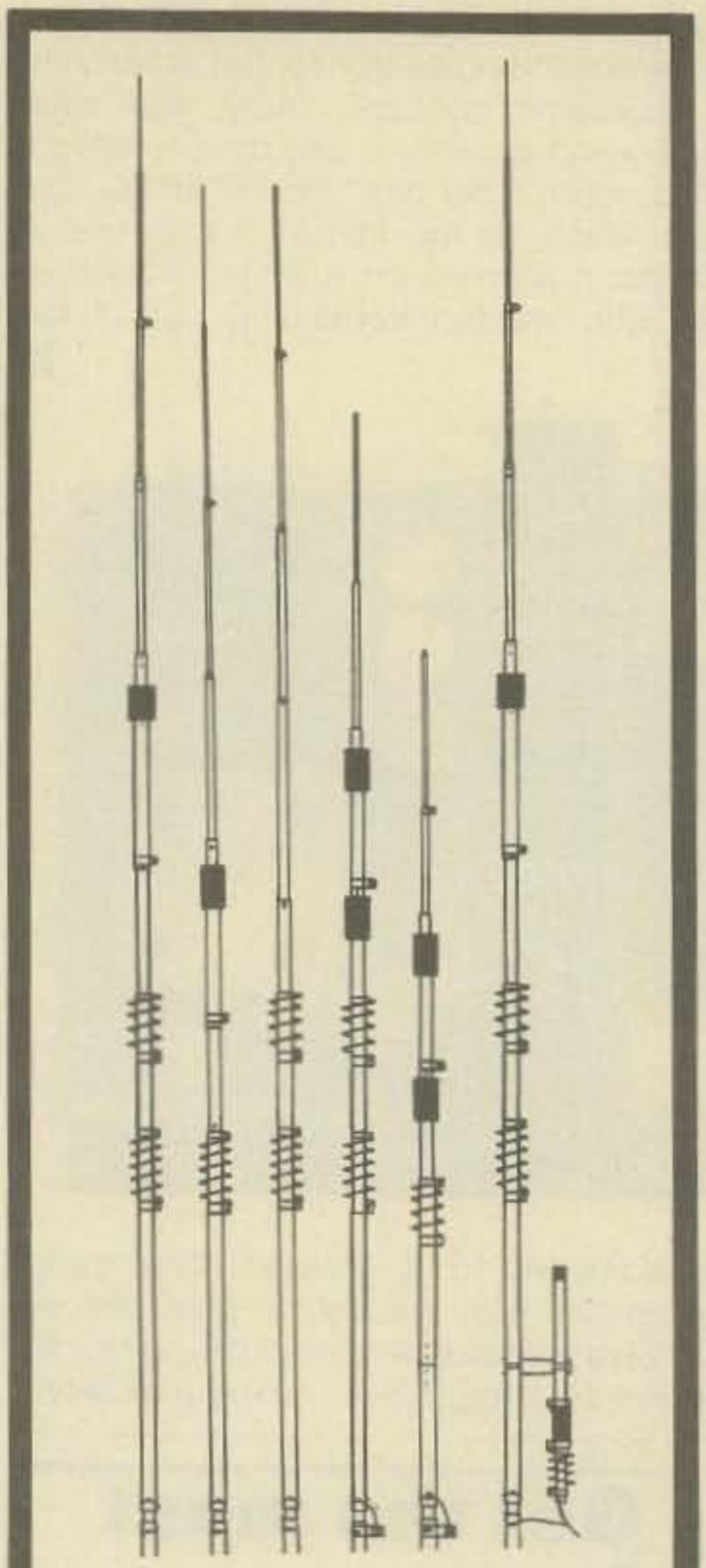

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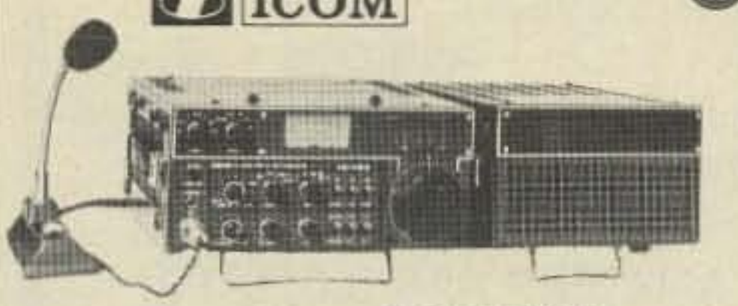

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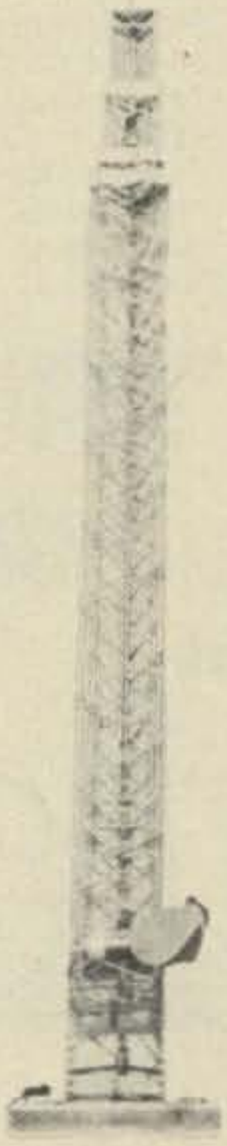

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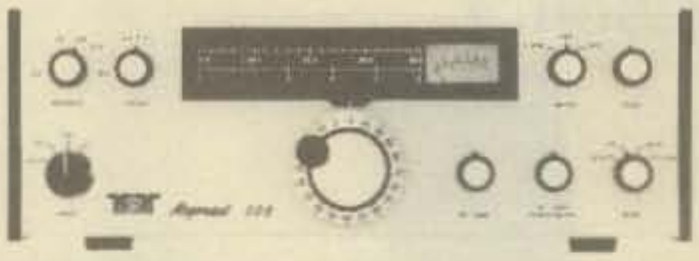

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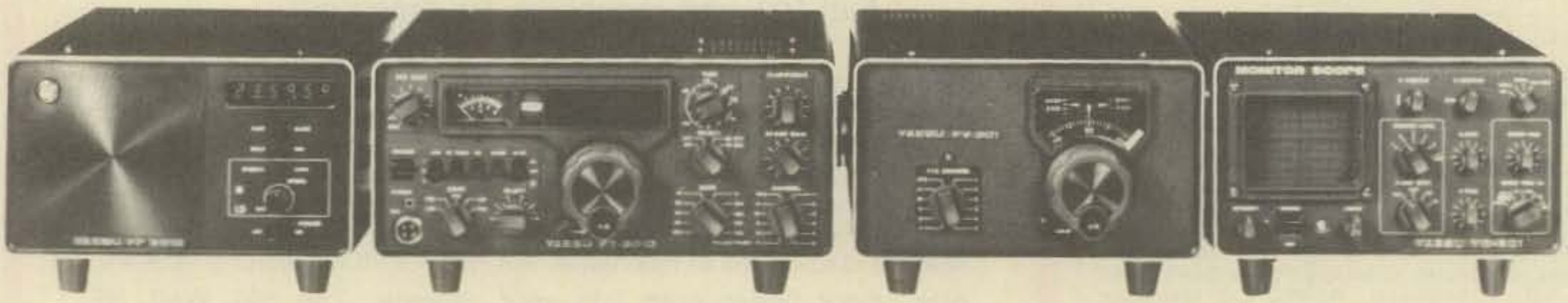

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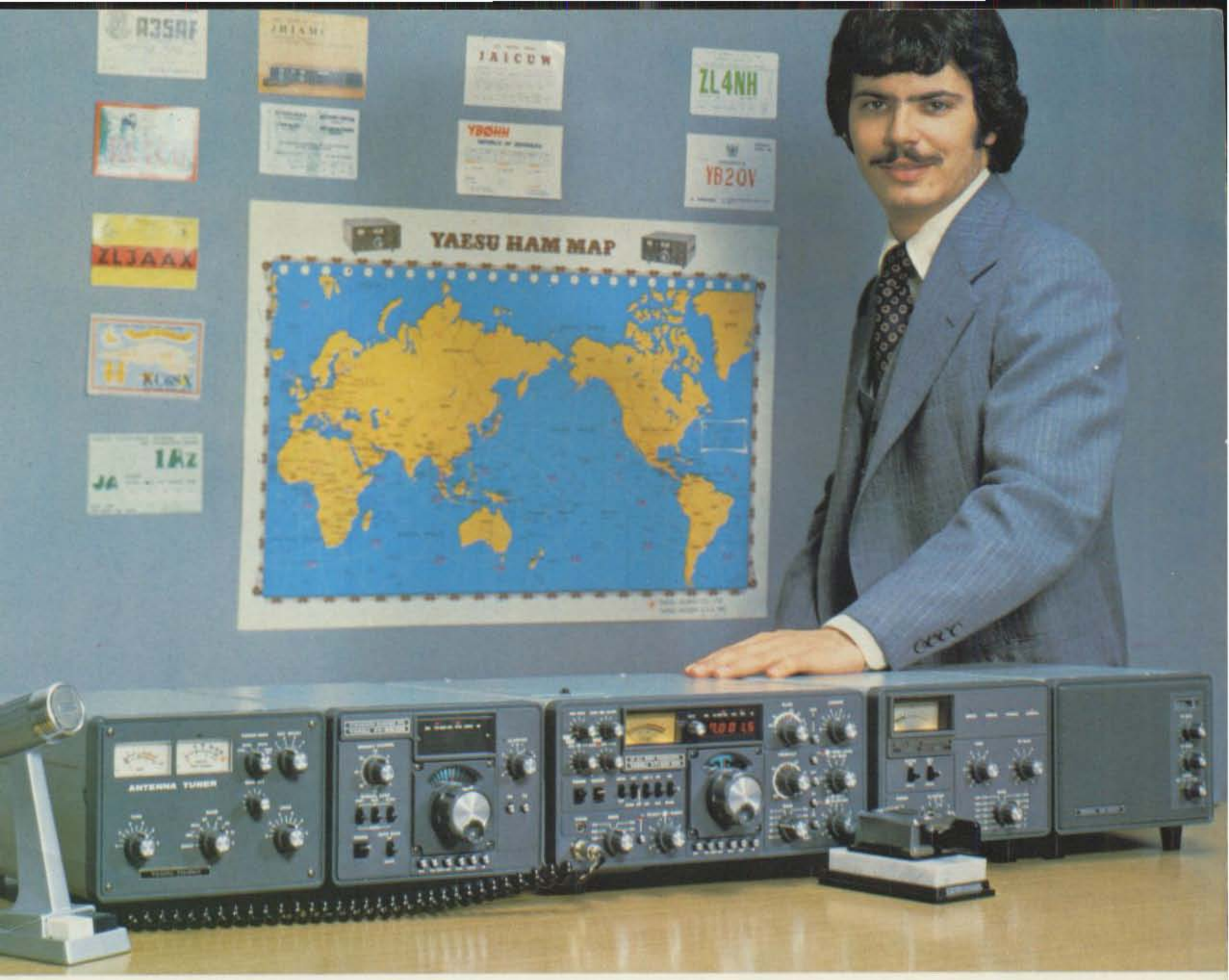

THE 901DM "SMART RADIO" FAMILY

HERE NOW
left to right

YD-844A High/Low Impedance Microphone (50K/600 Ohms)
FC-901 Antenna Tuner
FV-901DM Synthesized Scanning VFO
FT-901DM HF All Mode Transceiver
FTV-901 Multi Band Transverter—2 meter/6 meter/¾ meter
SP-901P Speaker Phone Patch

THERE'S MORE TO COME . . .

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CIRCLE 50 ON READER SERVICE CARD

EIMAC tubes win a place in Rockwell-Collins' HF-80 systems.

Rockwell-Collins chooses EIMAC tubes again.

To power their new HF-80 family of 1 to 10 kW hf single sideband radio equipment, Rockwell-Collins needed tubes as well-constructed and reliable as the HF-80 system itself. That's why they went with EIMAC, the way they have for every hf system they've built since 1958.

The deciding factors—EIMAC's quality, backup, availability and customer acceptance.

The new HF-80 equipment ranges from operator-attended receivers and transmitters to fully automated, remotely located communications stations. The HF-80 is used worldwide in business, military and general government communications. So Rockwell-Collins needed tubes with worldwide availability and technical back-up. EIMAC's proven customer acceptance and well-established reliability were more pluses.

The HF-80 uses EIMAC's 4CX1500B at 1 kW, 4CX5000A at 3 kW, and 4CX15000A at 10 kW with EIMAC's 4CX350A as drivers.

For more information on what makes these and other EIMAC tubes so special, contact Varian, EIMAC Division, 301 Industrial Way, San Carlos, California 94070. Telephone (415) 592-1221. Or contact any of the more than 30 Varian Electron Device Group Sales Offices throughout the world.

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CIRCLE 13 ON READER SERVICE CARD