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Amateur Radio

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THE RADIO AMATEUR JOURNAL

74820 08240



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This NEW MFJ Super Antenna Tuner matches everything from 160 thru 10 Meters: dipoles, inverted vees, long wires, verticals, mobile whips, beams, balance lines, coax lines. Up to 200 watts RF OUTPUT. Built-in balun, too!

• Operate all bands with one antenna • Works with all solid state and tube rigs • Ultra compact: 5 x 2 x 6 inches • Uses toroid cores

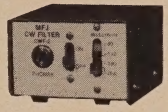


$39.95

MFJ-16010 Antenna Tuner

Now you can operate all bands — 160 thru 10 Meters — with a single random wire and run your full transceiver power output — up to 200 watts RF power OUTPUT.

• Small enough to carry in your hip pocket, 2-3/16 x 3-1/4 x 4 inches • Matches low and high impedance by interchanging input and output • SO-239 coaxial connectors • 12 position tapped inductor. Stacked toroid cores • At 1.8 MHz tuner matches 25 to 200 ohms.



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CWF-2BX Super CW Filter

This MFJ Super CW Filter gives you 80 Hz bandwidth, and extremely steep skirts with no ringing for razor sharp selectivity that lets you pull signals out of heavy QRM. Plugs between receiver and phones or connect between audio stage for speaker operation.

• Selectable BW: 80, 110, 180 Hz • 60 dB down one octave from center frequency of 750 Hz for 80 Hz BW • Reduces noises 15 dB • 9 V battery • 2-3/16 x 3-1/4 x 4 inches • CWF-2PC, wired PC board, $19.95.

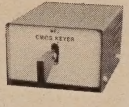


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This NEW MFJ Deluxe Keyer gives you more features per dollar than any other keyer available.

• Uses Curtis-8043 keyer chip • Sends iambic, automatic, semi-automatic, manual • Use squeeze, single lever, or straight key • Dot memory, self-completing dots and dashes, jam proof spacing, instant start • RF proof • Solid state keying ±300 V max • Weight, tone, volume, speed controls • Uses 4 C-cells; external power jack • 6 x 6 x 2 inches • Sidetone and speaker • Optional squeeze key: $29.95



$54.95

CMOS-8043 Electronic Keyer

State of the art design uses CURTIS-8043 Keyer-on-a-chip.

• Built-in Key • Dot memory • Iambic operation with external squeeze key • 8 to 50 WPM • Sidetone and speaker • Speed, volume, tone, weight controls • Ultra reliable solid state keying ±300 volts max. • 4 position switch for TUNE, OFF, ON, SIDETONE OFF • Uses 4 penlight cells • 2-3/16 x 3-1/4 x 4 inches

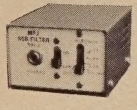


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LSP-520BX II Log Speech Processor

Up to 400% more RF power. Plugs between your microphone and transmitter.

• Gives your audio punch power to slice through QRM • 30 dB IC log amp and 3 active filters • RF protected • 9 V battery • Two Mic jacks: ¼" phone jacks, uncommitted 4 pin jack • Output cable • 2-1/8 x 3-5/8 x 5-9/16 inches • LSP-520BX, in standard MFJ enclosure, electronically identical, $49.95.

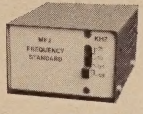


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SBF-2BX SSB Filter

Dramatically improves readability.

• Optimizes your audio to reduce sideband splatter, remove low and high pitched QRM, hiss, static crashes, background noise, 60 and 120 Hz hum • Reduces fatique during contest, DX, and ragchewing • Plugs between phones and receiver or connect between audio stage for speaker operation • Selectable bandwidth IC active audio filter • Uses 9 volt battery • 2-3/16 x 3-1/4 x 4 inches



$29.95

MFJ-200BX Frequency Standard

Provides strong, precise markers every 100, 50, or 25 KHz well into VHF region.

• Exclusive circuitry suppresses all unwanted markers • Markers are **gated** for positive identification. CMOS IC's with transistor output. • No direct connection necessary • Uses 9 volt battery • Adjustable trimmer for zero beating to WWV • Switch selects 100, 50, 25 KHz or OFF • 2-3/16 x 3-1/4 x 4 inches

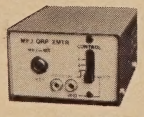


$49.95

MFJ-1030BX Receiver Preselector

Clearly copy weak unreadable signals (increases signal 3 to 5 "S" units).

• More than 20 dB low noise gain • Separate input and output tuning controls give maximum gain and RF selectivity to significantly reject out-of-band signals and reduce image responses • Dual gate MOS FET for low noise, strong signal handling abilities • Completely stable • Optimized for 10 thru 30 MHz • 9 V battery • 2-1/8 x 3-5/8 x 5-9/16 inches



$29.95

MFJ-40T QRP Transmitter

Work the world with 5 watts on 40 Meter CW.

• No tuning • Matches 50 ohm load • Clean output with low harmonic content • Power amplifier transistor protected against burnout • Switch selects 3 crystals or VFO input • 12 VDC • 2-3/16 x 3-1/4 x 4 inches

MFJ-40V, Companion VFO $29.95
MFJ-12DC, IC Regulated Power Supply, 1 amp, 12 VDC $29.95



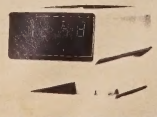
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CPO-555 Code Oscillator

For the Newcomer to learn the Morse code.
For the Old Timer to polish his fist.
For the Code Instructor to teach his classes.

• Send crisp clear code with plenty of volume for classroom use • Self contained speaker, volume, tone controls, aluminum cabinet • 9 V battery • Top quality U.S. construction • Uses 555 IC timer • 2-3/16 x 3-1/4 x 4 inches

TK-555, Optional Telegraph Key $1.95



$19.95

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This digital alarm clock is also an ID Timer. Assembled, too!

• Gives ID buzz every 9 minutes automatically, or after tapping ID/doze button • Pressing ID/doze button displays seconds • Large .63 inch digits • Easily zeros to WWV • AM and PM LED indicators • Power out indicator • Fast set, slow set buttons • 110 VAC, 60 Hz • 3-1/8 x 3-3/4 x 3-3/8 inches • One year warranty by Fairchild

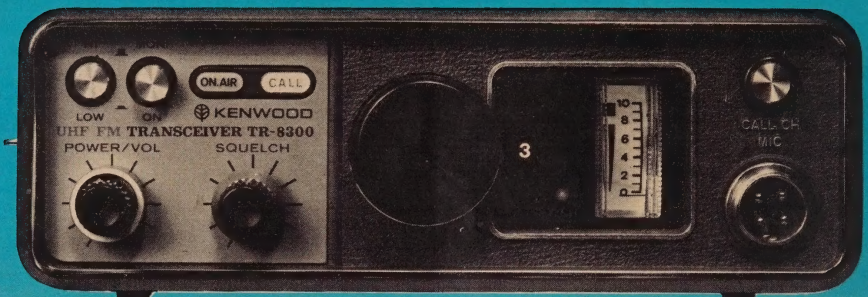
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TR-8300

KENWOOD ANNOUNCES THE TR-8300. NOW YOU CAN TAKE ADVANTAGE OF THE LUXURIES OFFERED ON UHF. THE 70 CM (440 MHz) BAND OFFERS YOU NOISE-FREE, UNCROWDED OPERATION ON FM. THE TR-8300 PUTS YOU ON THE AIR WITH 10 WATTS RF OUTPUT POWER ON 23 CRYSTAL CONTROLLED CHANNELS (3 SUPPLIED) AT A LOW COST WHICH WILL SURPRISE YOU. THE TR-8300 HAS BEEN CAREFULLY DESIGNED BY KENWOOD ENGINEERS TO GIVE YOU EXCELLENT PERFORMANCE OVER A BROAD FREQUENCY RANGE. THE TR-8300 IS FACTORY ADJUSTED AS FOLLOWS: TRANSMITTER (445.0-450.0 MHz), RECEIVER (442.0-447.0 MHz). HOWEVER, THE TR-8300's RECEIVER AND TRANSMITTER SECTIONS CAN BE INDEPENDENTLY ADJUSTED TO COVER ANY 5 MHz SEGMENT BETWEEN 440.0 and 450.0 MHz.

Excellent Performance Characteristics
A host of new innovations developed as a result of intensive testing have been incorporated.
These include a 5 section helical resonator and a two-pole crystal filter in the IF section of the receiver for improved intermodulation characteristics. In addition, receiver sensitivity, spurious response, and temperature characteristics have all been improved drastically.

Safety Protection Circuit
Special protection circuitry designed to protect the final stage transistors from the effects of severe SWR fluctuations that mobile equipment is subject to is provided. In addition, a power supply stabilization circuit is provided for the final stage to prevent any damage to the power transistors because of excessively high power supply voltages.

Protection Circuit for Reversed Polarity Connections
A protection circuit is provided to prevent any damage to the unit even if the polarity of the power supply connections is inadvertently reversed.

Call Channel Switch
The TR-8300 incorporates an additional feature called CALL CH. It allows control of a user desired function (CTCS, etc.) by using a single button on the front panel.

Broad Band Operation
The TR-8300 is designed for flexible coverage of the 70 CM band. The transmitter and receiver can be independently adjusted to cover any 5 MHz segment between 440.0 and 450.0 MHz.

2 Output Settings
Maximum transmitting power is a husky 10 watts from meticulously designed and assembled final stage. It may be set to provide either this 10 watt "Hi" output or a "Low" 1 watt output simply by means of a pushbutton switch.

Special Monitor Circuit
The TR-8300 includes a special monitor circuit which enables the user to listen to his own modulation and make frequency adjustments.

Coaxial Relay Employed for Antenna Switching
Motorola Power Transistor for Excellent Reliability

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JANUARY, 1978 VOL. 34, NO. 1

CQ The Radio Amateur's Journal

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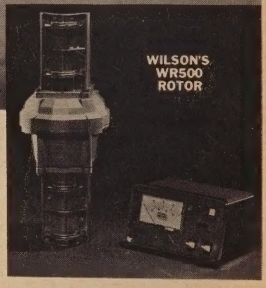
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FOR 20, 15 and 10 METERS
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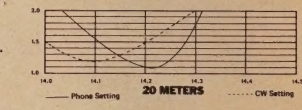
THE SY 1000 TRIBANDER ANTENNA IS SHOWN HERE WITH THE WR 500 ROTOR AND SST-64 CRANK-UP TOWER @ 50 FT. (Guy System not shown)



The new standard of performance for Tribanders is the Wilson System One!!! A DX'ers delight operating 20 meters on a full 26' boom with 4 elements, 4 operational elements on 20-15-10, plus separate reflector element on 10 meters for correct monoband spacing. Featured are the large diameter High-Q Traps, Beta matching system, heavy duty Taper Swaged Elements, rugged Boom to Element mounting . . . and value priced at $259.95. Additional features: • 10 dB Gain • 20-25 dB Front-to-Back Ratio • SWR less than 1.5 to 1 on all bands.

MODEL SY-1 SPECIFICATIONS:

Matching Method:	Beta	F/B Ratio	20-25 dB	Mast Diameter	2" O.D.
Band MHz:	14-21-28	Boom Length	26' (2" O.D.)	Boom Diameter	2" O.D.
Maximum Power Input:	Legal Limit			Surface Area	7.3 sq. ft.
Gain	10 dB	No. of Elements	5	Windload Area	146 lbs.
VSWR (at Resonance)	1.5 to 1	Longest Element	26' 7"	Shipping Weight	50 lbs.
Impedance	50 ohms	Turning Radius	18' 6"		

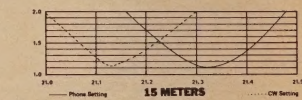


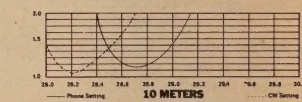


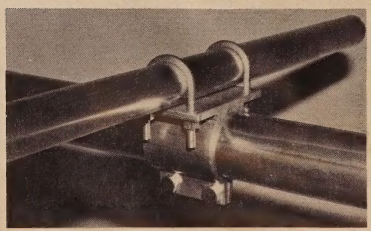
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Zero Bias

an editorial

Ethics, Ethics . . . What Price Ethics?

Ethics is one of those hard to define words that generally include morals, right and wrong, personal conduct, and being in accord with the standards and principles of the society at large. We learn ethics subjectively by imitation. We try to do the "right thing". This "right thing" of course varies from situation to situation and learning what is appropriate and what we can get away with. It is at best a mixture of social and religious rules that are not clearly written down in legal form, providing for punishment for those who stray in the same manner that one is punished for breaking a law. The punishment for a breach of ethics reverts back to tribal behavior of ostracism. If you don't behave in the accepted manner you are shunned by the group.

Recent editorial material from *QST* magazine calling for a Code of Ethics, presumably to be signed by advertisers who wish to sell their goods through the pages of *QST*, is actually a double-edged sword. First, I do agree that something should be done to keep amateur transmitting equipment out of the hands of unlicensed individuals and groups. How this can be done is not that easy. Requirement of a signature on a Code of Ethics is also not easy, in that it is probably illegal to put such a restraint of trade restriction on advertisers. What actually would constitute a Code of Ethics? What would it include? What would the advertiser have to promise to do and not do? Presumably again, if the advertiser failed to sign such a contract he would not be allowed to advertise in the pages of *QST*; he would in effect be ostracised.

Well, we can put aside the word presume. As of September 14, 1977, ARRL Directors' Letter No. 1696 spells out, in no uncertain terms, that such a Code of Ethics exists, and that a signature is mandatory from advertisers in *QST*. In fact, the letter also reports that some form of decal or emblem will be displayed by the advertiser, to show that he supports the Code of Ethics.

If we are to believe the power of the League, and the smug self-assuredness of its spokesmen, then truly this Code of Ethics is tantamount to actual LAW. This Law then, has several far reaching ramifications that should be considered.

Perhaps, at some future League headquarters meeting, an amendment will be brought up for the Code. Some self rightious individual sees the need to protect American interests in the market to the exclusion of imports. It could be argued that some sort of requirement should apply that final assembly of the product must be done in this country. That could fit in with a Code of Ethics. Then, perhaps enlarging on that, it could state that all products must be manufactured in this country. This could also expand to include components as well.

We could also carry this rationale to the point where factories and employees would have to be "approved" by this future committee. Employees might be required to sign forms in the same manner as "loyalty oaths". Firms that engage questionable employees might be required to either "shape them up" or discharge them.

This "extreme" possibility goes far beyond mere ostracism. We are now talking about restricting the income of an employee or curtailing a manufacturer's right or option to conduct a free and unhindered business. It potentially eliminates a so called free enterprise system and directly controls the purse strings of that manufacturer.

A very quick rejoinder might be that this situation couldn't be better for *CQ* and other amateur magazines. They could reap the advertising benefit by accepting all of the advertisers who refuse the mandate by *QST*. If a manufacturer is hurt in any way, it filters down and eventually hurts everyone. There might be some short range benefits, but in the long run everyone, including the consumer, would suffer.

Elsewhere in this issue, you will read of a threatening lawsuit against the League in the amount of $50,000,000. That's a lot of money in anyone's terms. The Communications Attorney Service, a California based operation, sees a clear violation of the law and will enter a suit on behalf of their clients over this very Code of Ethics. It seems as though a lot of people, and, I might add, manufacturers are upset over the Code of Ethics. It is not that the original concept is that horrendous but when you begin to think it through with all of the possibilities you are forced to come up with a term from the past — "McCarthy-ism". The Code is something that should be nipped in the bud before it has a chance to fester.

If the League continues on this course, they will be forced to defend this lawsuit. The defense will be costly, and from what I can gather from attorneys I've spoken to, their position will be very difficult to defend with their chances of winning being extremely slim.

On the surface the League can, once again, argue that they, and only they, are combatting the many ills that befall amateur radio, and that the Code of Ethics is just one more weapon in their arsenal of weapons to keep amateur radio for

(Continued on page 79)

KENWOOD'S

TS-520S

AND DG-5 DIGITAL FREQUENCY DISPLAY

A NEW STANDARD IN ECONOMY TRANSCEIVERS

The NEW TS-520S combines all of the fine, field-proven characteristics of the original TS-520 together with many of the ideas, comments, and suggestions for improvement from amateurs worldwide. Kenwood's ultimate objectives . . . to make quality equipment available at reasonable prices.

FULL COVERAGE TRANSCEIVER

The new TS-520S provides full coverage on all amateur bands from 1.8 to 29.7 MHz. Kenwood gives you 160 meter capability, WWV on 15.000 MHz., and an auxiliary band position for maximum flexibility. And with the addition of the TV-502 and TV-506 transverters, your TS-520S can cover 160 meters to 2 meters on SSB and CW.

DIGITAL DISPLAY DG-5 (option)

The new Kenwood DG-5 provides easy, accurate readout of your operating frequency while transmitting *and* receiving.

OUTSTANDING RECEIVER SENSITIVITY AND MINIMUM CROSS MODULATION

The new TS-520S incorporates a 3SK-35 dual gate MOSFET for outstanding cross modulation and spurious response characteristics. The 3SK35 has a low noise figure (3.5 dB typ.) and high gain (18 dB typ.) for excellent sensitivity.

NEW IMPROVED SPEECH PROCESSOR

A new audio compression amplifier gives you extra punch in the pile ups and when the going gets rough.

VERNIER TUNING FOR FINAL PLATE CONTROL

A new vernier tuning mechanism allows easy and accurate adjustment of the plate control during tune-up.

FINAL AMPLIFIER

The new TS-520S is completely solid state except for the driver (12BY7A) and the final tubes. Rather than substitute TV sweep tubes as final amplifier tubes in a state of the art amateur transceiver, Kenwood has employed two husky S-2001A (equivalent to 6146B) tubes. These rugged, time-proven tubes are known for their long life and superb linearity.

HIGHLY EFFECTIVE NOISE BLANKER

An effective noise blanking circuit developed by Kenwood that virtually eliminates ignition noise is built-in to the TS-520S.

RF ATTENUATOR

The new TS-520S has a built-in 20 dB attentuator that can be activated by a push button switch conveniently located on the front panel.

VFO-520 — NEW REMOTE VFO

The VFO-520 remote VFO has been designed to match the styling of the TS-520S and provide maximum operating flexibility on the band selected on your TS-520S.

AC POWER SUPPLY

The TS-520S is completely self-contained with a rugged AC power supply built-in. The addition of the DS-1A DC-DC converter (option) allows for mobile operation of the TS-520S.

EASY CONNECTION PHONE PATCH

The TS-520S has 2 convenient RCA phono jacks on the rear panel for PHONE PATCH IN and PHONE PATCH OUT.

CW-520 — CW FILTER (OPTION)

The CW-520 500 Hz filter can be easily installed and will provide improved operation on CW.

AMPLIFIED TYPE AGC CIRCUIT

The AGC circuit has 3 positions (OFF, FAST, SLOW) to enable the TS-520S to be operated in the optimum condition at all times whether operating CW or SSB.

The TS-520S retains all of the features of the original TS-520 that made it tops in its class: RIT control • 8-pole crystal filter • Built-in 25 KHz calibrator • Front panel carrier level control • Semi-break-in CW with sidetone • VOX/PTT/MOX • TUNE position for low power tune up • Built-in speaker • Built-in Cooling Fan • Provisions for 4 fixed frequency channels • Heater switch.



Specifications

Amateur Bands: 160-10 meters plus WWV (receive only)
Modes: USB, LSB, CW
Antenna Impedance: 50-75 Ohms
Frequency Stability: Within ±1 kHz during one hour after one minute of warm-up, and within 100 Hz during any 30 minute period thereafter
Tubes & Semiconductors:
Tubes ..... 3 (S2001A x 2, 12BY7A)
Transistors 52
FETs 19
Diodes 101
Power Requirements: 120/220 V AC, 50/60 Hz, 13.8 V DC (with optional DS-1A)
Power Consumption: Transmit: 280 Watts Receive: 26 Watts (with heater off)
Dimension: 333(13⅛) W x 153 (6-0) H x 335(13-(13-3/16) D mm(inch)
Weight: 16.0 kg(35.2 lbs)

TRANSMITTER

RF Input Power: SSB: 200 Watts PEP CW: 160 Watts DC
Carrier Suppression: Better than -40 dB
Sideband Suppression: Better than -50 dB
Spurious Radiation: Better than -40 dB
Microphone Impedance: 50k Ohms
AF Response: 400 to 2,600 Hz

RECEIVER

Sensitivity: 0.25 uV for 10 dB (S+N)/N
Selectivity: SSB:2.4 kHz/-6 dB, 4.4 kHz/-60 dB
Selectivity: CW: 0.5 kHz/-6 dB, 1.5 kHz/-60 dB (with optional CW-520 filter)
Image Ratio: Better than 50 dB
IF Rejection: Better than 50 dB
AF Output Power: 1.0 Watt (8 Ohm load, with less than 10% distortion)
AF Output Impedance: 4 to 16 Ohms

DG-5

SPECIFICATIONS

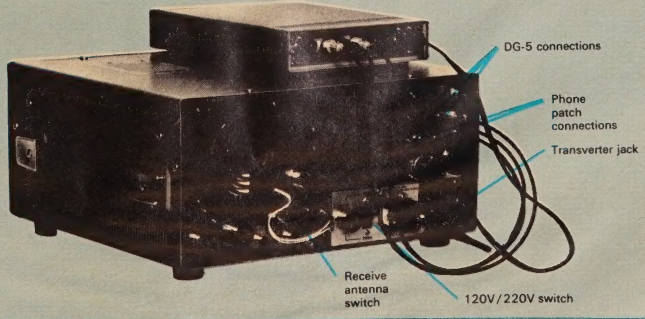
Measuring Range: 100 Hz to 40 MHz
Input Impedance: 5 k Ohms
Gate Time: 0.1 Sec.
Input Sensitivity: 100 Hz to 40 MHz . . . 200 mV rms or over, 10 kHz to 10 MHz . . 50 mV or over
Measuring Accuracy: Internal time base accuracy ±0.1 count
Time Base: 10 MHz
Operating Temperature: -10° to 50° C/14° 122° F
Power Requirement: Supplied from TS-520S or 12 to 16 VDC (nominal 13.8 VDC)
Dimensions: 167(6-9/16) W x 43(1-11/16) H x 268(10-9/16) D mm(inch)
Weight: 1.3 kg(2.9 lbs)



DG-5
(optional)

The luxury of digital readout is available on the TS-520S by connecting the new DG-5 readout (option). More than just the average readout circuit, this counter mixes the carrier, VFO, and heterodyne frequencies to give you your exact frequency. This handsomely-styled accessory can be set almost anyplace in your shack for easy to read operation . . . or set it on the dashboard during mobile operation for safety and convenience. Six bold digits display your operating frequency while you transmit and receive. Complete with DH (display hold) switch for frequency memory and 2 position intensity selector. The DG-5 can also be used as a normal frequency counter up to 40 MHz at the touch of a switch. (Input cable provided.)

NOTE: TS-520 owners can use the DG-5 with a DK-520 adapter kit.



TRIO-KENWOOD COMMUNICATIONS INC. 1111 WEST WALNUT/COMPTON, CA 90220

KENWOOD
...pacesetter in amateur radio

Our Readers Say

Thaler Challenged

Editor, CQ:

Here is a letter that I wrote to Mr. Thaler.

Dear Mr. Thaler:

I read your reply to the "Open Letter" in the November 1977 issue of CQ. After reviewing that letter and the rebuttal to your response in CQ, I have concluded that you missed the point completely. That is, the FCC has been, for whatever reason, underfunded to the point where it cannot provide those services it is required by legislative act to provide. Further, the FCC has in the past collected various monies, ostensibly to defray the costs of those services, but has been proscribed by either Congressional oversight or OMB neglect from using those monies for that purpose.

While the CB issue is certainly the most well-known, it is but a manifestation of the above. Contrary to your closing statement, the FCC has not perfomed effeciently—there are still lengthly delays in processing CB and other types of license requests. Even more serious than this—and certainly more vexing is the fact that the enforcement and research functions are for intent and purposes totally emasculated. I submit that to a great degree that this has created a "chicken and the egg" situation, i.e., the FCC is underfunded and consequently is not able to present an adequate case for proper funding, which leads to the underfunded situation, etc.

I might add that I am very concerned that Administration policy does not appear to distinguish between those governmental functions which are highly technical in nature and for which the Federal establishment has a clear mandate to provide and those functions which have been assumed by default or whatever reason. In the former category are such things as National Defense, the Space Program, FCC matters, National Bureau of Standards activities and the like. These efforts found, by and large to be relatively stable and do not mushroom to the extent as other activities. In the latter category are such things as aid to education, welfare, and the like. The point is that your argument that the Administration is attempting to hold the size of the Federal Bureaucracy down is not pertinent in this case but is instead, an excuse (and a lame one at that).

(continued on page 72)

Announcing

• In cooperation with AMSAT, Skip Reymann, W6PAJ, has published an improved AMSAT-OSCAR orbital data calendar containing all orbits for 1978 for AMSAT-OSCAR 7. Designed so that it may be hung on the wall, the calendar includes information on the operating schedules and frequencies for the spacecraft, and also the telemetry decoding equations. Also included is step-by-step information on how to determine times of passage of the satellite. The orbital calendar is available post-paid for $5 U.S. funds or 30 IRCs (3.00 to AMSAT members, and free to AMSAT life members). Overseas orders will be airmailed. Orders and payments should be made to: Skip Reymann, W6PAJ, P.O. Box 374, San Dimas, CA 91773. To speed up handling of your order, please include a gummed, self-addressed label. Proceeds from the Orbital Calendar benefit AMSAT.

• During the week of January 14-22, 1978, Special Event Station,



KM1CC, will be celebrating the 75th Anniversary of the first two-way radio telegraph transmission between the United States and Europe by Guglielmo Marconi in 1903. The station will be operating from the original Marconi station location in South Wellfleet, Massachusetts. The sponsor of the station is The Town of Barnstable Radio Club of Cape Cod, Mass. Operation will be on 160 through 10 meters, c.w., s.s.b., RTTY, and Slow Scan TV. A 2 f.m. and 6 s.s.b. station are also planned. The FCC has granted special approval for the use of A2 on all amateur bands and the famous sound of the 240 hz Marconi Rotary Spark Gap 1903 Station "CC" will be reproduced for CW QSOs. The Cornish Radio Club will be operating special event station, GB3MSA, at Poldhu, England at the original

(continued on page 72)

This ones for you.

Because you asked for it . . . we built it. The all-new JR. MONITOR[tm] Antenna Tuner.

Call it what you will – antenna tuner, matchbox, or matching network, the JR. MONITOR[tm] has it all wrapped up in one neat 5¼"Wx2¾"Hx6"D all metal cabinet.

Here are the features you said you wanted:

Continuous tuning from 1.8-30 MHz. 300 watt power capability. Forward reading relative output power meter – simply tune JR. MONITOR[tm] controls for maximum RF output on the meter. Built-in balun. Mobile mounting bracket. Ceramic rotary 12-position switch. Capacitor spacing 1000 volts. Tapped toroid inductor. Antenna inputs: coax unbalanced SO 239, random wire, balanced feed line 75-660 ohm. Weight: 2½ pounds.

With so many special features – think of the unlimited possibilities you'll have for experimenting with dozens of antennas! For instance, the DenTron All Band Doublet fed with balanced feed line hooked to the JR. MONITOR[tm] covers 1.8-30 MHz in one antenna. . . or try this mobile suggestion: 108" mobile whip fed with coax to the JR. MONITOR[tm] located under the dash will give you 10-40 meter mobile coverage and no coils to change!

It's easy to understand the excitement the JR. MONITOR[tm] has created. Wherever you are – home, boat, car, plane, or campsite you'll always be in contact. It's a fun little tuner that easily fits in a briefcase or coat pocket – but why would anyone want to smuggle it into their radio room?



JR. MONITOR[tm] $79.50
ALL BAND DOUBLET $24.50

DenTron
Radio Co. Inc.
2100 Enterprise Pkwy.,
Twinsburg, Ohio 44087

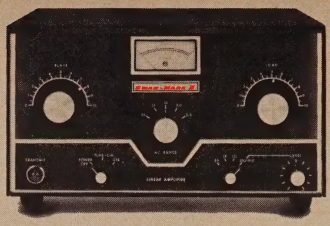
(216) 425-3173

arma
amateur radio manufacturer's association

Everybody likes power and nowhere can you get more of it for $349.95 than with our Cygnet 1200X linear amplifier.

With 100 watts of driving power you're on the air with a solid 1200 watts PEP input and most people won't be able to tell you from somebody operating full bore.

Linearity on the 1200X is excellent, efficiency is outstanding, 117/230 A.C. power supply is built in, and features like provision for external ALC give you the flexibility you need to get the most out of your rig.



Mark II for power and glory, too. But if you've got your heart set on block-buster power we've also got the right linear amp for you.

It's the Mark II, the proven unit everybody thinks of when you talk about workhorse linear amplifiers.

The Mark II dominates the bands with all the power that's allowed—2000 watts PEP—and a clean, linear signal that's music to your ears.

The Mark II features a separate, matching power supply, big, quiet blowers for both the RF deck and the power supply, all bands from 10 to 80 meters and all you need to enjoy it is 100 watts driving power.

Get a Swan 1200X or Mark II linear amplifier today and stop letting people shout you down. Use your Swan credit card. Applications at your dealer or write to us.

Cygnet 1200X 1200-watt linear amplifier complete with built in 110/220V power supply $349.95

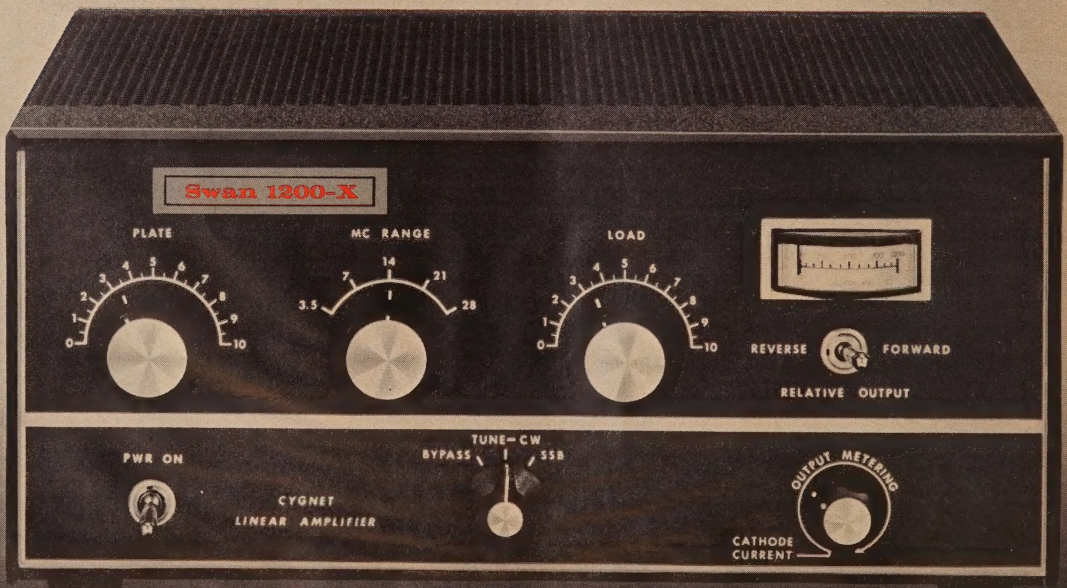
Mark II 2000-watt linear amplifier complete with separate 117/230 VAC power supply and two 3-500Z tubes $849.95

(Prices FOB Oceanside, CA)

Dealers throughout the world or order direct from

SWAN®
ELECTRONICS
A subsidiary of Cubic Corporation
305 Airport Road, Oceanside, CA 92054

SWAN 1200X LINEAR AMPLIFIER. TALK LOUD FOR A SONG. $349.95



think of yourself as an antenna expert!

—you select your components!

1. Get optimum performance band for band. Choose from medium or high power resonators for your favorite bands.
2. Fold over, 360° swivel mast for quick band change or easy garaging. Select from two versions, fender/deck or bumper mount location.
3. Stainless steel ball mount, 180° adjustable, commercial duty for superior mechanical and electrical performance.
4. Get exceptional reports, broadest bandwidth, lowest SWR. Use with any convenient length 50 ohm coax. Matching devices not required.
5. For convenience, use the Hustler stainless steel resonator spring, and special design quick disconnect.

...and you'll mobile with the experts' foremost choice... HUSTLER®

Get fixed station reports from your mobile—operate 6-10-15-20-40-75 or 80 meters with the experts and join the vast majority using Hustler for nearly two decades.





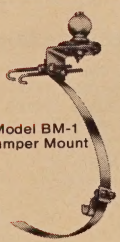
Model SSM-2 Ball Mount



Model QD-1 Quick Disconnect



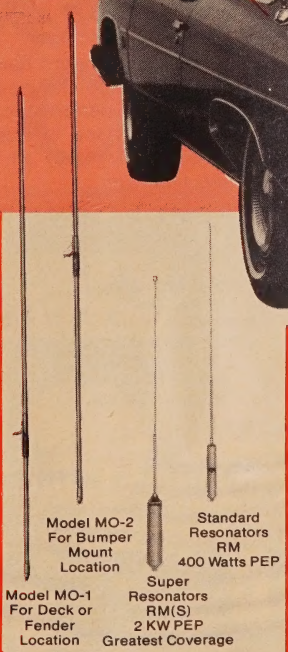
Model RSS-2 Resonator Spring



Model BM-1 Bumper Mount



Model L-14-240 Mil Spec 50 Ohm Feedline



Model MO-1 For Deck or Fender Location

Model MO-2 For Bumper Mount Location

Super Resonators RM(S) 2 KW PEP Greatest Coverage

Standard Resonators RM 400 Watts PEP

HUSTLER ANTENNA PRODUCTS—for sixteen years—original designs—created and manufactured by American ingenuity, labor and materials—used by communicators throughout the world.

Hustler designs are patented under one or more of the following assigned to New-Tronics Corporation 3287732, 3513472, 3419869, 3873985, 3327311, 3599214, 3582951.

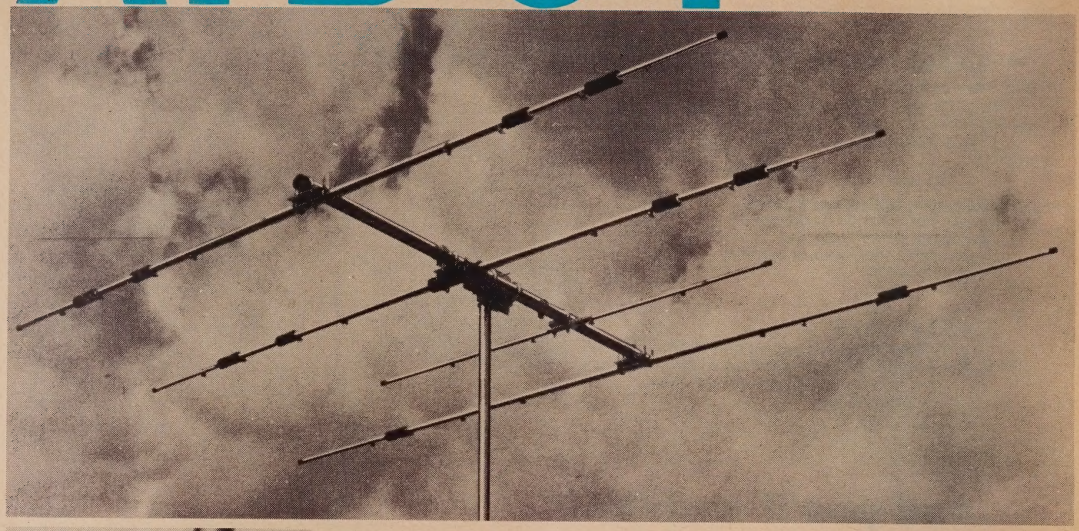
"the home of originals"

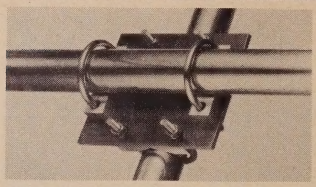
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Available from all distributors who recognize the best.

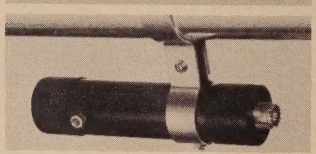
new-tronics corporation
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Brookpark, Ohio 44142
(216) 267-3150

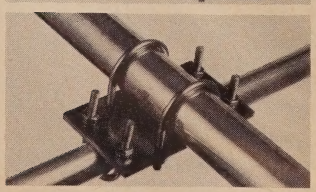
ATB-34











4 ELEMENT-3 BAND
10-15-20 METER BEAM

Cushcraft engineers have incorporated more than 30 years of design experience into the best 3 band HF beam available today. **ATB-34** has superb performance with three active elements on each band, the convenience of easy assembly and modest dimensions. Value through heavy duty all aluminum construction and a price complete with 1-1 balun.

Enjoy a new world of DX communications with ATB-34!

SPECIFICATIONS

FORWARD GAIN -	7.5 dBd	WIND SFC -	5.4 Sq.Ft.
F/B RATIO -	30 dB	WEIGHT -	42 Lbs.
VSWR -	1.5-1	WIND SURVIVAL -	90 MPH.
POWER HANDLING -	2000 WATTS PEP		
BOOM LENGTH/DIA. -	18' x 2 1/8"		
LONGEST ELEMENT -	32'8"		
TURNING RADIUS -	18'9"		

$239.95
COMPLETE
NO EXTRAS TO BUY

IN STOCK WITH DISTRIBUTORS WORLDWIDE

cushcraft
CORPORATION

BOX 4680, MANCHESTER, N.H. 03108

TEN-TEC CENTURY 21. The Exciting New 70-Watt, 5-Band CW Transceiver That's Surprising Everyone, Beginner and Old Timer, With Its Super Performance and Low Cost.

• Full Break-In • Full Band Coverage on 3, 5, 7, 14, 21 MHz Bands, 1 MHz on 28 MHz Band • 70 Watts Input • Total Solid-State • Receives SSB and CW • Receiver Sensitivity 1 μV • Instant Band Change, No Tune-up • Offset Receiver Tuning • 3-Position Selectivity • Adjustable Sidetone Level • Linear Crystal-Mixed VFO • Overload Protection • Built-In AC Power Supply • Black & Gray Styling • HWD: 6⅛" × 12½" × 12", 15½ lbs. • Matching Accessories

THE RECEIVER. Double-Direct-Conversion. Easy tuning. Just select the frequency and set the audio level. Excellent cross-modulation characteristics. Offset tuning so you can tune either side of zero beat to reduce QRM. Front panel control selects one of 3 selectivity curves: 2.5 kHz for SSB reception, 1 kHz for normal CW, and 500 Hz for when the QRM gets rough. Plus separate AF and RF controls, headphone jack, and built-in speaker.

THE TRANSMITTER. Total solid-state. Push-pull Class C final amplifier. Individual low-pass filters are switched into the antenna line to reduce unwanted radiations, minimize TVI. No tune-up needed when changing frequencies or bands. And *full* break-in allows incoming signals to be heard between transmitted characters. Now CW is real conversation!

THE VFO. Common to receiver and transmitter. Permeability tuned. Linear scale. 5-5.5 MHz basic frequency is crystal-mixed to the desired frequency so bandspread and stability are the same on all bands (crystals included for 3.5, 7, and 14 MHz bands).

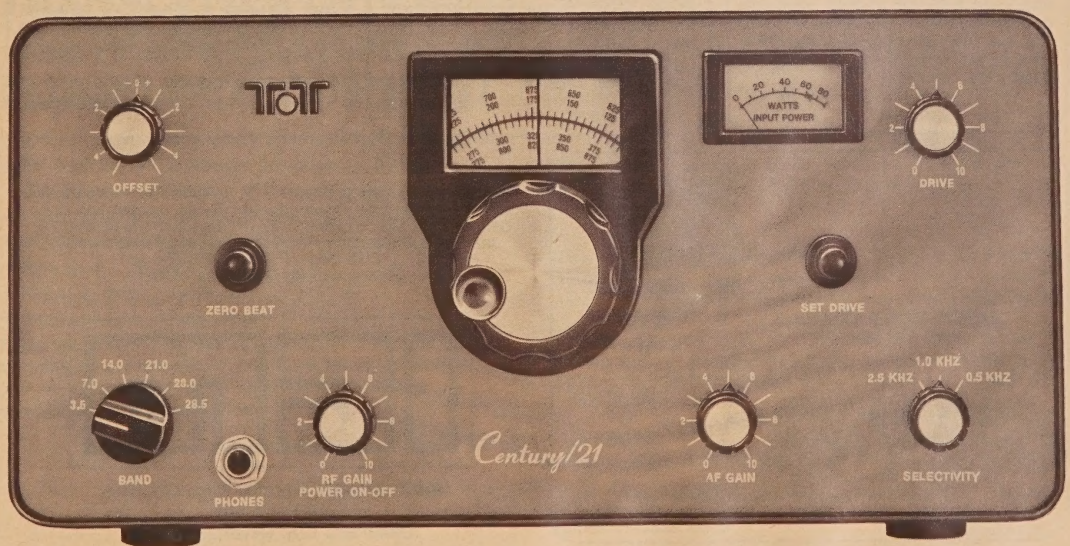
THE POWER SUPPLY. Built-in, AC operated, and regulated. Monitors current demand, shuts down automatically when necessary for protection. Lighted input current meter shows proper Drive setting.

MATCHING ACCESSORIES. Model 670 Electronic Keyer, 6-50 wpm, self-completing characters, powered by the Century. Model 276 Calibrator for markers at every 100 and 25 kHz. Model 271 Crystal for 21-21.5 MHz; 272 Crystal for 28-28.5 MHz; 273 Crystal for 28.5-29 MHz.

See the surprise of the CENTURY 21 at your TEN-TEC dealer – or write for full details.

TEN-TEC, INC.
SEVIERVILLE, TENNESSEE 37862
EXPORT:5715 LINCOLN AVE., CHICAGO, ILL. 60646

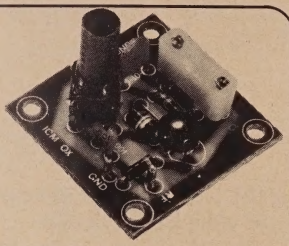
THE SURPRISE OF THE CENTURY



for the experimenter!

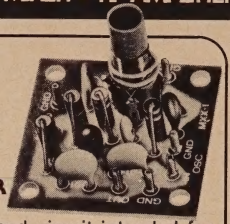
INTERNATIONAL CRYSTALS & KITS

OSCILLATORS • RF MIXER • RF AMPLIFIER • POWER AMPLIFIER



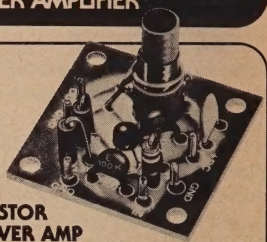
OX OSCILLATOR
Crystal controlled transistor type. 3 to 20 MHz, OX-Lo, Cat. No. 035100. 20 to 60 MHz, OX-Hi, Cat. No. 035101
Specify when ordering.

$3.95 ea.



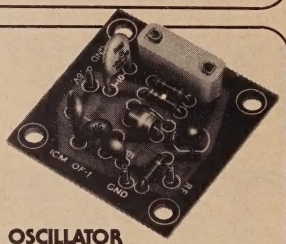
MXX-1 TRANSISTOR RF MIXER
A single tuned circuit intended for signal conversion in the 30 to 170 MHz range. Harmonics of the OX or OF-1 oscillator are used for injection in the 60 to 179 MHz range. 3 to 20 MHz, Lo Kit, Cat. No. 035105. 20 to 170 MHz, Hi Kit, Cat. No. 035106
Specify when ordering.

$4.50 ea.



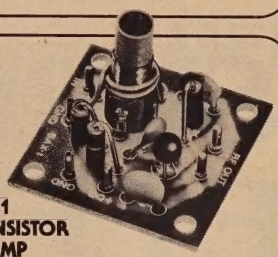
PAX-1 TRANSISTOR RF POWER AMP
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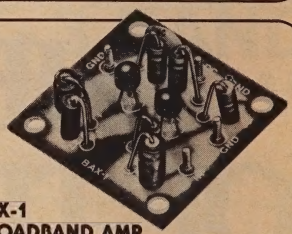
OF-1 OSCILLATOR
Resistor/capacitor circuit provides osc over a range of freq with the desired crystal. 2 to 22 MHz, OF-1 LO, Cat. No. 035108. 18 to 60 MHz, OF-1 HI, Cat. No. 035109
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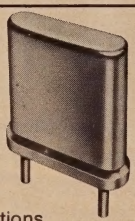
SAX-1 TRANSISTOR RF AMP
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Chart your course to success on 80 meters. Ply the DX waters through darkness as you reach out for that next port-of-call.

Navigating To 80 Meter DX

BY ROD LINKOUS*, W7OM

Navigators have been charting their course by the sun for centuries. Using a sextant, a watch and tables, the modern-day navigator can tell you accurately where he is during daylight. Knowing where the sun is with respect to the horizon is the key. Knowing where the sun *isn't* is the key to DX navigating on the 80 meter band.

DXing on 75 and 80 meters is a nighttime sport. To achieve maximum range both stations must be in darkness or just transitioning in or out of darkness. John Devoldere, ON4UN, covers 80 meter propagation very well in his recent book.[1] He discusses optimizing propagation by using the gray line phenomena to maximize DXing while minimizing lost sleep.

Course to DX

Several methods and tools are available for the serious 80 meter DXer. A book of sunset and sunrise tables are great. Using a world globe provides a fine means of predicting propagation. This article will provide you with a less expensive means to predict DX openings and thus helping to conserve a prime commodity.

Several years ago, Jack White, an avid low band s.w.l. gave a presentation on this subject. I took notes but didn't start using the system until I got down to those last few required for 5BDXCC. Then I found how effective his methods are in making schedules. They are an exceptional tool for developing low band strategy for DX contests.

By knowing who you want to communicate with and where the station is located, you are on your way to navigating the 80 meter band. Like the normal navigator you have two parts of the equation: the geographical location and the sun's location (below the horizon). Now you can solve for the time of darkness and SAVE SOME SLEEP.

*5632 47th Ave. SW, Seattle, Washington 98136

[1] *80 Meter DXing*, John Devoldere, ON4UN; Communications Technology Inc., Greenville, NH; 1977.

Concept

The navigator needs two pieces of information to determine location: correct time and the sun's position. So if you know the sun's position and the geographical location you can solve for the time. Table 1 provides the median apparent darkness period at 10 degree increments of latitude as a function of season. The seasonal effect on darkness is due to the position of the earth's axis as it rotates around the sun.

The apparent time is based upon 24 equally divided time segments. Each 15° increment of longitude constitutes an apparent time zone (segment). These segments may or may not coincide with actual local time zone.

To correlate or compare apparent times at two distant points, a standard time reference is required. The obvious choice is UTC (GMT).

The Greenwich Meridian is at 0° longitude. Conversion from apparent time to UTC (GMT) is merely a matter of adding or subtracting the number of 15° longitude increments either east or west of Greenwich. Table 2 provides the conversion.

With the time of darkness known at each end of the path, the time of common darkness can be easily noted. Any common darkness time indicates a possible all-darkness signal path.

Technique

With the basis outlined under concept, let us go through a sample using four examples:

1. Prepare a worksheet similar to the sample shown in fig. 1 by:
   a. Marking size vertical columns and labeling (see fig. 1)
   b. Identifying month of data (December in our sample)
2. In the first column list the locations you wish to communicate with including your own. (Seattle, Singapore, Angola, Kuwait and Tonga Islands in the sample)
3. From a world map, enter the latitude in column **b** and longitude in column **c.** Five degree accuracy is sufficient for this purpose. I use a call book atlas for this job.
4. Using table 1 and latitude for each location, determine the apparent darkness period for

LOCATION	LATITUDE	LONGTITUDE	DARKNESS SPAN (APPARENT)	UTC CONVERSION	DARKNESS SPAN UTC
A	B	C	D	E	F
SEATTLE	48%N	122%W	1200–0745	+8	0000–1545
SINGAPORE	2%N	103%E	1800–0550	–7	1100–2250
ANGOLA	10%S	12%E	1810–0530	–1	1710–0430
KUWAIT	10%S	48%E	1700–0650	–4	1300–0250
TONGA IS.	20%S	175%W	1830–0515	+11	0530–1615
JAPAN	50%N	195%W	1600–0745	–10	0600–2145

Fig. 1—An 80 meter DX worksheet.

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CQ

The Radio Amateur's Journal

TABLE 1– Local Darkness Periods (Apparent Time)

Latitude	January	February	March	April	May	June
60°N	1515-0900	1640-0800	1750-0630	1915-0500	2030-0330	2100-0300
50°N	1615-0800	1710-0720	1800-0625	1845-0520	1940-0430	2000-0400
40°N	1640-0730	1730-0700	1800-0620	1830-0530	1910-0500	1930-0430
30°N	1710-0700	1745-0645	1805-0615	1820-0540	1845-0520	1900-0505
20°N	1730-0640	1800-0640	1810-0615	1815-0550	1830-0540	1840-0520
10°N	1740-0630	1810-0630	1810-0615	1810-0600	1815-0550	1820-0540
0° Eq	1810-0620	1815-0620	1810-0610	1805-0600	1800-0600	1800-0600
10°S	1820-0600	1820-0615	1810-0610	1800-0610	1750-0615	1750-0615
20°S	1830-0540	1830-0600	1815-0610	1750-0615	1730-0630	1730-0630
30°S	1900-0520	1845-0545	1815-0610	1740-0630	1720-0645	1645-0705
40°S	1930-0500	1900-0530	1820-0605	1730-0640	1700-0710	1640-0720
50°S	2000-0430	1920-0515	1820-0600	1720-0700	1630-0740	1600-0800
60°S	2100-0330	1950-0440	1830-0550	1700-0715	1545-0830	1500-0915

Latitude	July	August	September	October	November	December
60°N	2100-0310	1950-0415	1815-0530	1645-0640	1510-0810	1500-0900
50°N	2000-0410	1915-0450	1810-0540	1710-0620	1600-0715	1600-0745
40°N	1920-0445	1850-0515	1805-0545	1715-0610	1630-0645	1630-0715
30°N	1900-0515	1840-0530	1800-0550	1720-0600	1700-0630	1700-0650
20°N	1840-0530	1820-0545	1800-0550	1730-0555	1710-0615	1715-0630
10°N	1820-0545	1815-0600	1800-0550	1740-0550	1720-0600	1740-0610
0°Eq	1810-0600	1800-0600	1800-0550	1745-0545	1740-0545	1800-0550
10°S	1750-0615	1750-0615	1800-0555	1750-0540	1750-0530	1810-0530
20°S	1730-0630	1745-0620	1800-0555	1755-0530	1805-0520	1830-0515
30°S	1715-0700	1730-0640	1750-0600	1800-0525	1815-0500	1850-0450
40°S	1650-0720	1715-0700	1745-0600	1810-0520	1845-0440	1915-0420
50°S	1615-0800	1650-0715	1740-0610	1820-0510	1910-0410	2000-0345
60°S	1520-0900	1620-0750	1730-0615	1840-0450	2000-0350	2100-0250

Note: The periods shown are median for the indicated month and therefore reflect mid-month values. Should a wide variation be noted (especially true as the polar extremities are approached) from one month to the next, simple linear interpolation will result in an accurate adjustment. For example, 60°S around 1 December would be: 2030-0320.

Similar approximations may be applied to latitude values. For example: 45°N in June would be 1945-0415.

Although not required for radio work, exact values for given dates may be obtained from a solar ephemeris available at engineering supply outlets.

TABLE 2 – Apparent Time Conversion

West Longitude (degrees)	Conversion	East Longitude (degrees)	Conversion
0-15	0	0-15	-1
15-30	+1	15-30	-2
30-45	+2	30-45	-3
45-60	+3	45-60	-4
60-75	+4	60-75	-5
75-90	+5	75-90	-6
90-105	+6	90-105	-7
105-120	+7	105-120	-8
120-135	+8	120-135	-9
135-150	+9	135-150	-10
150-165	+10	150-165	-11
165-180	+11	165-180	-12

each location for the month of consideration. Record these times in column **d.** Selecting the closest value is usually sufficient. Accuracy can be obtained by rough linear interpolation if desired.

5. Using table 2 and the longitude for each location, determine the time conversion factor for each location. Record the value in column **e.**
6. Algebraically add columns **d** and **e** to determine darkness span for column **f.** If the sum is larger than 24, subtract 24 or if the sum is negative, add 24.
7. On a ruled sheet (graph paper is preferrable) rule a horizontal time reference as shown in fig. 2. Start the time on the left with 2000 hours.
8. Using the time reference, draw a bar indicating the darkness span for each location.
9. Draw a vertical line at each end of *your* darkness period.

Conclusion

The portion of darkness shared at both locations can be noted from the resulting chart shown in fig. 2. The time of a possible opening is thus determined as it is that period when both stations (ends of the path) are in darkness.

In review, let us use Japan as a location and December as a month and go through an example. Following the steps above:

1. Draw up work sheet (see fig. 1)
2. Enter JAPAN in column **a.**
3. Enter 50°N in column **b.** Enter 145°E in column **c.**
4. From table 1, select apparent darkness (for 50°N is 1600-0745) and record in column **d.**
5. From table 2, select the conversion (for 145°E is -10) and record in column **e.**
6. Add columns **d** and **e.** (Adding 1600-0745 to -10 equals 0600-(-0345) or 0600-2145).
7. Draw up opening chart (see fig. 2)
8. Plot the time for column **f.**
9. Determine reference opening.
10. The common opening for my Seattle location and Japan in December is thus from 0600 to 1530 UTC.

The 0600 to 1530 UTC opening to Japan is remarkably accurate with respect to the opening experienced from Seattle. The opening is usually never off but a few minutes. Then you wonder if the timing of the prediction was influenced by the high power and good antennas or the other end.

The Gray Line Time Zone

Dale Hoppe, K6UA and Pete Dalton, W6NLZ in their article of the Gray Line Zone in September 1975 *CQ* emphasized that optimum propagation conditions occur during sunset and sunrise. For the period during transitioning to and from daylight increased path links occur due to the phenomena of D layer decay and buildup discussed in the article.

The time over which this occurs varies from a few minutes at the equator to several hours at the poles. The approximate Gray Line Time Zone in Seattle (48°N) is 1.5 hours. At 65°N it is roughly 4 hours. Using this information, you can approximate your Gray Line Time Zone and add it to the opening prediction chart as shown in fig. 3. This will isolate the period in which you can expect opti-

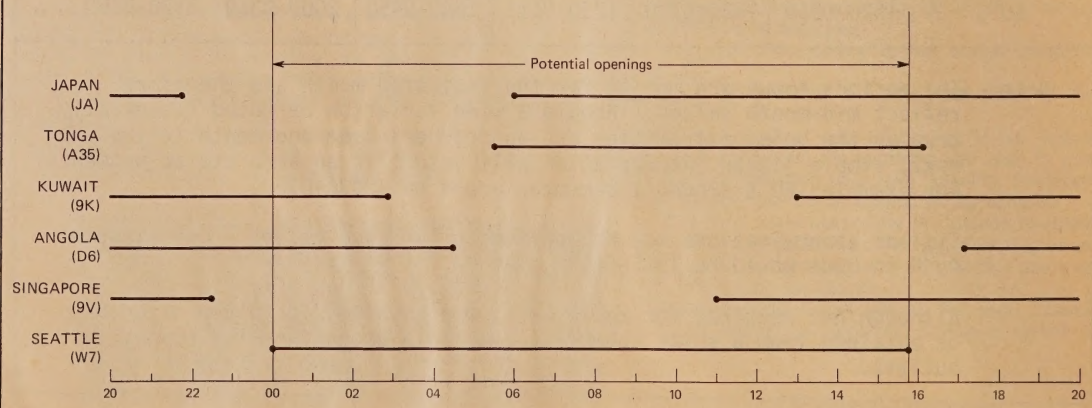


Fig. 2—An 80 meter DX opening chart.

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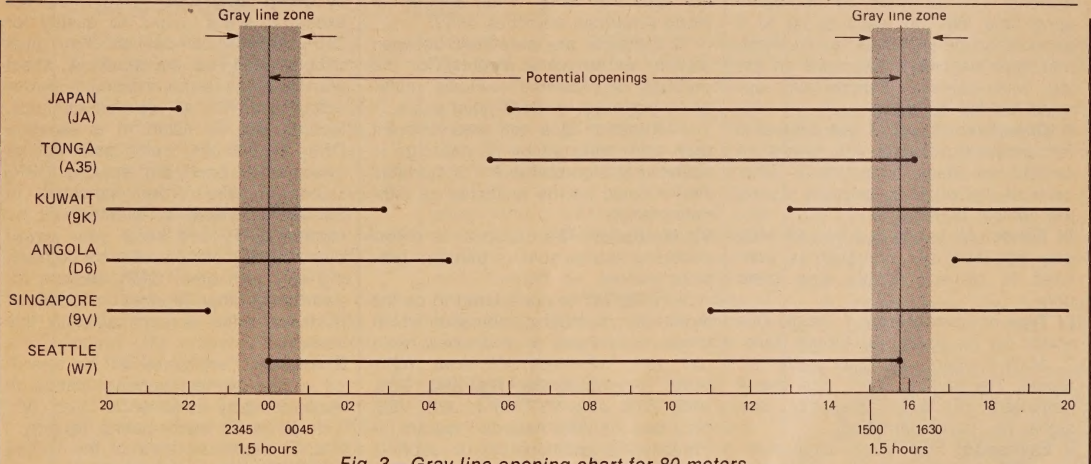


Fig. 3—Gray line opening chart for 80 meters.

mum conditions on a given day.

Short path propagation peaks will occur first around sunrise of the eastern end of the path and then around sunset of the western end of the path. A long path peak may occur at the sunrise of the western end of the path or at sunset of the eastern end of the path. Long path openings may be observed when the paths are partially in daylight.

Summary

This prediction scheme is accurate enough to schedule the DX station you snag on 20 for an 80 meter QSO later that night. Nothing can be worse in scheduling than to pick a time when communication is marginal or impossible. It is also more considerate to select a sunrise or sunset time for the other DXer so he doesn't lose his sleep.

Good luck, good navigating, and good DX. ■

CQ will soon be releasing The Shortwave Propagation Handbook by George Jacobs and Ted Cohen. Details will be in upcoming issues.

New in the 1978 Contest...
"A QRPp Section"
and "A Club Competition Award"

22nd Annual CQ World Wide WPX/SSB Contest

0000 GMT MARCH 25-2400 GMT MARCH 26, 1978

I Contest Period: Starts 0000 GMT Saturday. Ends: 2400 GMT Sunday. Only 30 hours of the 48 hour contest period permitted for Single Operator stations. The 18 hours of non-operating time may be taken in up to 5 periods anytime during the contest, and must be clearly indicated on the log. Multi-operator stations may operate the full 48 hours.

II Objective: Object of the contest is for amateurs around the world to contact as many amateurs in other parts of the world as possible during the contest period.

III Bands: All bands, 1.8 thru 28 MHz may be used, but operation is confined to two-way single side band *only*.

IV Type of Competition: 1. Single Operator (a) All Band, (b) Single Band. 2. Multi-operator, All Band *only*. (a) Single Transmitter, (only one signal permitted), (b) Multi-Transmitter, (one signal per band permitted).

V Exchange: Five figure serial number, RS report plus a progressive three digit contact number starting with 001 for the first contact. (Continue to four digits if past 1000) Multi-transmitter stations use separate numbers for each band.

VI Points: 1. Contacts between stations on different continents; count 3 points on the 14, 21, and 28 MHz bands, and 6 points on the 7, 3.5 and 1.8 MHz bands.

2. Contacts between stations in the same continent but not in the same country; count 1 point on 14, 21 and 28 MHz and 2 points on 7, 3.5 and 1.8 MHz (Exception: Contacts between different North American countries count 2 points on 14, 21 and 28 MHz and 4 points on 7, 3.5 and 1.8 MHz. This applies to North American countries *only*).

3. Contacts are permitted between stations in the same country for the purpose of obtaining a Prefix multiplier, but have no QSO point value.

4. A station in a call area different than that indicated by its call sign is required to sign portable. The portable Prefix would be the multiplier as indicated below.

VII Multiplier: The multiplier is determined by the number of different prefixes worked.

A **"PREFIX"** is considered to be the three letter/number combination which forms the first part of an amateur radio call. (N1, W2, WB3, K4, AA6, WD8, WA0, DA1, DL7, G3, IT9, 4X4, 3D6, 9M2, CT9, 4J9, PY7, VK4, JE3, VE3, etc.) See the WPX Awards Program information if additional clarification is necessary. It is available from K6XP.

Special event, commemorative and other unique prefix stations are also encouraged to participate.

VIII Scoring: 1. Single Operator (a) All Band score, total QSO points from all bands multiplied by the number of different Prefixes worked. (b) Single Band score, QSO points on that band multiplied by the number of different Prefixes worked. See VII.

2. Multi-Operated stations. Scoring in both these categories is the same as the All Band scoring for Single Operator.

3. A station may be worked once on each band for QSO point credit. However, prefix credit can be taken only **once** regardless of the band.

IX QRPp SECTION: Power must not exceed 5 watts output to qualify for QRP_p section competition. You must denote QRP_p on the summary sheet and state the actual maximum power output used for all claimed contacts. Results will be listed in a separate QRP_p section and certificates will be awarded to each top scoring QRP_p station in the order indicated in Section X. These certificates will be marked QRP_p and show your power output. QRP_p stations will be competing only with other QRP_p stations for awards. All other information contained in these rules is applicable to this section.

X Awards: Certificates will be awarded to the highest scoring station in each category listed under Sec. IV.

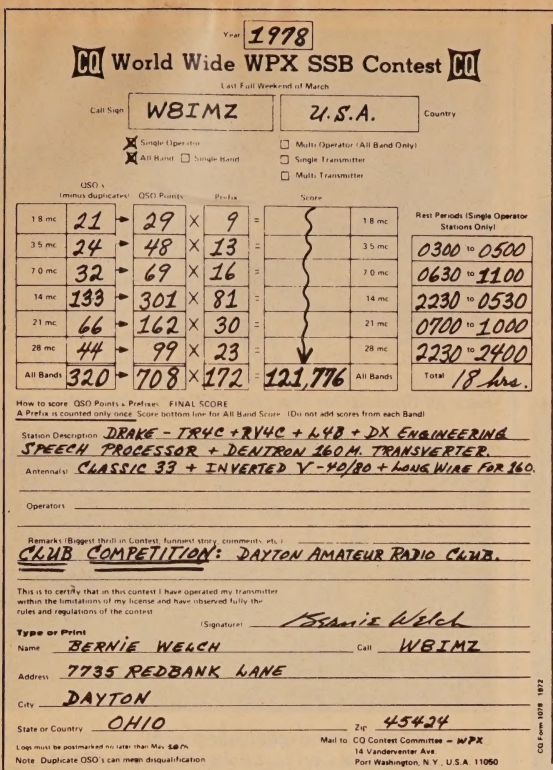
1. In every participating country.

2. In each call area of the United States, Canada and Australia.

All scores will be published. However, to be eligible for an award, a Single Operator station must show a minimum of 12 hours of operation. Multi-operator stations must show a minimum of 24 hours.

A single band log is eligible for a single award *only*. If a log contains more than one band it will be judged as an all band entry, unless specified otherwise. However, a 12 hour minimum is required on the single band.

In countries or sections where the returns justify, 2nd and 3rd place



Year 1978

CQ World Wide WPX SSB Contest CQ

Last Full Weekend of March

Call Sign W8IMZ | Country U.S.A.

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

	QSO's (minus duplicates)		QSO Points		Prefix		Score		Rest Periods (Single Operator Stations Only)
1.8 mc	21	→	29	×	9	=		1.8 mc	
3.5 mc	24	→	48	×	13	=		3.5 mc	0300 to 0500
7.0 mc	32	→	69	×	16	=		7.0 mc	0630 to 1100
14 mc	133	→	301	×	81	=		14 mc	2230 to 0530
21 mc	66	→	162	×	30	=		21 mc	0700 to 1000
28 mc	44	→	99	×	23	=		28 mc	2230 to 2400
All Bands	320	→	708	×	172	=	121,776	All Bands	Total 18 hrs.

How to score: QSO Points x Prefixes = FINAL SCORE
A Prefix is counted only once. Score bottom line for All Band Score. (Do not add scores from each Band)

Station Description: DRAKE - TR4C + RV4C + L4B + DX ENGINEERING SPEECH PROCESSOR + DENTRON 160 M. TRANSVERTER.

Antenna(s): CLASSIC 33 + INVERTED V - 40/80 + LONG WIRE FOR 160.

Operators:

Remarks (Biggest thrill on Contest, funniest story, comments, etc.):
CLUB COMPETITION: DAYTON AMATEUR RADIO 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.

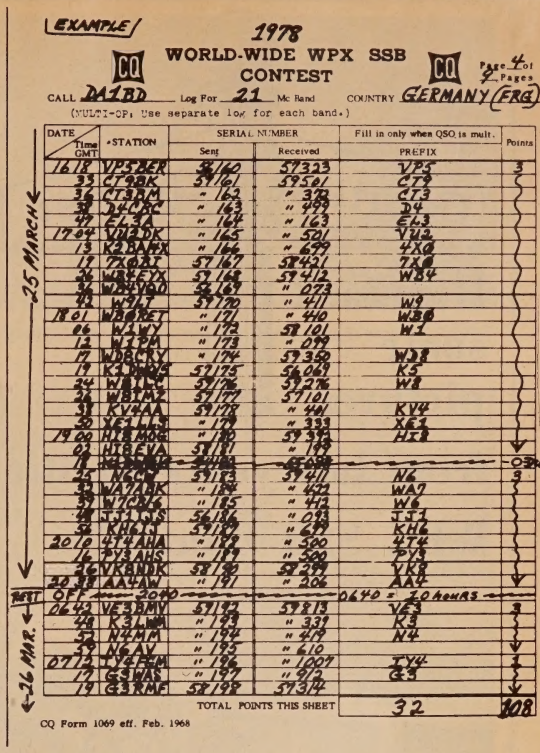
(Signature) Bernie Welch

Type or Print
Name: BERNIE WELCH Call: W8IMZ
Address: 7735 REDBANK LANE
City: DAYTON
State or Country: OHIO Zip: 45424

Logs must be postmarked no later than May 10th.
Note: Duplicate QSO's can mean disqualification

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

CQ Form 1078 1977



EXAMPLE

1978
CQ WORLD-WIDE WPX SSB CONTEST CQ
Page 4 of 4 Pages

CALL DA1BD Log For 21 Mc Band COUNTRY GERMANY (FRG)
(MULTI-OP: Use separate log for each band.)

DATE / Time GMT	STATION	SERIAL NUMBER Sent	Received	Fill in only when QSO is mult. PREFIX	Points
1618	VP5BER	58/160	57333	VP5	3
33	CT9BK	59/161	59501	CT9	3
36	CT3BM	" 162	" 378	CT3	3
38	D4CRC	" 163	" 499	D4	3
42	EL4A	" 164	" 163	EL4	3
1704	VP2DK	" 165	" 501	VP2	3
13	K2BAVEX	" 166	" 679	4X6	3
17	7X0AI	57/167	58421	7X0	3
24	W8EYK	59/168	59412	W8Y	3
34	WB4YDO	58/169	" 073		
44	W9KT	59/170	" 411	W9	3
1801	WB8RET	" 171	" 440	WB8	3
06	W1WY	" 172	58101	W1	3
12	W3PM	" 173	" 099		
17	WB8CMY	" 174	59350	WD8	3
19	K3WWG	57/175	56049	K3	3
24	W4MC	59/176	59276	W4	3
28	WB4AZ	59/177	57101		
31	KV4AA	59/178	" 441	KV4	3
39	VE3EJG	" 179	" 333	XE1	3
1900	HI8MDR	" 180	59333	HI8	3
03	HI8EWA	59/181	" 193		
11	WB8EWC	59/182	56088		0
15	NC4M	59/183	59411	N4	3
23	WA7ANK	" 184	" 422	WA7	3
29	W7GJ6	" 185	" 442	W6	3
41	JJ1GGS	56/186	" 093	JJ1	3
54	KH6IN	59/187	" 449	KH6	3
2010	4X4AHA	" 188	" 500	4X4	3
16	PY3ANS	" 189	" 500	PY3	3
26	VK8NDK	58/190	58299	VK8	3
2038	AA4AW	" 191	" 206	AA4	3
OFF		2040		0640 = 10 HOURS	
0643	VE3EMY	57/192	59813	VE3	3
48	K3LMM	" 193	" 337	K3	3
53	N4MM	" 194	" 479	N4	3
59	N6AV	" 195	" 610		
0713	VE6FM	" 196	" 1009	VY4	3
17	G3WAS	" 197	" 970	G3	3
19	G3XMC	58/198	57314		
			TOTAL POINTS THIS SHEET	32	108

25 MARCH
16 MAR.

CQ Form 1069 eff. Feb. 1968

awards will be made.

XI Trophies & Plaques: *(Donors)*

1. WORLD—Single Operator, Single Band, *(Jack Reichert, W3ZKH)*

2. WORLD—Single Operator, All Band. *(North Florida DX Assn.)*

3. WORLD—Multi-operator, Single transmitter. The Ted Thorpe, ZL2AWJ Memorial. *(Don Miller, W9WNV)*

4. WORLD—Multi-operator, Multi-transmitter. The Chuck Swain, K7LMU Memorial. *(Don Miller, W9WNV)*

5. USA—Single Operator, Single Band. The Joe Johnson, W5QBM Memorial. *(Richardson Wireless Klub)*

6. USA—Single Operator, All Band. *(Bob Epstein, K8IA)*

7. CANADA—Single Operator, Single Band. *(Gene Krehbiel, VE7KB)*

8. CANADA—Single Operator, All Band. *(Garth Hamilton, VE2VY)*

9. WORLD—Club. *(Ontario Contest Beavers Club of Canada)*

10. WORLD — Contest Director's Plaque. To the DXpedition especially organized and operated in the WPX Contest that the Committee considers the most worthy. A minimum of three logs must be received. *(Bernie Welch, W8IMZ)*

(Except for #10 above, the awards are for high score.) WORLD Trophy & Plaque winners may win the same award only once within a two year period. This does not apply to any USA, Canada or CQ Special Awards.

XII Club Competition: A trophy will be awarded each year to the club or group that has the highest aggregate score from logs submitted by members. The club must be a local group and not a national organization. Participation is limited to members operating within a local geographical area. *(Exception: DXpeditions especially organized for operation in the contest and manned by members.)* Indicate on your Summary Sheet the name of your club affiliation. To be listed, a minimum of three logs must be received from a club.

XIII Log Instructions: 1. All times must be in GMT. The 18 hour non-operating periods must be clearly shown.

2. Prefix multipliers should be entered *only* the FIRST TIME they are contacted.

3. Logs must be checked for duplicate contacts and prefix multipliers. Recopied logs must be in their original form, with corrections clearly indicated.

4. A prefix check list is not only desirable but a *must* for proper contest operation. (It is recommended that you also send it along with your contest log.)

5. Each entry must be accompanied by a Summary Sheet listing all scoring information, the category of competition and the contestant's name and mailing address in BLOCK LETTERS.

Also a signed declaration that all contest rules and regulations for amateur radio in the country of the contestant, have been observed.

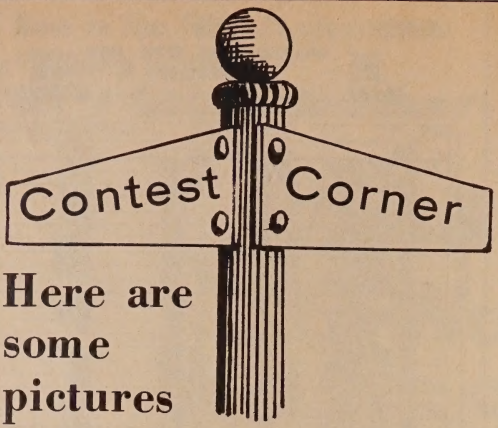
6. Official log and summary sheets are available from *CQ*. A large self-addressed envelope with sufficient postage or IRCs must accompany your request.

If official forms are not available you can make your own with 40 contacts to the page.

XIV 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 multipliers will be deemed sufficient cause for disqualification. Actions and decisions of the CQ WPX Contest Committee are official and final.

XV Deadline: All entries must be postmarked no later than May 10, 1978. From rare isolated areas the deadline will be made more flexible. Your support is appreciated.

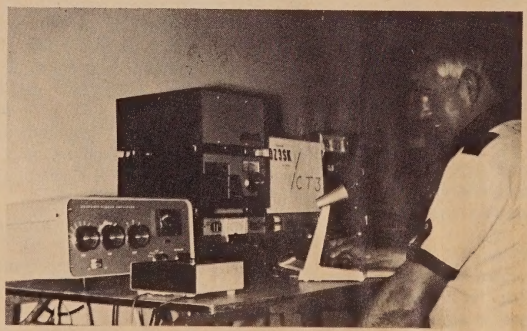
Logs go to: *CQ* WPX SSB Contest Committee, 14 Vanderventer Avenue, Port Washington, NY 11050 USA.



Here are some pictures from last years exciting WPX SSB Contest.



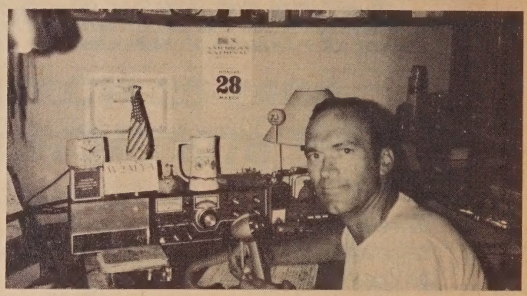
Pedro, OA4AHA is responsible for the exotic prefix 4T4AHA station operation on 14 MHz. He scored over one million points.



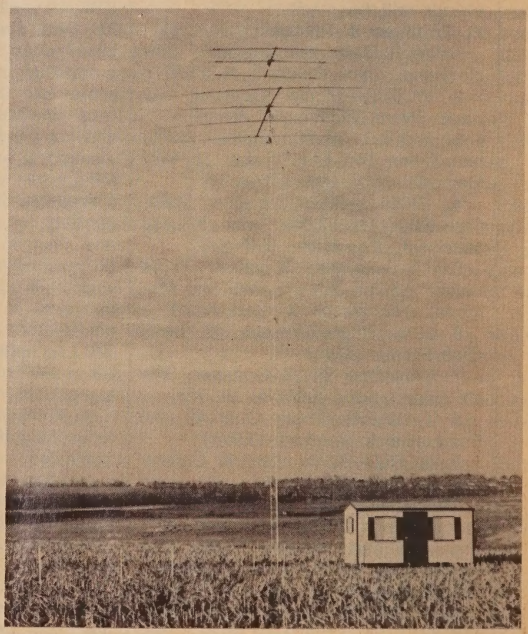
The highest All-Band Score from Africa was the DXpedition by Egon, operating OZ3SK/CT3 at Machico, Madeira Is.



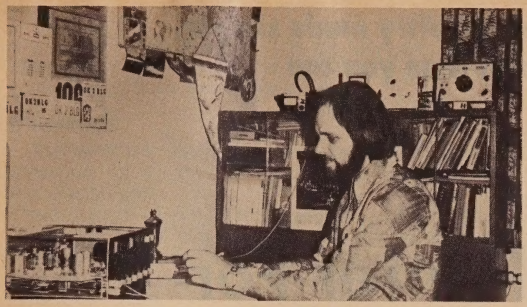
Ron, W8ILC, QRPp 1 watt in the contest proudly displays the #1 DXCC Milliwatt Trophy he recently won. He's all fired up for the new QRPp section action in '78.



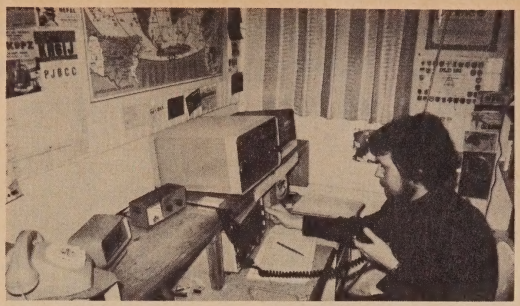
Greg, W2MYA found contesting a bit easier this year. He won a Certificate Award for his efforts.



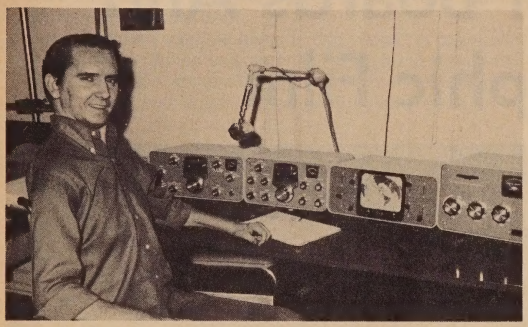
With construction only partially completed the new shack and antenna farm near Spring Hill, Kansas was greatly responsible for Steve, WB0RET winning his first 0 District Certificate Award. Watch out for him in the '78 contest.



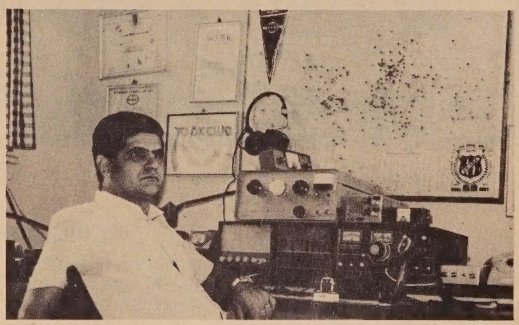
An avid WPX contester for several years, Karel, OK2BLG won an All-Band Certificate Award.



Top 80 Meter Score from the Netherlands was by PA9TK. Wilf is also DJ6TK.



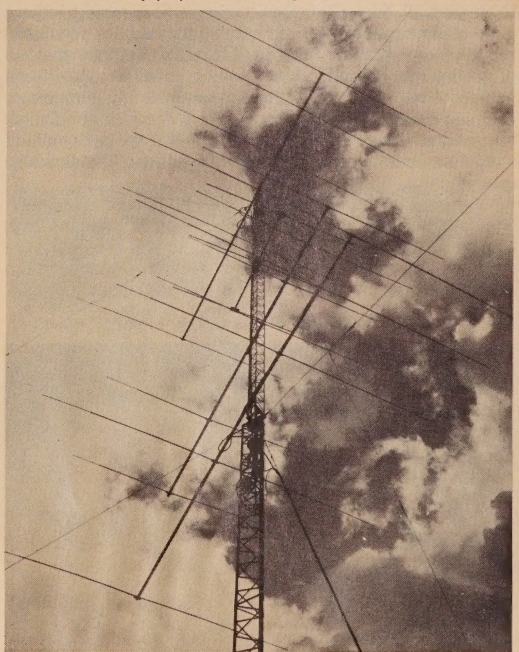
Chuck, K5FKD—Certificate Award Winner, 21 MHz.



Luciano, ex. PY7VNY found his new prefix call PT7WA very popular in this year's event.



4J9B, Chief Operator Sam, UA9AN (center) and two of his helpers. That is one of their fabulous antennas high above ground on the top of the Chelyabinsk Polytechnic Institute Radio Club building in Asiatic Russia.



Morrie, W8FF used this antenna array to win the 8th District, 1st Place, All-Band Certificate Award. 5/5 on 14 MHz at 125 ft.; 6 on 21 MHz at 90 ft.; 3 on 28 MHz at 110 ft.; and the top 55 feet of tower rotates.

Photography without a camera! Printed circuitry made simple. For a few dollars and a couple of hours of time you can get in on the fun of building again.

A Contact Printer For Printed Circuit Boards And Photographic Film

BY BILL JOHNSTON*, N5KR

One of the most common methods used by the home-brewer to make printed circuit boards is to place a full-sized negative of the circuit directly on the sensitized board and make the exposure directly, without the aid of an enlarger. Frequently, he may also make one-to-one copies of negatives in the same manner. This procedure is called **contact printing,** and it offers a number of distinct advantages. The most important is that it requires neither a camera, nor a photographic enlarger, so the financial investment is practically zero.

In order for contact printing to be successful, however, the negative must be held securely against the item being exposed. If the two pieces should slip, the exposure is ruined. If they are not pressed tightly against each other, definition suffers and the image becomes fuzzy.

*1808 Pomona Drive, Las Cruces, New Mexico 88001

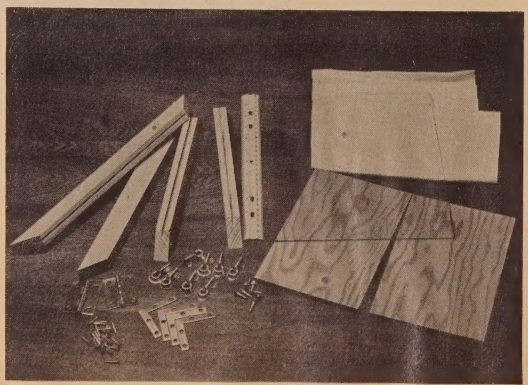


Fig. 1—The parts required for the contact printer, ready for assembly.

That in turn results in a poorly-etched board, sometimes causing bridges between adjacent copper runs.

Laying a piece of glass on top of the negative might help in some cases, but it usually causes as many problems as it solves. What we really need is a simple, inexpensive device that is easy to make and use, and which will hold the negative and the item to be exposed securely in place and tightly pressed against each other.

The handy device described here meets all of those requirements. Purchased new, the parts cost about $3.60. In my case, I found most everything in the junk box, and laid out only 63c to complete the parts acquisition. You might spend another 50c or so if you use hardwood rather than the select pine that I used. As seen in the accompanying photographs, the contact printer consists of a sheet of glass held in a wooden frame. A two-piece hinged removable wooden back is felt-covered, and locks into place with turn buttons. This allows easy insertion of the negative and the material to be exposed, and sandwiches them tightly between the glass and the back.

Dimensions

The exact size of the contact printer is left up to the builder. I will, however, make some comments that may help you decide what you need. First of all make the printer big enough to handle the largest piece of film or circuit board you expect to use. I personally use up to 8 × 10 in. (20.3 × 25.4 cm) photographic film and 8½ × 11 in. (21.6 × 27.9 cm) litho film, so the inside dimensions of the frame were made a half-inch larger than the litho film, or 9 × 11½ in. (22.9 × 29.2 cm). Remember that this is the *exposed* area of the glass, so the sheet of glass itself has to be a half-inch larger than that, or 9½ × 12 in. (24.1 × 30.5 cm). The outside dimensions of the frame will depend upon the actual width of the wood you use.

It's better to build the printer a little too big, of course, than to make it too small. I've found that a printer capable

of handling 8½ × 11 inch film will take care of just about any printed circuit board (except perhaps a microprocessor mother board), and at the same time it is still small enough to be stored in a drawer.

Materials

The materials required to build the contact printer are shown in fig. 1, and are listed below, with comments where appropriate.

Wood (frame)—A 6 ft. (1.8 m) length of 1 × 2 in. (2.5 × 5.1 cm) select pine or hardwood will be more than enough. Select a straight piece with no warps, twists, or knots. You may prefer to have it ripped to a slightly narrower width.

Wood (back)—Quarter inch (0.64 cm) smooth plywood works well. You need a perfectly flat piece, the same size as the exposed glass area. Birch veneer cabinet wood works nicely also.

Glass—Standard window glass is fine. Select a piece with no bubbles, ripples or scratches. Have it cut a half-inch larger in each dimension than the intended exposed area. You don't want to use plastic here because its optical qualities are poor, and the static electricity will attract dust.

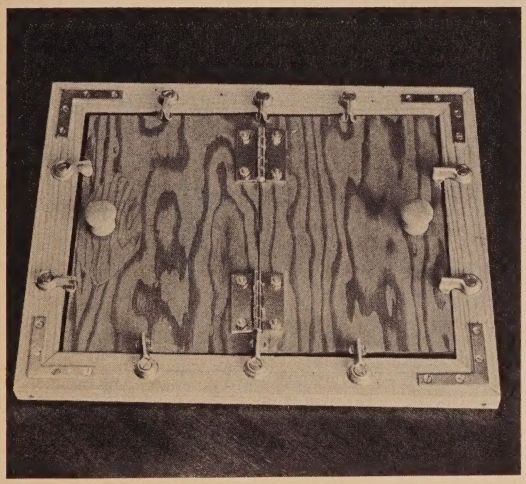


Fig. 2—Back view of the contact printer, fully assembled.

Corner Braces—Flat steel or brass corner braces. 4 required.

Turn Buttons—10 required to make the size printer described.

Hinges—2 required. Must be flat where they contact the wood back pieces.

Machine Screws—8 required, plus lockwashers and nuts, for mounting hinges. These must be flat-head type.

Wood Screws—A sufficient number of flat-head wood screws of the appropriate sizes, required to mount the corner braces, turn buttons, knobs, etc.

Knobs—2 small wooden knobs.

Felt—Tight-woven, lint-free felt of sufficient size to cover the back pieces.

Glue—Model airplane glue or white glue for mounting the felt.

Assembly

Refer to fig. 2 for assembly of the frame and backplate. The first step is to prepare the pieces for the frame. Cut the pieces about 5 inches longer than the intended *inside* dimensions. Now cut the grooves that will hold the glass. A power saw or router will do this nicely. If you have no way at all of cutting the groove, the glass can be mounted on front of the frame with overlapping moulding strips, in which case you will need a thicker back piece.

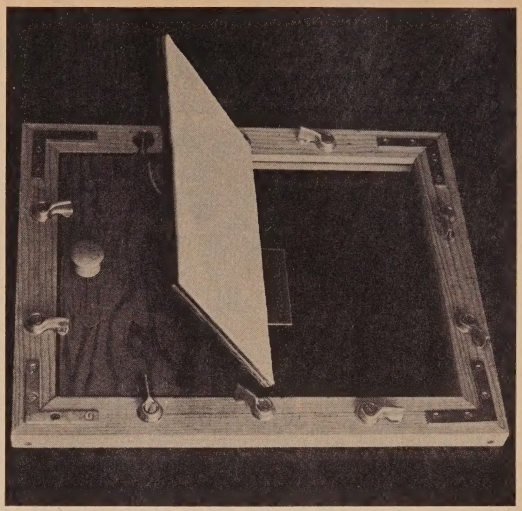


Fig. 3—Loading the printer with a negative and the material to be exposed.

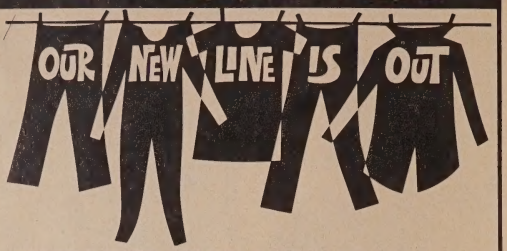
The grooves should be about 5/16 inch (8 mm) deep, and they should be placed so that when the glass is installed, the back plate (without the felt) will be just flush with the back of the frame. The grooves should be wide enough and deep enough that the glass will not bend.

Now lay the frame pieces in a rectangle on a table, such that the grooves line up. Clearly mark each piece



Fig. 4—Front view of the N5KR contact printer, exposing a small circuit board by solar power!

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on the side that will be the back of the frame. You're now ready to cut the pieces to their proper lengths. If you make square (butt-end) corners, the measurements are straightforward. It's more difficult to make the 45° mitered corners, but it does look a little nicer. In this case, I suggest you start by mitering one end of each of two *adjacent* sides. Hold this corner together and insert the glass. Carefully mark the point on each piece where the next miter cut will be made. Remember that the glass extends into the groove, so you have to adjust the location of the miter accordingly. Make the cuts one at a time, and recheck the pieces for fit after each cut. Once you're satisfied that you have these two adjacent sides cut correctly, you can use them to mark the other two pieces. Be sure to always keep the pieces right side up, or the grooves won't line up. Use fine sandpaper to give the pieces a smooth finish.

Use the corner braces to assemble *three* sides of the frame. You must carefully mark the locations of the mounting screws and drill the pilot holes; otherwise, the corners won't be flush. Also be sure you place the corner braces so that the screws won't interfere with the glass. If needed for added strength, an extra screw can be installed through the edge of the frame at each corner (see figures 2 and 3). If you prefer, the corners can be assembled with glue and edge-mounted screws, but do this for three sides only.

Now fit the fourth side and drill the pilot holes. Remove the side, insert the glass, and put the last side back on. If you cut everything right, the glass should slide freely with no binding, and with the fourth side fitted the glass should be slightly loose.

Assuming everything fits, go ahead and varnish the frame if you intend to do so (but don't get it in the grooves). Cut some very narrow strips of felt and lay them in the grooves. You want just enough to keep the glass from moving in the frame. Reinstall the glass and fasten on the fourth side of the frame. If you used glue on the other joints, don't use it here. Should you ever break the glass, you can just take out the screws to remove one side, slide in a new piece of glass, reinstall the side, and you're back in business!

We're now ready to assemble the back plate. The finished assembly should be about one-eighth inch (3 mm) shorter in each dimension than the opening in the frame. Cut the piece in half, across the shorter dimension. Varnish the pieces at this time if you care to do so. Install the hinges with flathead machine screws. The heads must be countersunk into the wood on the side that will face the glass. Now install the wooden knobs with flathead wood screws, countersinking them in the same manner.

Cut two pieces of felt to fit the two halves of the back plate, and glue them in place with white glue or model airplane glue. Make sure the glue is dry before you use the contact printer as the fumes can harm the film or photoresist.

Place the back-plate in the frame, and mark the locations for the turn buttons. Make sure the mounting screws will clear the glass in the frame, then drill the pilot holes and mount the turn buttons. When closed, the turn buttons should exert pressure on the back-plate. If the back-plate sticks up above the frame, tighten the turn button mounting screws just enough to get the right pressures. If the back plate isn't thick enough to get sufficient pressure, glue on one or more additional layers of felt. The exact adjustment may have to be a compromise, since the printer will be used to expose both film and circuit boards, which are of considerably different thicknesses.

Fig. 2 shows a back view of the completed contact printer, with the back plate locked in place.

Using the Printer

The printer is extremely easy to use, even in a darkroom. Lay the printer face down and place the negative and the item to be exposed on the glass, with the negative against the glass. Hold these in place with one hand and lower the hinged back plate into place so that half of it contacts material to be exposed. See fig. 3. Lock this half into place with the turn buttons, then close and lock the other half. Turn right side up and you're ready to make the exposure.

Making the Exposure

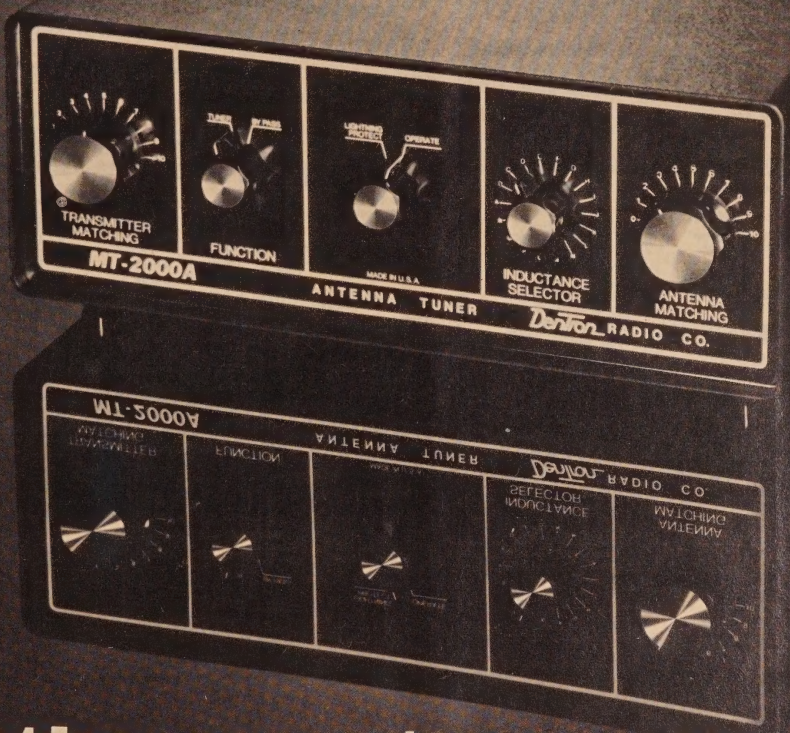
For film, follow the manufacturer's exposure recommendations, or experiment as desired. For circuit boards, I prefer to make the exposures in sunlight. Fig. 4 shows a front view of the contact printer with a small circuit board being exposed outdoors. Either way, the printer should be at right angles to the light source.

Summary

For a measly three dollars and a couple hours time, you can build yourself a simple but high-quality contact printer that will last a lifetime. In addition to the uses previously mentioned, you can work up your own boards by using standard black PC artwork stick-ons on clear acetate, and expose the negative directly from your original. The stick-ons can then be re-used for other projects. Not only that; you've saved yourself $350 for a camera and enlarger, which you can now spend on more amateur gear!

As a final word, I would like to express my thanks to Blaine Byers, who offered a number of useful suggestions for this project. ■

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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

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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
HR-10-B Receiver	69
SB-303 Receiver	269
SB-220 Linear Amp	449
SB-102 Trivcvr	379
DX-60B Transmitter	69
HW-32 Transmitter	85
HW-100 Transceiver	249
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
HA-20 6m Linear	125
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-21 2M FM Xcvr	$299
IC-230 Demo	369
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IC-30A 432 MCFM	269

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Ranger I Transmitter	85
Ranger II Transmitter	139
Valiant I Transmitter	129
Invader 2000 Xmitt	495

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T-599 Transmitter	$289
R-599 Receiver	289
TS-520 Tranc	429
QR-666	259
QR-666 Receiver	239
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r-100 Receiver	59
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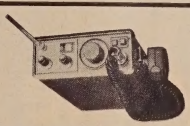
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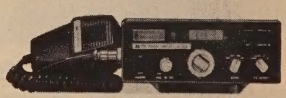
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CQ Reviews: The RFE-100 Digital Frequency Display

BY HUGH R. PAUL*, W6POK

RF Engineering Corporation's RFE-100 digital frequency display has not been widely advertised, but has been exhibited at a number of the major amateur radio conventions during the past few months. The unique design features of the RFE-100 prompted us to obtain one for test and evaluation.

The RFE-100 is available in either a black or grey cabinet measuring 1½" high, 7" wide and 6" deep. The built in power supply will operate from 117/220 v.a.c. 60 Hz. For mobile operation the unit may be powered by 13.8 v.d.c. The only control is the push type power switch. Unlike some digital frequency displays, this one features automatic band and mode switching, from 160 through 10 meters.

To accomplish automatic band and mode switching it is necessary to sample the operating frequencies of the variable frequency oscillator, beat frequency oscillator and the carrier oscillator. These frequencies are available at the back of some transceivers and transmitter/receiver combinations such as the Collins S line, Drake C line and Kenwood TS-520S or TS-820. In the case of my early TS-520, it was necessary to install three phono type jacks on the back and connect these to the proper pickoff points of the oscillators with special low loss coax supplied with the RFE-100. Installation was quickly and simply accomplished by following the explicit directions and diagrams furnished by the manufacturer. The display tested will function with all of the makes of equipment just mentioned. With some other makes it may be necessary to reprogram the counter circuitry to conform to the heterodyning scheme employed. RF engineering will do this for a nominal charge, thus your investment is protected in the event you change equipment.

Some transceivers such as the Tempo 2020 have a lower v.f.o. output level. When the RFE-100 is ordered for these units a single stage FET pre-amp is added to the digital display circuit board. This pre-amp can be easily field installed should it be required at a later date.

The first thing you notice after turning on the display unit is the brilliance of the ⅜" high digits. The six individual modules look like LEDs, but they are incandescent, capable of 700 Ft. lambert per segment light output through a polarized filter, they are much easier to read at high ambient light levels than LEDs If you prefer a red or green display, it should be easy to achieve by merely placing a small sheet of colored cellophane or transparent plastic behind the polarized filter.

Because there are no mixing or preset counter offsets used in the RFE-100 you are not limited to displaying only amateur band frequencies. MARS frequencies are displayed quite nicely. Readout accuracy is to the nearest 100 Hz. Some counters will readout closer than this, but I could never see the need for it since the backlash in most dial mechanisms makes it difficult to tune any more precisely than 100 Hz.

The RFE-100 was calibrated by first adjusting the crystal calibrator in the TS-520 to WWV and then tuning to 29.5 MHz, zero beating the receiver to the crystal calibrator and adjusting the trimmer on the time base crystal in the digital display for a readout of 29.5000 MHz. I could then go from band to band without having to re-calibrate as would be required with the analog dial on the TS-520. The counter will not readout the WWV frequency because a different crystal is employed when tuning to WWV on the TS-520.

Long term accuracy of the readout is extremely good provided the ambient operating temperature does not vary greatly. No trouble was experienced with the display placed on top of the TS-520 as shown in the picture, but when placed on top of a Drake R4C, the increased heat from the vacuum tubes in the receiver caused the base oscillator to drift, resulting in a readout error of several hundred Hertz.

In discussing the operating features of the RFE-100 with the RF Engineering people, I was informed that it is very

(Continued on page 75)



The RFE-100 frequency display sitting on top of the author's TS-520.

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You say you can't see the sky for all of the wire crossing your property. Do you feel that it might be cheaper to own stock in your own cable company? Well K2OT has one solution to make it all better.

A Single Wire Antenna For 160, 80 and 40 Meters

BY HANK STECKLER*, K2OT

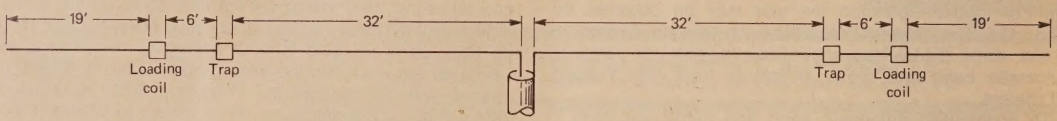


Fig. 1—The original antenna tried by the author. The traps are Model T-8040 and the loading coils are S-160 (Antenna Specialists).

With the acquisition of a TS-820, I acquired the capability to operate on the 160 meter band for the first time in my amateur career. Naturally, curiosity got the better of me, but what to do for an antenna? I was using parallel dipoles for 80 and 40 (actually parallel inverted V's), but the thought of another set of wires extending about my property turned me, to say nothing of the XYL, off.

It was then that my thoughts turned to some form of single wire antenna such as a trap antenna. However, to the best of my knowledge no manufacturer makes a trap for an antenna that covers 160, i.e., a trap that is resonant on 80. Being a lover and not an athlete, the thought of making a weatherproof trap was not appealing. Then I remembered the principle of the "choke decoupler"[1]. This uses just a pair of coils in the antenna, instead of a coil and a capacitor in a parallel tuned circuit, as does a conventional trap. The idea is that the coil, if it's reactance is high enough, will act as an r.f. choke and isolate the inner and outer sections of the antenna from each other at the higher frequency band and act as a loading coil at the lower one (assuming a two band antenna). One company, Antenna Supermarket, makes both a trap for an 80 and 40 dipole (T-8040) and a loading coil for a shortened 160 meter dipole (S-160). Could the two concepts be combined in a single antenna?

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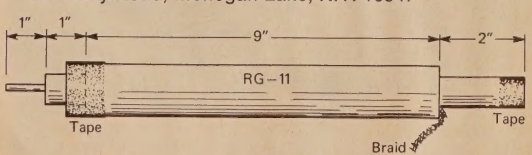


Fig. 2—The coaxial capacitor.

Fig. 1 shows this first attempt. The dimensions were set in accordance with the manufacturer's instructions. After some length adjustments, good s.w.r. was obtained on 40 and 160. On 80 the s.w.r. had a minimum at 3.5 MHz. Since I am a phone man, I tried to raise this frequency by shortening the lengths between the traps and the loading coils. Shortening them from the original six feet by as little as one foot produced absolutely no effect on 80! Stymied, I contacted the manufacturer, who suggested that the inductance of the loading coil (147 μH) was too low to provide enough reactance (3510 ohms at 3.8 MHz) to give choking action. If this was so, where did the 3.5 MHz resonance come from? Possibly it was second harmonic resonance of the 160 resonance. This will be a high impedance one. I use about 60 feet of foam RG-8 to feed the antenna, which is about right for a ¼ wave Q section. This may have transformed the high impedance to a low one, and hence given a good s.w.r. at the low end of the band. However, changing the length of the feedline had no effect on the s.w.r.

In any event, I considered these results unsatisfactory. The only thing I could think of was to turn the loading coils into traps by adding capacitors across them. But where to get high voltage capacitors? Then I remembered the trick of using coax to do the job[2]. Checking the voltage ratings of coax[3], I found that solid dielectric has a much higher breakdown voltage than foam. I used about 4½

inches of solid dielectric RG-58 across each loading coil, which will be resonant at about 3.8 MHz. I now got a double resonance effect on 80, one at 3.5 MHz, the other at 3.9 MHz. What was this caused by? Anyway, applying 2 kw PEP blew out the coax capacitors.

Clearly, solid dielectric RG-8 or RG-11 was what was called for. (Never end a sentence with a preposition? In the words of Churchill—"This is a rule up with which I shall not put.") As expected, the local Radio Shack store did not have solid dielectric coax, but they directed me to a CB store, that fortuitously had some in RG-11. When I told the salesman I needed about two feet, he asked for what? I replied for a multiband trap dipole. He had no idea of what I was talking about, but graciously gave it to me free.

Before beginning the reconstruction, I decided to read in more detail about traps. One article[4] pointed out that the traps should be resonant slightly lower than the lower band edge to give the broadest s.w.r. curve within it. Another good reason would be that power is never applied to the trap at its exact resonance, thus reducing the voltage that the capacitor must handle. With these considerations in mind, a capacitor as shown in fig. 2 was built. At the left end, where the inner conductor will be attached to one end of the loading coil, be sure to trim the outer braid off and tape around it. At the right end, where the braid will be connected to the other end of the loading coil, be sure to trim off and tape up the inner conductor. These steps will prevent any corona discharge problems. If RG-8 is used, remember it should be solid dielectric, the length shown as nine inches should be about six inches. With these lengths, the resonant frequency will be a little below 3.4 MHz.

Fig. 3 shows the final antenna. Except for the dimensions, and the addition of the coax capacitors in parallel with the loading coils, it is similar to the original antenna. Although not shown in the drawing, it is actually somewhat in the form of an inverted V. This might have a slight effect on your lengths if you put up a straight dipole or an inverted V with an acute angle.

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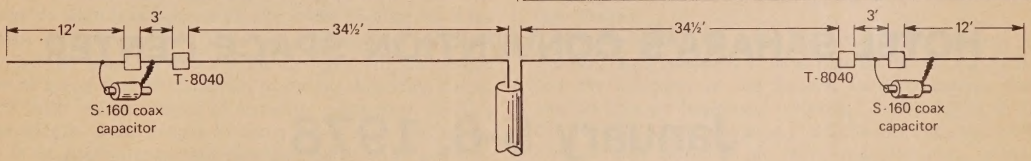


Fig. 3—The final antenna.

Fig. 4 shows the s.w.r. on the three bands. Forty is completely covered with an s.w.r. of under 1.5. Eighty has the most interesting curve. It can be seen that the double resonance effect is still present. There still is a low s.w.r. at 3.5 MHz and a perfect match at 3.9 MHz. Thus, by making use of this effect, this band is also covered with an s.w.r. of less than 1.5:1. If desired, the eighty meter three foot sections can be lengthened to four feet to eliminate the peak in the s.w.r. curve. If you find it necessary to adjust this antenna, always start with the 40 meter innermost sections first, then go to the 80 meter sections, and finally to the endmost 160 meter sections. As expected for a short antenna, the curve for 160 is very sharp. The minimum is at 1825 kHz, the "DX window" for the band. However, the first 75 kHz of the band is covered with an s.w.r. of less than 2:1.

In summary, for a total length of about 104 feet (including traps) a single wire antenna for 40, 80, and 160 was achieved with good s.w.r. It should be a good antenna for anyone with a rig that covers 160 through 10 meters and who already has a tribander for 10, 15, and 20. ■

References

[1] *CQ*, Oct. 1975, "*Antennas*," page 24.
[2] *QST*, May 1975, "*Hinks* and *Kinks*," page 45.
[3] *ARRL Antenna Book*, 13 *ed.*, page 91.
[4] *CQ*, December 1973, "*Antennas*," at pages 90 and 92.

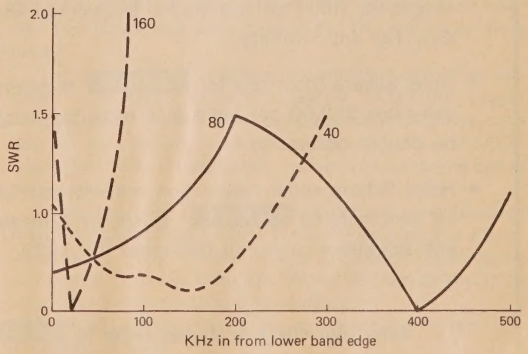


Fig. 4—S.w.r. vs. kHz in from the lower edge of the band for 160, 80 and 40 meters.



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A MESSAGE FROM THE PUBLISHER

ARRL Threatened With 50,000,000 Lawsuit

For the past few months we've published comments on the American Radio Relay League and some of their activities which we have felt to be detrimental to radio amateurs. In reply to our comments League staff members have accused us of making accusations by inuendo, rather than with facts. Frankly, I don't agree.

But now, it seems, the League has gone completely off the deep end with a new dictatorial policy; they are, indeed, being threatened by a $50 million dollar lawsuit by the Communications Attorney Service.

As soon as I learned about this organization and the news release that they've sent out to the press, I began digging to find out more about them. The attorneys I've spoken to about CAS tell me that they're a highly reputable group whose founder, Richard B. Cooper is both knowledgeable and active in amateur radio affairs. Mr. Cooper is an attorney himself, as well as being an active amateur and CBer.

Published below is Mr. Cooper's press release about his potential suit against the League, together with the text of the League notice to the industry on their statement of ethics policy. After reading both documents I tend to feel that the Communications Attorney Service states a pretty strong case. Whether it will ever get to court or not is yet to be seen.

In any event, you might want to check with your own lawyer to learn how you personally might be affected if the League in fact gets sued and loses. Will you, as a League member, be liable for a part of the damages? Will the League have to spend tens of thousands of dollars defending the action? Such dollars would, of necessity, come from ARRL's legal budget. Is the League stooping to a form of McCarthyism in its attempt to dictate marketing policy to an entire industry? If so, do you want to be a part of those tactics? Can the League, in affect, make law where even the FCC has feared to tread? Do you want to be told what you can or can't buy in the years ahead? After all, if the practice becomes accepted, perhaps the next step might be a decision that only extra class amateurs may buy kilowatt amplifiers. Who knows what jim-dandies the League's brilliant staff has in store for us?

And then remember this: if the League's policy does, in fact, go into affect, QST should naturally voluntarily discontinue its classified advertising section. After all, we can't have non-amateurs being exposed to even used amateur equipment that might be used illegally.

The League perports to be a true democratic organization. If that's true, I suspect that an outraged group of intelligent amateurs will make their feelings known to their directors in short order. Let's see just how well Democracy really works in Newington.

The League action, in my opinion, is a severe infringement on the rights of companies doing business within the amateur radio market place. Several lawyers have told me that in their opinion, this action not only violates Federal Trade Commission laws, but also violates some constitutional rights. For those reasons I have personally requested an investigation by the FTC into the matter. The amateur service is one area of the industry that has been growing well, and I hate to see a power grab, by a magazine publisher, do anything to destroy or weaken that market.

Richard A. Cowan, WA2LRO

The American Radio Relay League Passes Law

For years now, the Federal Communications Commission has tried to devise a means of gaining control of who may purchase a two- way communications radio, via point of sales or point of manufacture laws. But, the Constitution Of The United States stood in the way. In fact, the very concept was so illegal that the Commission did not even dare try to hold hearings on it. The general idea being to prevent CBers from owning amateur type radio equipment.

The 240,000 amateurs in the United States are in a panic, deathly afraid that the CBer will somehow organize and take the amateur bands away from them. It is, of course felt that if the CBer has amateur type gear, he is ready to move right in. The Federal Communications Commission, being largely composed of amateur radio operators, is highly motivated to place top priority on this matter. Fortunately, the Commission has been hamstrung by the law in implementing their desires.

On September 14, 1977, the illicit affair between the amateur radio operators at large (represented by the ARRL) and the amateurs of the Federal Communications Commission bore an illegitimate offspring . . . The ARRL CODE OF ETHICS. Under the guise of a Code of Ethics, the ARRL created law; ordering all radio manufacturers, jobbers, dealers and distributors to refuse to sell amateur radio gear to anyone who could not produce a radio amateurs license issued by the Federal Communications Commission. Since the Bible of the radio industry is the trade publication "QST" magazine, published by the ARRL, the means of enforcing the new law was at hand. Their means of enforcement is through denying advertising space to anyone who will not comply! To be doubly sure of enforcement, there will be a published blacklist of vendors who refuse to comply. This is precisely what is going on. This is the way law is made?

The concept that a private organization can create law where none exists, enforce it against 14,000,000 people in the United States, when; Congress cannot legislate such law, nor can regulatory agencies enforce it, because the Constitution Of The United States prohibits it, is a daring one at the very least.

I have examined this concept as an attorney and discussed it with officials of the Federal Trade Commission, the Justice Department, The Federal Communications Commission and several other law firms specializing in this type law; from this I have drawn the following conclusions:

1) That this action violates the anti-trust laws in that it is a restraint of trade.

2) That is falls well within the deceptive practices of the FCC.



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3) That it is a blatant violation of the Fourteenth Amendment to the Constitution of the United States.
4) That it must also be considered a violation of the First Amendment to the United States Constitution.
5) That any vendor signing such agreement (Code Of Ethics) must be considered as an accessory after the fact, in any or all of the above violations.
6) That where the vendor has a city business license and opens his doors to serve the public; he must serve all the public, or none of the public. Anything less and the city must void his license to operate.

The amateur license is but an upgraded version of the Citizen Band license. Does the ARRL believe that with the issuance of an amateur license on is somehow also issued a different and superior American Citizenship? Thus, making the amateur exempt from the Constitutional prohibitions of the other American people.

The Communications Attorney Service is, to our knowledge, the only subscription Attorney in the United States. We specialize in regulatory Ageny Practice. Anyone in the country connected with citizen band, amateur or commercial radio, be it by hobby, occupation, sales or service, may retain our services by the year by simply purchasing a $25.00 annual subscription. As of this date we have over 70,000 subscribers and our subscriber list is doubling every 90 days. We are the fastest growing service in America today, and predict that within 18 months we will capture 25% of the known market of 14,000,000. We defend our subscribers against any radio orientated charge, be it City, County, State, Federal or private party suit.

After carefully examing the ARRL action, we have notified the parties involved that; we will file an action seeking $50,000,000 in damages on the behalf of our subscribers should they persist in this course. Further, should the Federal agencies named fail to do their respective duties in this matter, we will name them as co-defendants in this action.

Afterthought

It is notable that the FCC, to lay the groundwork for the ARRL, is asking the CBer who seeks his novice license,what type of equipment they operate. Then, the minute that he passes the exam for novice, the FCC lays in wait and usually without even inspecting the equipment, cites the man for using the amateur equipment on the CB band. It is commonly found that the person studying for a license will buy an amateur transceiver, so he can monitor the code on the amateur bands. Now, the ARRL by its action, would compel him to purchase a receiver which he would then have to sell, at a loss, when he received his license, in order to buy a transceiver. A mother or son could not buy dad a radio for Christmas. First step, proscribe purchase, then ownership.

It is interesting to note that this is exactly the formula followed by Adolph Hitler in 1934, followed almost immediately by confiscation of all short wave radio equipment. Surely the American public will not stand for this.

The Communications Attorney Service stays in close touch with the United States Senate, The House Of Representatives, The Senate Sub-Committee on Communications, The FCC hearings and court decisions and Local and State Court decisions, which might affect our subscribers. We are willing to place $1,000,000 in the legal chest to prevent the ARRL from making and enforcing law in the radio industry.

CQ Reviews: The Kenwood TR-2200A 2 Meter Portable Transceiver

BY HUGH R. PAUL*, W6POK

Kenwood's latest offering to those desiring a 2 meter portable unit is the TR-2200A. While the package design is almost identical to earlier models, the innards have been modified for greatly improved receiver performance and increased power output.

Those of you not familiar with the earlier units should note that the TR-2200A is not a hand held. Measuring 2¼" high, 5¾6" wide, 7½" deep and weighing 3.5 pounds, it is more on the order of a small mobile unit. While I use mine primarily in the car, I do find it very convenient to be able to clip on the web type shoulder strap, pull up the telescopic antenna and operate portable with the built-in Ni-Cad battery supply. The Ni-Cads will power the unit for an average full day of operating. A charger is built into the TR-2200A, but is not heavy enough to function as an a.c. supply. The receiver may be on during the charging process, but this will greatly extend time required to achieve a full charge.

The transceiver is crystal controlled with provisions for up to twelve channels. Kenwood supplies crystals for six channels, two simplex and four repeater. The repeater frequencies are 146.34/94, 146.16/76, 146.22/82 and 146.28/88 MHz. Accessory items that are included with the TR-2200A are a.c. line cord, d.c. line cord and carrying case with strap. A quick disconnect mobile mount is available at extra cost.

New operating features include a channel indicator lamp that may be turned off to conserve battery power. On/off is by means of a push type switch. Another push type switch selects either a high power (2 watt) or low power (.4 watt) transmitter output level. On the rear of the transceiver is a jack for powering an external speaker, which when in use mutes the built-in speaker. A nine pin socket provides for metering of the ratio detector and relay control of an external power amplifier.

Features retained from earlier models include the external antenna socket, which accepts a standard PL259 connector and the combination S meter that also indicates the state of charge on the built-in Ni-Cad batteries. External squelch control is provided and squelch sensitivity is adjustable internally.

The receiver section is still dual conversion with a 10.7 MHz first i.f. and a 455 kHz second i.f. Sensitivity and cross modulation characteristics have been improved through the

*291 Macalester Drive, Walnut, California 91789

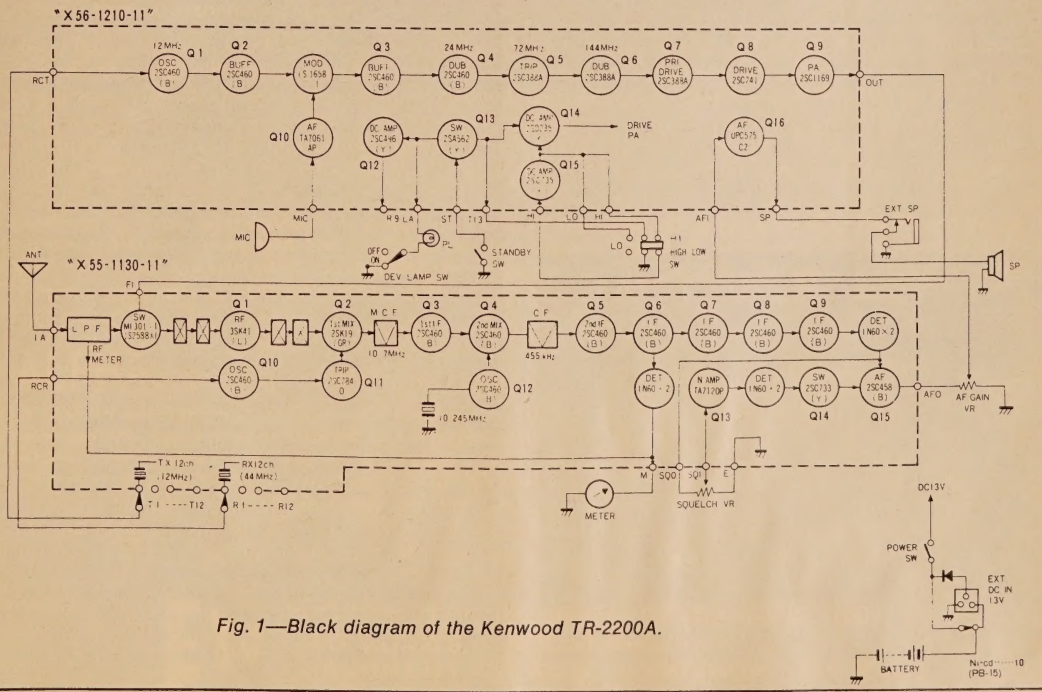
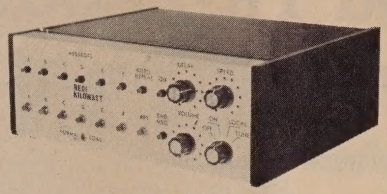


Fig. 1—Black diagram of the Kenwood TR-2200A.

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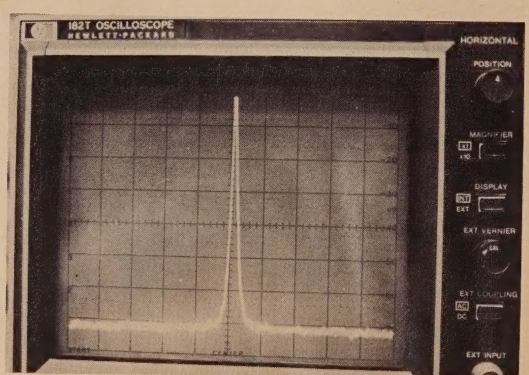
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use of a 3SK41 dual gate MOSFET as an r.f. amplifier and the addition of a two section band pass filter before and after the r.f. amplifier stage. Sensitivity measured .2 microvolts for 20 db of quieting. Selectivity is determined by a 2 pole monolithic filter in the 10.7 MHz i.f. and a multi-section crystal filter in the 455 kHz i.f. Selectivity measured about the same as the earlier models, 19 kHz at the —6 db point and 30 kHz at the —60 db point.

Audio output is rated by the manufacturer at .7 watt at 10% distortion. Tests indicated this was a conservative figure. Actually close to 1 watt was obtained at 10% distortion. Power is adequate for driving an external speaker for mobile use. The built-in speaker is fine for fixed or portable operation, but not for mobile use at high ambient noise levels.



Spectrum Analyzer display of TR-2200A transmitter. Analyzer adjusted for 500 kHz per division. Total bandwidth displayed, 5 MHz.

The transmitter section is almost identical in design to earlier models. The final transistor has been changed to a 2SC1169 for greater power output and a new low pass filter has improved the attenuation of the second harmonic. As you can see from the spectrum analyzer picture, the transmitter is very clean. The second harmonic measured 69 db down and all other spurious greater than 70 db down. Transmitter power out measured 2.2 watts when the unit was powered from fully charged Ni-Cads. In the low power position, power was just over .4 watts out. Power was adequate for repeater operation throughout the Los Angeles basin. When operating mobile, with the transceiver powered from the car battery, it was necessary to install a hash filter between the battery and the transceiver in order to achieve noise free reception on some of the more distant repeaters. A simple circuit using two chokes and two capacitors is provided in the instruction book. The operator's manual is fairly complete except no alignment procedure is given. Trimmer capacitors are provided for the transmitter crystals but not for the receiver crystals. This does not present a problem as long as you are careful to purchase receiver crystals that meet the manufacturer's tolerances.

While the TR-2200A is not a hand held nor a high power mobile unit it is a good compromise in design for all around use. I have an earlier model that was marketed under another well known name that has traveled many a mile in my briefcase. It has never failed to give good performance and a great deal of operating pleasure. The design improvements in the TR-2200A coupled with the number of crystals included with the unit make it an especially good buy. For more information contact Trio-Kenwood Communications, Inc., 1111 West Walnut, Compton, California, 90220. ■

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Amateur radio leads the race. Read about the now famous N.Y. Marathon and the important part played by amateur radio.

A MARATHON HEARD, NOT RUN

by STEPHEN MENDELSOHN, *WA2DHF

It is October 23, 1977 and in New York City long distance runners everywhere are beginning to do the stretching exercises that will get them in shape for the ultimate race, the Marathon. A marathon is a 26 mile, 385 yard endurance event designed to separate the fit from us mere mortals. For the 1977 Marathon the New York Road runners Club, an AAU sponsoring group, had gathered the best field since the olympics. Gold medal holder Lasse Viren from Finland would be there, Hill and Stewart from Great Britain would be there. Bill Rogers, last years winner, and Frank Shorter would be there, as would a few of their friends. 5000 to be exact. It was to be the largest marathon in the history of American track. But even as these notables were suiting up another call was going out to start its own mini-marathon. The amateurs of the tri-state area were rising, putting rigs in cars, taking handi-talkies out of their chargers, and getting ready to start construction on the largest non-emergency communications network ever assembled.

Everyone knows of the fine job amateurs do during emergency conditions, and how for a local parade a club will turn out ten to fifty members or so, but this monster would require over 200 amateurs before it was over. For such a net to exist some ground work had to be done. Lets set the clock back to February, 1977.

The New York chapter of the Road Runners Club is starting to realize that the number of entrants for the 1977 event will top Boston's 2800. Pre-registration numbers already far exceed the 1976 New York Marathon. Club president Fred Lebow calls his executive council together for an idea session on how to coordinate the growing race. Club member Len Duey, K2KRI, mentions how effective the group of 45 amateurs were in the 1976 race for coordination of the course, and suggests that they might be called on again for more public service. Lebow asks Duey to find out if the Tri-State Amateur Repeater Council, a group representing over 75 repeater systems, would once again consider taking on the task. Len, aware of the ability of 2 meter f.m. to provide clear and QRM free communications over such a long area as the course would be, meets with Council president Dave Minott, WA2EXP. Dave sees this as another positive way for amateur radio to meet community needs, and at an Executive board meeting recommends that the Council take this project on.

Steve Mendelsohn, WA2DHF, is delegated to be the TSARC/RRC liason, and the Council area coordinators volunteer to supply man power from their areas. A meeting of the full Council makes the idea a unanimous one with everyone agreeing that this will be the "Big Event" for the year. With TSARC representing over 10,000 amateurs on f.m. in the New York, New Jersey, and Connecticut area manpower should be no problem. Council coordinators started making presentations to the clubs within their area. New Jersey finds Pete Glenn, WB2YGT, and Gary Kantor, WA2BAU, roaming through the state attending civil defense meetings, and club meetings, and taking a listening-on-the-air-every-minute attitude. Westchester, and Connecticut find Paul Vydareny, WB2VUK, and Stan Rothman, WA2NRV, visiting their areas, making presentations, and with the help of Williard Smith, K2CFX, making sure everyone knows about the race in their area. Long Island finds Bob Grace, WB2MIY, wandering around talking to whomever will listen. A club that does lots of listening when public service is mentioned is LIMARC. The Long Island Mobile Amateur Radio Club, with Op Sail experience under their belts, and over 500 members, made time available for Bob to make presentations, and ultimately supplied over 75 operators for the Big Event. For the mid-Manhattan area Council president Dave, WA2EXP, and Allen Singer, N2KW, talked the marathon up on the air, went to club meetings, and with the help of Norm, WB2IPQ, the ever listening monitor of WR2ACD, were able to fill in the center of the course.

A word about the course itself. Most marathons go through several communities, or cities. This race was to go through all five boroughs of New York City. This would mean closing the vital arteries that feed the city including 5 bridges, and over 300 streetcrossings. The race would start in the toll plaza of the Verrazano Narrows bridge, judged the only place that could hold over 5000 runners, go across the bridge into Brooklyn, run through such famous areas as Flatbush Avenue, and Bedford Stuyvesant, cross the Pulaski bridge into Queens, run through Long Island City, across the Queensborough bridge (59th street bridge) and down onto First Avenue in Manhattan. First a side comment about the 59th street bridge. In 1976 the runners had complained about the grating that made up the bridge. RRC president Lebow found that a local carpet company was willing to do something about the problem. Have you ever seen a carpet 3 yards wide, and ONE MILE long? I guess there are not many times in one's life that you can call a carpet company, and say, "can you give me a wall to wall carpeting estimate for my bridge?" After the race the carpet was reportedly going to Texas for the hallway in an oilmans home. A three mile stretch up first avenue through the swinging sixties, and seventies, and up into Harlem, and the south Bronx, via the Willis Avenue bridge was next on the agenda. Through the south Bronx, and back to Manhattan via the Madison Avenue bridge was

* 144-25 33rd Ave., Flushing, N.Y. 11354

next. To perform that minor trick required the Coast Guard to put out a notice to mariners that the bridges would not open, causing the rescheduling of fourteen ships. Manhattan would find the runners winding down glamorous Fifth Avenue. At the north end of Central Park they would enter and stay in the park until 57th street when the runners would exit on to Central Park Drive South. The exit point would be just opposite the Plaza hotel. It should be noted here that the course was designed to let as many as possible view the race. At Columbus Circle the runners would again enter the park ending the race at the Tavern on the Green restaurant. All we had to do was to provide operators for all 26 mile points, starting line network, finish line network, escort services for the busses that would take the runners from the West Side YMCA to the starting line, all 27 busses, provide manpower for the pace car, 3 press trucks, communications for the medical teams on the course at the "watering stations' where the runners pick-up special beverage that has electrolyte in it, help dispatch ambulances, and even provide an operator in the helicopter that the VIPs would use to view the race.

A check of the course showed that the optimum repeaters in the area would be WR2ACH on Staten Island, WR2ACD, the repeater in the Chrysler Building that covered Manhattan and Queens like a glove, and WR2AFE, located within blocks of the finish line. Respectively the N.Y. County Repeater Association, Metropolitan Repeater Assn. and Manhattan Radio clubs agreed to donate their machines, for which the Council added its thanks. Bi-weekly meetings of the coordinators showed that there would be enough operators to perform the assigned tasks. Network subsets were drawn up. Each mile would have a synthesized mobile with a HT operator along in case of trouble. 5 mile and water station points would have an additional HT operator which would allow the HTs to operate together and the mobile to relay information into the main network. The finish line developed a need for operators in the Command trailer (3) the Police operations trailer, the computer trailer, scorers trailer, two medical areas, press area, two stations in the Road Runners Club offices, a special two man network working on the press scaffold that would be erected to allow some control over the chutes that the runners would be led into, and a logger position. It was requested that the first priority of communications be for medical emergencies, second priority to having each mile point report the first three runners, and third priority to having the 5 mile point, and each subsequent 5 mile point give the first ten runners. The purpose of giving runner numbers was to let the press and public know who was leading. This led to a request that the mobile operators have an external speaker on the rig for the day. This would focus public attention on amateur radio, as no one would have such information as soon as we would.

People were recruited, plans made, and on Sunday, October 23rd at 4 a.m. the network started to form.

The New Jersey group had agreed to arrive at 6 a.m. to begin following busses. WA2DHF, and WB2YGT were first on the scene followed by N2KW. As Steve would be in the pace car with race director Lebow, Pete, and Allen set up in the office, and proceeded to talk people in. Busses came and went trailed by amateur radio cars. People were directed around the Y by amateurs. At Staten Island the starting line network was being formed. Traffic control was aided at the staging area in Fort Wadsworth by Bill, WA2-RXQ, Andy, WB2FXN, and Lee, WB2CUW. To make use of the press facility, and let the press know who was providing communications Stan, K2SJO, ARRL Hudson division director was detailed to stand by in the press area and give them a hand. When the race was about ready to stage to the starting line a cry from Andy "were being invaded" alerted us to the fact that some fifteen hundred runners had started for the start line a bit early, and bridge traffic had not been stopped yet. Quick action by the police rounded up the runners, and the race proceeded to the starting line when all were ready.

Most races start with the starter looking at his watch. Not this one. The starter was Alan, KL7HIR, a runner recently relocated to New York, so with the help of Roy, W2CF, we used WWV piped over WR2ACH. At 10:31 a.m., just one minute later than planned, I was sitting in the pace car when Alan fired the West Point cannon, brought in to help as a gun could not be heard over the roar of the 11 press helicopters, and all I could see from the pace car was 5000 people running at me. I think it was the fastest takeoff of a car I have ever seen. It is quite a feeling to have 5000 people come running at you. Over the bridge we went with Lee, and Stan in the press bus, Phil, WA2-BMC, Bob, WA2KHR, and Art, WB2IRA, in open press trucks, and I all on 52 for vehicle control. Contact was made with the finish line, and I was surprised to find that some rearranging had been done, and net control was in the hands of Pam Peterson, a close associate of Dave, WA2EXP. Pam is not an amateur yet, but is studying, having just gotten her first class commercial license. Pam was checking in stations, reassigning people to cover half mile points (by this time we had more than enough to cover primary areas), and generally keeping things flowing. As we passed Andy WB2DWP, at the first mile point on the bridge the reports started to flow in to net control. All through Brooklyn the sight seen by the runners was of cars with yellow amateur radio signs, or amateurs with HTs standing on the side cheering them on. Bill Rogers, eventual winner of the race, was later to remark, "that he wasn't sure if there were more runners, or amateurs." Through Brooklyn we went waving at Bruce, WB2CUN, standing alone on the roadway with his amateur radio sign. Past Phil, K2LIO, president of LIMARC, with the LIMARC banner at a fire house, through Bedford Avenue with its multethnic flavor, and WA2APJ, Jay, helping to set up a water station, and coordinating his own net on 52, and 147.51. The race now swung onto the Pulaski bridge and there at the halfway point sat Milt, WB2DYO with Harry, W2NIP, smiling and waving. All the while the people stationed at the mile points were keeping information flowing to Pam at net control in Central Park. Race director Lebow, while trying to keep police lead cars, press trucks and busses, and scooters away from the runners (they lay down a smoke screen of carbon dioxide), was thus able to keep in touch with all elements of the race no matter where on the course he was.

Through Queens and the wide open areas with the crowds only 5 deep, and the smiling faces of Sal, WA2-SXW, and Harvey, K2CJP, waving us on with HTs in their hands. LIMARC, and the group from Manhattan had the chore of manning the 59th street bridge (no cars allowed) so they took turns and shuttled men on and off the bridge from both sides. A special thanks to those hardy individuals. On to First Avenue. The crown was just a sea of humanity. The police say ten to fifteen deep from 67th street to well over 110th street in Harlem. Crowd conrol, and a sip of juice courtesy of Ric, K2WR, and Ray, K2AWQ. A request to let the police know when the race was coming by Randy, WA2OMT, was accompanied by a request for the formula for the ERG refresher by Dave, WA2AII. By now medical traffic was starting to be seen with requests for ambulances, and calls for medics being heard more frequently. A medical priority network was established on WR2AFE with Harvey, K2CJP, holding down the ncs spot. Relays to the medical corps was performed at

(Continued on page 75)

For a few dollars and a few hours of your time you can add an extra rig to your station. It's also an easy way to try out 2 meter f.m.

Improved Selectivity For The Regency HR-2 Transceiver

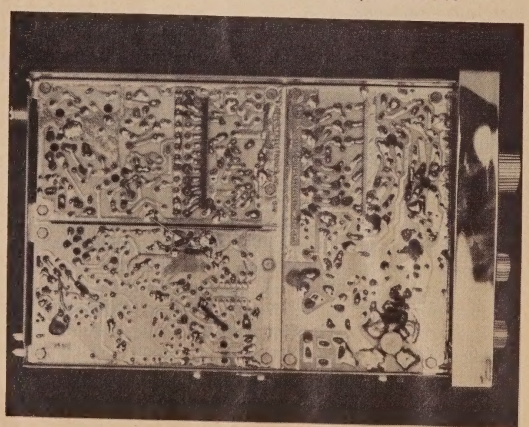
BY JAMES E. ARCONATI*, K0FBJ

The Regency HR-series of transceivers has always been a good value. Recently, a number of the early versions (HR-2, early HR-2A) of these radios have been appearing at hamfests and auctions at "too good to pass up" prices. Six channels, ten to twelve watts out, good receiver sensitivity and small size were enough to convince me to purchase one for our other family car.

When these radios were manufactured in 1970 or so, selectivity wasn't much of a problem. Even the bigger cities had maybe two active repeaters and they were spaced far enough apart that the single ceramic filter in the 455 kHz i.f. was more than adequate to provide the selectivity.

Times have changed and now any area large enough to be called a city has several repeaters and many active direct frequencies. Some are on split (and even split-split) channels. So one of my first projects was to determine a way to improve the selectivity of the HR-2. In discussing the problem on one of the more popular local repeaters, I discovered that there are a number of methods available to improve the HR-2. The following is sort of a composite of the easier and cheaper methods. In fact, if you know which end of a soldering iron to hold, you can complete this $15.00 improvement in about an hour.

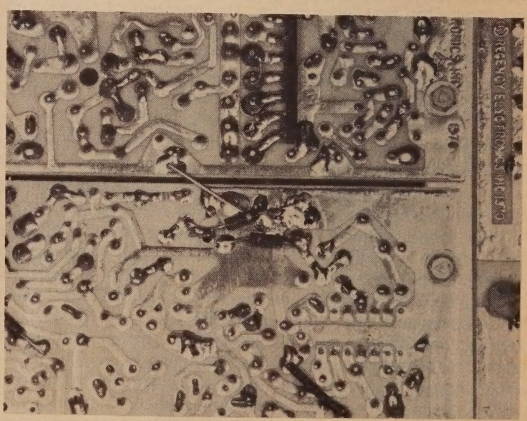
*12190 Lake Placid Drive, Creve Coeur, MO 63141



Foil side of the Regency HR-2.

The HR-2 and some early versions of the HR-2A were equipped with a Murata CFP-455A filter to provide all of the i.f. selectivity. Changing this filter to a Murata Model CFR-455D is the simplest way to increase the selectivity without causing other problems. The CFR-455D filter is available from Murata Corporation of America, 2 Westchester Plaza, Elmsford, NY 10523, for $14.30 each. The CFR-455D utilizes 11 ceramic resonators and has a 60db bandwidth of ±20 kHz. The new filter is slightly longer and narrower than the original.

Remove the radio from its case and temporarily remove the speaker. Remove the original filter, taking care not to overheat the circuit-board foil. A de-soldering aid such as



Foil side of the HR-2. This is a close-up view of the area near the new filter. Resistors R133 and R134 are mounted on the foil side of the board.

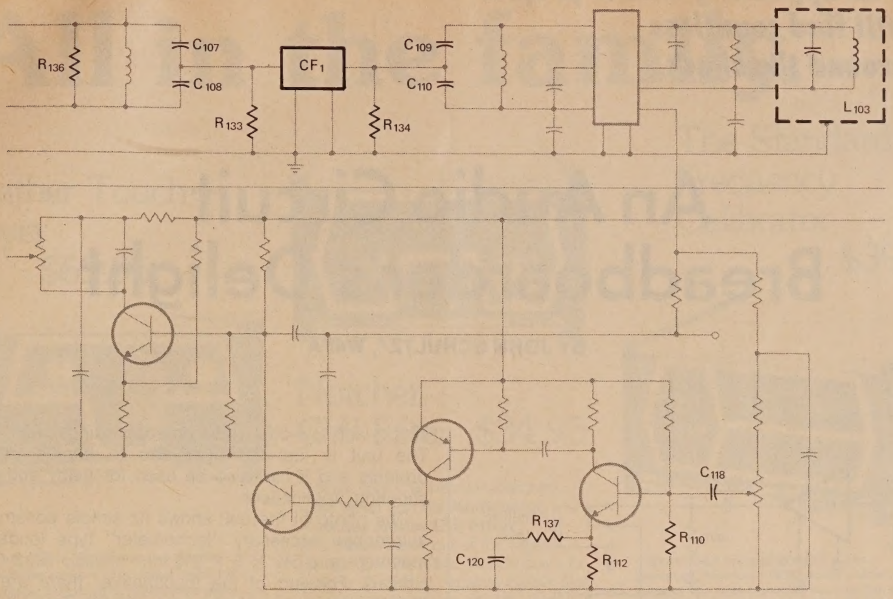


Fig. 1—Basic schematic of the Regency HR-2. Only the components that are to be changed are labeled.

"Wik-It" or "Solder-Sipper" makes the removal quick and painless. Using the new filter as a guide, drill four holes in the board. (Only one of the existing holes is reused.) Insert the filter and solder the four pins and the shield connection. Note that the "common" connections are on the same side of the filter as the shield tab.

Change the following components:

C107	180 pf	**to**	680 pf
C108	470 pf	**to**	180 pf
C109	180 pf	**to**	270 pf
C118	.0047	**to**	.015
R110	10 K	**to**	47 K
R112	1 K	**to**	4.7 K

Remove the R137 (220 ohm) and C120 combination and replace with a .047 pf capacitor.

Remove R136 (22 K) located on the foil side of the board.

Add a 250 pf cap from the new filter CF-1 output to the end of L102 opposite C109. (Use existing board holes.)

Add 6.8 K resistors from the input and output of CF-1 to ground. Install these resistors on the foil side of the board.

Check the circuit board for shorts or solder splashes and shake out any wire clippings, etc. Adjust the quadrature coil L103 *slightly* for the cleanest sounding audio.

That completes the modification. The mod may change the squelch action slightly, giving it a smoother sound. If you're really desperate for selectivity, try the Murata CFS-455D Filter ($24.20). It's slightly longer than the CFR-455D and it has a *70db* bandwidth of ±20 kHz. I have recently learned that Regency will modify the HR-2 to improve the selectivity for about $40.00. ■

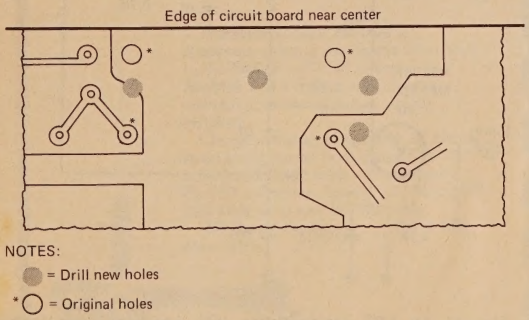
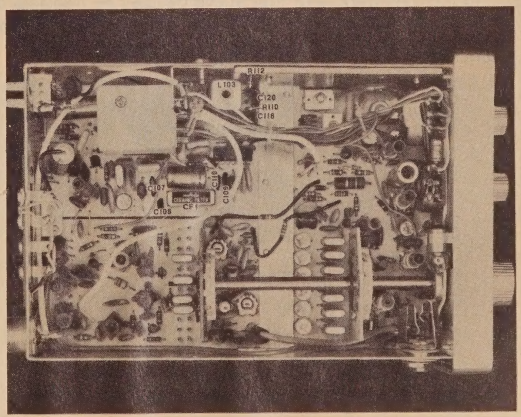


Fig. 2—Sketch of the circuit board in the area of the new filter. Note the location of the new holes.



Component side of the Regency HR-2. The components that are changed are labeled.

Here's an appealing winter project — that will find countless uses around the shack.

An Audio Circuit Breadboarder's Delight

BY JOHN SCHULTZ*, W4FA

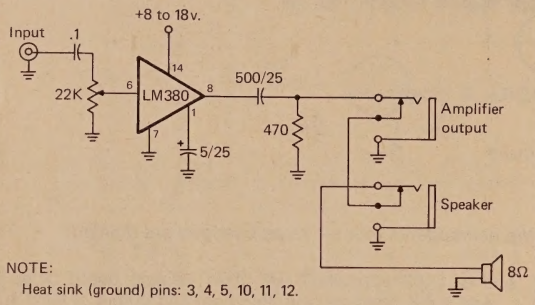


Fig. 1—The LM380 is an inexpensive audio amplifier in a 14 pin DIP package which can supply up to 2 watts output.

Experimenting with just simple audio or control circuits can be a great deal of fun. Many audio accessory type circuits can have an application around one's shack and then there are just those audio circuits which make funny noises and impress the non-amateur with the wizardry of modern electronics.

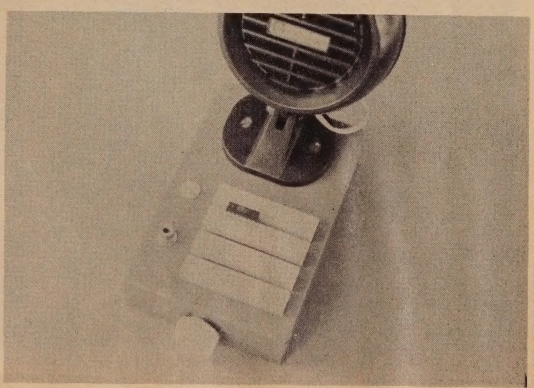
Except for the more serious technically minded amateur, very few amateurs will experiment with audio circuits using more than three or four active devices — transistors or IC's. For such an amateur, this article describes a very simple and low-cost audio breadboarding/amplifier device. The unit is just the right size to handle small audio projects and it can also be used for many audio trouble-shooting applications.

The photo of the unit shows its simple construction. An automobile accessory "tachometer" type loudspeaker is mounted on a 5¼ × 3 × 2⅛ inch chassis (Bud CU2106 or similar). Forward of the loudspeaker there are mounted four Vector plug-in blocks type T66-96. These blocks provide 24 rows of 4 connection points each. The blocks are spaced so an IC can straddle two of the blocks. The blocks are available from any dealer handling the Vector Electronics line of "KLIP-Bloks". The block is held to the chassis by four pins extending from the underside of each block. The perhaps more readily available Continental Specialties breadboarding strips can also be used. In that case only two type QT-18S strips are needed since these are dual strips.

Although experimenting with audio circuits is generally easier than working with r.f. circuits, modern audio IC's have such gain and bandwidth that all sorts of undesired oscillation can occur. Therefore, good direct grounding, especially in a breadboard setup, is necessary. Unlike the advertising photos, one occasionally sees for plug-in component breadboarding strips where resistors and ca-

(Continued on page 75)

*U.S. Consulate, Box L, FPO New York 09544



The audio circuit breadboard.

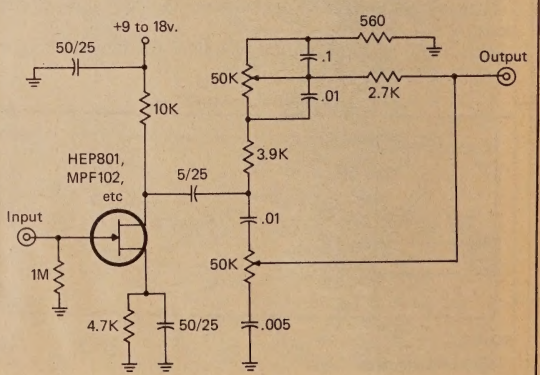
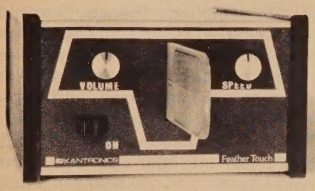


Fig. 2—An FET preamplifier with optional bass/treble tone controls for use with the basic LM380 amplifier shown in fig. 1.

All in the family.

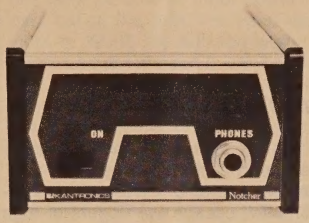
Feather Touch Keyer $69.95



No moving parts! The **Kantronics Feather Touch Keyer** responds to the lightest touch. No more slapping or sloshing! No moving parts also means the end of adjusting and readjusting before each QSO.

The **Feather Touch** sends self completing dots and dashes, adjustable from 7½ WPM, and gives you a great fist on the air. Attractive design and compact size make the **Feather Touch** a professional addition to the sharpest ham station. Design features keep the keyer from creeping away as you send.

This **battery powered** unit is great for portable use or home operation with the aid of any DC power supply from 5-15 volts. Pick up a motionless keyer today!



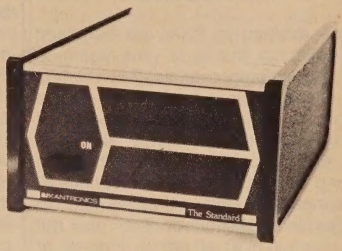
Notcher CW Filter $34.95

Make your CW receiver selectivity razor sharp with the **Kantronics Notcher Audio CW Filter.** This filter makes sense out of the biggest pileups! The **Notcher** funnels down to 150 Hz @ -3dB to separate signals that appeared to be on top of each other before.

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Designed to look sharp too, the **Notcher** is one in a growing family of **Kantronics** quality products. Our quality is more than skin deep. One look inside will tell you the **Notcher** is built to perform!

The Standard Frequency Calibrator $39.95



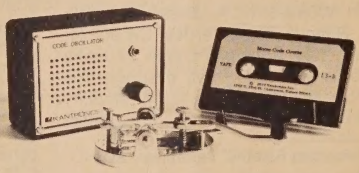
Kantronics frequency calibrator is **The Standard.** Advanced CMOS circuitry checks your frequency with crystal controlled accuracy. Zero-beat your transceiver to **The Standard** at 50 KHz intervals.

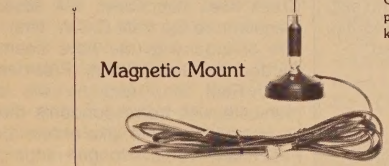
No direct connections are needed, the unit transmits to your receiver. Internal jumpers adjust **The Standard** for a choice of 25 KHz, 50 KHz or 100 KHz intervals.

Powered by battery for portable operation, or 5-15 volt DC power supply. **The Standard** is a handsome station accessory that looks sharp, inside and out.

Be confident of your frequency.

The **Kantronics Code Speed-Building Kit** offers perfect **computer generated** code. Code is sent to exact Morse specifications as used by the FCC. Choose 5, 7½, 10, 13, 16 or 20 words per minute tapes. Oscillator and brass key included.



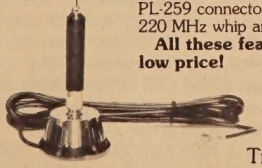


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a monthly feature by

ADRIAN WEISS, K8EEG

QRP

The art of very low power operating

Operating News

The mailbag is filling up here and that tells me that it is time again to turn this column over so that readers can share their experiences. Before getting to the mail, let me note that I will be out of the country for about the first eight months of 1978 while I'm kicking around various libraries, museums, beaches, ruins, theaters etc. in Europe. In all likelihood, either mail will not reach me at all, or if it does, at sporadic and widely separated intervals. As a result, I will probably be unable to answer questions and the like until I return. I would very much like to contact European QRPp operators and perhaps visit them. Let's get on to the letters. First off, a comment about C.C.W. that perhaps will point some of you in a helpful direction for future development of the technique:

C.C.W. News

de . . . W6KAG, M. A. Mason, 5 Bridle Lane, Rancho Palos Verdes, CA 90274: "I have two principal points to make concerning C.C.W., first, a suggestion on how to relieve the high stability requirement, and second, to suggest that the ideal terminal is a computer based upon a microprocessor.

Several systems I know about, including TV, escape the riggers of high stability by using a synchronizing scheme based upon the intelligence contained in the received signal. In TV, for example, the horizontal and vertical oscillators are held on frequency by the sync signals present in the received signal. In the early days of TV (pre-WWII) one had great difficulty keeping the picture because of high stability requirements, but look how easy it is today with the sync lock. Just as a first try, it would seem like the circuit on page 50 of the July issue (fig. 9) could be modified to make U6 a phase locked loop type oscillator which gets pulled +/— about 700 Hz-1200 Hz by the error signal available several places in the circuit. The received signal thus becomes the source of the info to cause the filter to track. The transmitted signal can now wander a bit (and the receiver also can wander some) but the system holds together. I think this is especially important when we try to use C.C.W. on the high orbit OSCAR in 1980. When a whole new DX band is available to the entire northern hemisphere simultaneously with no skip zone, it is going to take something like C.C.W. to take care of the crowd.

My second point might fall flat if none of you have been hooked on hobby computers. The new Commodore computer at $595 promises to change the picture rapidly. Anyhow, present computer c.w. systems suffer badly from two things—noise, and non-uniform dots, dashes, and space. The computer can be programed to produce just the right size dots, dashes, and spaces, and can also self-synchronize to the incoming string of ones and zeroes and reject anything that doesn't conform. In transmitting, one types into a buffer at any rate one desires, and the computer cranks out the code at exactly the speed one has programed it to send. It's just ideal for the C.C.W. scheme. Most of the computer amateurs have turned to RTTY rather than c.w. because of the above mentioned problems with computer c.w. Using RTTY is like going back to a.m. phone—you have to have a signal on the air all the time and the linear gets all hot and bothered."

de . . . W7GHM, Ray Petit, Petit Logic Systems, PO Box 51, Oak Harbor, WA 98277: "I am pleased to announce that arrangements have been made with Smith-Root Inc., 14014 N.E. Salmon Creek Ave., Vancouver, WA 98665, to manufacture the Petit C.C.W. filter. Letters of inquiry to me have been forwarded to Dave Smith, President of Smith-Root Inc., and he will communicate with correspondents directly when he is ready to take orders for the Petit Filter. We have longer-range plans "in the works" to manufacture high-performance synthesized receivers and transmitters which will be compatible with the Petit C.C.W. Filter. I look forward to the time when we can QSO on the air with this state-of-the-art technique!"

de . . . W1AM, Art Westneat, 146 Paradise Ave., Middletown, RI 02842: "I am most pleased to see *CQ* enter the C.C.W. area, for it has been an area of continuing frustration to me. I subscribed to the *C.C.W. Newsletter* about two years ago and received a package of material to page 75:47. After that I received nothing! *(Ed. Note: W6NEY, Editor of the CCWN, has been incredibly overloaded with professional duties,*

*83 Suburban Estates, Vermillion, SD 57069

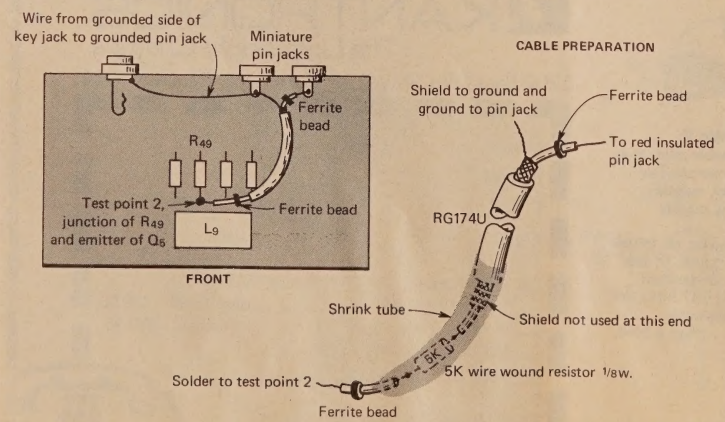


Fig. 1— Reader Raymond Hough submits his latest HW-8 modification. If you have a high impedance frequency counter you can now add digital readout to the HW-8 by following these simple mods.

and has turned out new material as time and availability permits. Correspondence can be quite a drain on time, as I well know! Just a word to ask readers for a bit of understanding—those of us who develop electronic gear and write about it, for the most part, are in this area as a hobby. We still must earn a living and that takes most of our time! We try our best, but oftentimes that means that correspondence goes unanswered, sometimes indefinitely. We apologize for this, but circumstances often dictate what we can manage to do!) My letters were unanswered and no progress in C.C.W. could be observed anywhere. I had a system partially built, and had to put it aside when there was no evidence that there would be anyone to QSO! Your articles on C.C.W. give me renewed hope. I hope that in the future, you will be able to publish a list of the stations actively engaged in putting systems together, and working on the air, so that schedules may be established and correspondence may be initiated. I hope further that you will give advice as to where printed circuit boards for C.C.W. systems components may be found. Again, many thanks for your most informative articles on C.C.W. in the June and July issues. C.C.W. should be a great new area for amateur radio, and I would like to earn the first C.C.W. WAS!"

It appears that the C.C.W. articles have had some impact. This writer intends to give full coverage to any future C.C.W. developments, and this column is open to any submissions of information, questions, and the like. C.C.W. deserves a public forum at this stage of the development of the technique, and *CQ*, as always, is first on the spot with space and publicity for "minority" areas of amateur radio. So, keep this writer posted on your progress with construction, testing, alignment, and operation of the C.C.W. components. P.c. board designs, circuit improvements, hints & kinks, are all welcome, and will be edited from scribbled notes, etc.

A very good indication that C.C.W. is going to become an on-the-air reality is the fact that W7GHM received about 20 requests for C.C.W. filter kits/boards by mid-August! Now that Smith-Root Inc. will be manufacturing the Petit Filter, and perhaps other components of a system, C.C.W. can become practical for most amateurs. Give it some thought! And when you do begin work, share your results with other C.C.W. experimenters thru this column.

Wyoming 160m QRPp

de . . . W7TO, Dave Hardacker, 1745 S. Thurmond, Sheridan, WYO 82801: "As the QRPp Editor of *CQ*, you might be interested in noting in your column that I am going to attempt 160 meter WAS QRPp in the 1977-78 winter season. I will be transmitting on 1995 kHz with "CQ QSX 1R8." I will listen for responses both on 1995 kHz and the low end of 160 (1800-1805 kHz) I'm not quite sure what input power I will use, but in the past I've been able to work to W1-2-3-4 with ten watts, so I might be able to hack it with five watts. *(Ed. Note: the QRPp level is limited to either 10 watts input, or five watts output.)* My antenna is enough to make one cry. It is a 27 ft. high end-fed random wire with a 54 ft. flat-top. It uses 400 sq. ft. of chicken wire for a ground screen, and a few 70 ft. radials. However, this was good enough to work WAS on 160 in two seasons with a bit under 100 watts input. The QRPp transmitter is crystal controlled only. I'd like to hear from others hooked on 160 meter QRPp. Anyone out there interested in a 160 meter QRPp Net? If so, drop me a line stating preferences as to meeting time, etc."

The Newly Bitten Ones

de . . . W6NPN, Bruce K. French, (no QTH given): "Just got on QRPp last week, and am having a lot of fun racking up various states. My first and only DX QSO thus far was slightly more than spectacular—would you believe LU8DQ, Buenos Aires, Argentina, answered my little peanut whistle, giving me a 559! I immediately had to verify my power output to the antenna. The Bird wattmeter gave me just 1.7 watts output—this to an inverted 40m Vee. The log data is: June 17, 1977, 0300Z, 7005 kHz. It is a distance of over 5300 miles. My location is not conducive to DX'ing—I live in a valley surrounded by hills and trees in all directions. My antenna is only up 30 ft., which is another factor making the LU8DQ QSO unbelievable! Well, that's my story. I hope I get a QSL from him for verification. CUL."

de . . . K9PNG, Jim Jones, 615 N. Benton St., Palatine, ILL 60067: "Picked up a copy of *CQ* one day a few months back, and was surprised to see they were still in business. I hadn't been active for about 14 or 15 years, and was just getting the bug back. To make a long story short, I was thrilled to see that someone was treating QRPp on an equal basis with QRO, RTTY, SSTV, 2 meters, OSCAR, and last but not least, microprocessors. What's the last one mean, anyway? I had just swapped an old inoperative RME99 for an equally inoperative HW-7, and was wondering if it was any use to try. Got the HW-7 on the air and it is really a gas. Just before acquiring it, I had bought some Collins gear with a KW linear from a friend who was moving. I have never had the KW on the air and only used the rest sparingly. I've been putting the HW-7 into a tuned long wire and so far have worked F5IN and a Bahamas station for DX. Otherwise, have worked all over the states and Canada getting FB reports. Subscribed to *CQ*. I'm putting an HW-8 together now and thank you much for your conversion articles. I'll soon have a triband beam up, also."

de . . . WB2JII, Mario Filippi *(NO* QTH): "I've been reading your column for about 8 months (that's how long I've been an amateur). The world of QRPp always intrigued me. Finally, last Tuesday I bought an Argonaut. Just like to let you know how I did. This is how my log looks to date. (9/6/77-9/9/77). 9/6/77—First day. Worked WB2CKL (local) with a 59 on s.s.b. Antenna was a 12AVQ vertical, mounted up 35 ft. Then, at 2035Z, worked VE3ARN with a 579 on 20m c.w. 9/7/77—Worked WA2KWE (local). Then, at 2030Z, worked WA4SBA (ALA) with a 559 on 20 c.w. 9/8/77—Worked W9AND/4/QRP with a 519! on 40 c.w. At 1000Z worked K4HXW (FLA) with a Q5 on 20 s.s.b. 9/9/77—Worked W5HQL (TX). Received a 459 on 40 c.w. Antenna was a ground-mounted 18V vertical. At 1850Z, worked N6RZ on 15 s.s.b.! Report was a 44. Then at 2010Z, worked DL0BX on 20 s.s.b. on the 12AVQ! Next came EI5U on 20 c.w. thru heavy QRM, and I couldn't copy my RST from him. Then followed WB0WRO (IA) with a 579 on 20 c.w., and at 0014Z, CY4UO on 20 c.w. with a 449. I was really amazed at the results. Frankly, I never thought you could do very well with QRPp. It is a lot of fun, and highly portable. My Argonaut is powered by a 12 v.d.c. 1 amp motorcycle battery. While I'm at it, I'd like to request info on *The Milliwatt,* your QRPp magazine. I am interested in a subscription. *(Ed. Note:* The Milliwatt *ceased publication in June, 1975. We still have 30 of the 33 issue run in stock for $20.50 a set. However, Do not attempt to send orders for back issues until August, 1978. They simply cannot be filled while I am in Europe.)* So, 73's and I'll write to you later informing you of my progress."

de . . . W9WI, D. E. Smith, 751 Fulcher, Madison, WI 53706: "Re your column in September *CQ*—I think that the wrong fig. 1 got printed. It looks like an HW-8 RIT to me. *(Ed. Note: You are correct. The RIT circuit mistakenly appeared instead of the power supply circuit.)* I don't use much QRPp here, but during the CAN-AM test, I QSY'd to 15 s.s.b. and forgot to tune up—and worked a W6 with an estimated 50-100 milliwatt r.f. output!"

de WB1DZR, Frandy Johnson, 275 Main, Northampton, MA 01060: "I en-

joyed reading your article on the HW-8, both before and after building mine. I got on the air with my new Extra ticket on the 12th of June, and have been making some fb contacts via short skip, mostly when 15m is open. My 40m ½ wave dipole loads up on 15 quite well, but with strange lobes that favor W4, Michigan, and I worked KP4 the other night. On 20m I had 3 QSO's with ILL, and this morning I talked with WB0-EHC in ND, this and KP4 being my best DX so far. The dipole is about 8ft above the roof of a 3 story downtown building. The high radiation angle apparently favors the short skip. I average about 1-2 QSO's per hour, have never had a CQ answered, but wait thru QSO's and then call the strong station. They're looking for real DX, but I'm elated when they come back! I mean that I spend 1-2 hours before I make a contact, not rag-chewing! I'm interested in a RIT circuit for the HW-8—any tips *(see the October issue of CQ with a fully automatic RIT. The circuit appearing in July QST is a good one, but ours is better!)* I have had absolutely no luck getting the v.f.o. to track. Heath told me to spread the plates of the tuning capacitor, but that didn't help. Even with the trimmer capacitor all the way out, it still wasn't enough. I ended up just calibrating what I got on a graph so that I know where I really am. I will probably end up shaving down the plates and trying to decrease over all capacitance that way. *(Ed. Note: The tuning capacitor that Heath provides with the HW-8 is apparently from a low-quality production run. Many other readers wrote in complaining that I overlooked that shortcoming of the HW-8 in my review in May CQ. Actually, my capacitor was a fairly good one, although not linear — ±2.5 kHz anywhere on the dial. But it didn't fall apart until about July! Sure enough, mine was just like the others —the rotor section just plain fell off! Solution: I just epoxy glued the rotor section back on, making sure that electrical contact with the rotor shaft was effected. It is fine now).*"

de . . . Raymond Hough, 4825 S.W. Lombard Apt #1, Beaverton, ORE 97005: "I have been reading your articles on the HW-8 and enjoy them very much. I also own an HW-8 and HW-7, but have yet to get my license, although I hope to have it soon. I picked up my copy of the September *CQ* and found a very strange looking power supply on page 65. I believe this circuit shown is the RIT for the HW-8! Well, I hope you follow up with the right article! I have included a rough sketch of one of my modifications on the HW-8, a digital readout. See figure 1. Test Point 2 contains the frequency to be displayed and the only problem was getting it to the counter without introducing a hum. A 5K ohm wire wound resistor is used for isolation, and a FB-43-101 ferrite bead at each end of the resistor eliminates the hum. See the sketch elsewhere in this column. My friends who are amateurs find the digital readout really neat and I like it too because I could never afford a factory rig with all the neat stuff! Have fun with your HW-8 and keep the QRPp articles coming!" de . . . WB9VJB, Charles Henderson, 250 E. Bristol St Apt G-66, Elkhart, IND 46514: "Enjoyed your article in the August *CQ* on modifying the HW-8. I changed the link of the 15 meter receiver toroid and was delighted with the results. Really looked forward to receiving the September *CQ* to get a look at the balance of your article, but unfortunately they didn't include it—nasty trick! Surely circulation isn't that bad *(Ed. Note: No, circulation is fine at 120,000 per month —the boys in New York have to shift things around sometimes to fit the space available.)* When is the balance of your article coming? I want to get a look at the circuit so I can compare it to the RIT modification that appeared in the August *QST (Ed. Note: My circuit has several advantages over the QST version.)* Next, I want to complement you on your article. It was clear, easy to follow, easily understood by "new" amateurs, and after reading the manner of presentation, I was encouraged to "dig in" and get to work.

I was at Heath last week and asked if there was a substitute final transistor that could be used to boost the HW-8 output. They weren't too helpful! I was told that "somewhere an article had been written describing what I was seeking" but where or when they didn't know. Are you aware of any method, article, or source that tells how to boost the output? I would like to avoid the construction and use of a small linear amplifier. *Ed. Note: No articles have appeared in CQ, QST or hr as yet. DeMaw produced a 15 watt outboard design that appeared in December, 1975, QST. In answer to Charles' question about a substitute final, the answer is "no." The final amplifier output level depends upon the drive power applied to its base, and in the HW-8, the drive power is sufficient to produce only as much as the present 2N4427 does. However, I plan to add another modification. It is still on the boards, and will consist of a broadband circuit using a 2N5591 or 2N6082 which will be inserted between the 2N4427 present final, and the output network in the HW-8. I expect this approach will work and provide about 15 watts r.f. output, and will eliminate the need for extra networks. The amplifier will be mounted in the HW-8 cabinet and the rig will be self-contained.)* I'm an apartment dweller and QRPp is the only way I can work. My "big" choice of antennas is limited to a not-so-long longwire which I put up and take down each time I want to get on the air. It gets a little frustrating at times, but it is a small sacrifice. My station is located in a small roll-top desk that is 26 inches wide, so compactness is vital since I don't have room for anything but QRPp equipment."

I Asked For It

In the last "operating news" column, I urged readers to submit material—any kind, even poems. Never really expected any to come. But it did, and, basing my judgment on my extensive knowledge of verse forms, I have decided to include it as worthy of publication. Read on, and just remember, poetry is for the educated, cultured types, and no reason why amateurs can't be educated and cultured!

"Pure Fantasy"

A down-hearted Novice once said,
'My noggin must be full of lead.
Though I study and cram,
For the General Exam,
I can't retain facts in my head.

Does a "ham" gear have teeth like a saw?
And does unfiltered D.C. taste raw?
If the grid leak got wet
would it foul up my set?
And just why did they pass Ohms Law?'

He was under a mental delusion.
'Did a "bleeder" need a transfusion?
Letter "N" is dash-dot,
But what is a watt?'
His mind was in utter confusion.

And then he started to think;
Drew a sketch on a paper with ink,
Of a coil and condenser,
Placed it in a dispenser,
And swallowed it down with a drink.

Now, an Extra Class amateur is he.
He became just as wise as could be.
Just how did he work it?
Gulping down that 'tuned circuit
Increased his mental capacity!

David Michaels, WB4OHH

HW-8 R.I.T P.C. Board Correction

Nothing is so frustrating as waiting expectantly for a circuit, and then finding that the artist messed up the p.c. board design. The p.c. board design on p. 64 for the R.I.T. circuit omits

(Continued on page 74)

a monthly feature by

WILLIAM I. ORR, W6SAI

Antennas

Design, construction, fact, and even some fiction

Pendergast was hunched over his desk, examining a small drawing with great care. I came up behind him quietly and poked him in the ribs. He jumped as if he had been shot.

"Hello," he remarked as his cardiovascular system returned to normal.

"You must have a guilty conscience," I said. "Why did you jump?"

"Who knows?" he asked cheerfully. "I was just looking at a Great Circle Chart centered on Australia (fig. 1). Interesting, isn't it?"

He didn't wait for me to reply, but continued on. "No wonder the VK's are such great DX-artists. Notice that they can work into Africa beaming west (270°), or east (90°). And it's almost a complete over-water path either way. And look at the path to the United States. Short path is 60° and long path is 240°. I remember when I lived on the east coast the VK's would come through the long path in the afternoon on 20 meters. And, believe it or not, I have worked Australia via the long path from California on 20 meters in the afternoon—right across the East Coast!

"South America doesn't look so easy. The VK's have to fire through the southern auroral zone on short path, and the long path is a *long* 12,000-miler which comes close to the northern auroral zone. But Antarctica should be duck soup—right in their back yard!"

"Very interesting, indeed," I admitted. "This map shows clearly the short and long paths from Australia to all parts of the world. The "down under" paths look mighty peculiar to one "up here," don't they?"

"Tell me something about long-path propagation" said Pendergast, as he placed the Great Circle map in the back of his log book.

"Well," I replied long-path propagation has been known for many years. There's no law that says radio waves have to stop once they have been reflected around the earth. In fact, observers have noted radio waves having multiple echoes, indicating they have travelled more than once around the world.

*48 Campbell Lane, Menlo Park, CA 94025



Fig. 1—"The World Turned Upside Down." A great circle map of the world centered on Adelaide, Australia. The "long path" is shown around the perimeter of the map.

"I remember during peak conditions on 20 meters when it was possible to hear your own, and other local signals, coming back around the world. The round-the-world signal was very strong. In fact, the round-the-world signal of one local amateur, who was partially hidden from me by a hill, was quite a bit stronger than his ground-wave signal."

"Are long-path signals heard only on 20 meters?", asked my friend.

"No," I replied. "Some of the strongest and most consistent long-path signals are heard on 15 meters. That band is coming back to life now, so you'll probably hear long-path signals very soon. Forty meters has plenty of long-path openings in the morning, particularly between the West Coast and Europe. Long-path winter openings are fairly common on 80 meters, too. But the signals on that band are quite weak.

"As far as 10 meters goes, I have only observed one long-path opening on that band during a sunspot cycle peak. But others have observed long-path openings, too. I would say that they are less frequent than on 15 meters. Long-path propagation seems to peak right around the 15 meter band.

"It is also thought that the MUF is higher for long-path openings. Cases of long-path propagation have been reported on 15 meters when that band was not open to the same location via the short path. So my guess is that long-path propagation will become more and more important on 20 and 15 meters during the coming years.

"Anybody can play the game, even though you don't have a rotary beam. However, you'll be able to tell a long path signal on many occasions as it can have a "flutter" to it similar to that on signals passing through the auroral zone. But not all long-path signals have a flutter. A rotary beam will quickly tell you the direction of the signal, in any case."

"Turning from propagation to antennas," said Pendergast briskly, "What's new?"

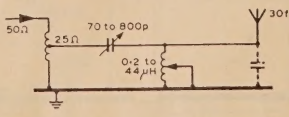


Fig. 2—A wideband antenna tuner for a 30 foot vertical whip, as used in British Marconi equipment. Capacitor at right is whip capacitance to ground through the mount. (Drawing courtesy of RSGB)

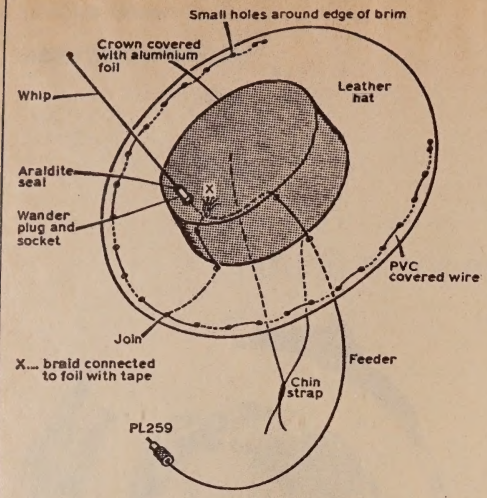


Fig. 3—The "Gaucho" hat-antenna of G4BWE. Mounted on a leather hat, this 19-inch whip provides a much better signal than a "rubber-ducky" antenna. While the "Araldite" seal and "Wander" plug are unknown in America, a good guess is that a BNC connector and epoxy would do the job.

"Well, I've seen a couple of items in *Radio Communication*, the monthly magazine of the Radio Society of Great Britain, that would interest you. The first is a universal antenna tuner that matches a 30 foot whip antenna over the range of 1.5 MHz to 30 MHz (fig. 2). A 50 ohm to 25 ohm wideband transformer is used (no details given). All that is then required are a variable capacitor and a rotary inductor.

"At the low end of the spectrum, the 30 foot whip "looks capacitive" at the feedpoint, passing through resonance around 7 MHz, and then "looking inductive" up to about 11 MHz when it again becomes "capacitive." The equivalent series resistance is about 2.5 ohms at 1.5 MHz, climbing to about 500 ohms at 11 MHz, then falling to about 50 ohms at the higher frequencies.

"Using a high-Q rotary inductor and a good ground system, the antenna efficiency remains remarkably high

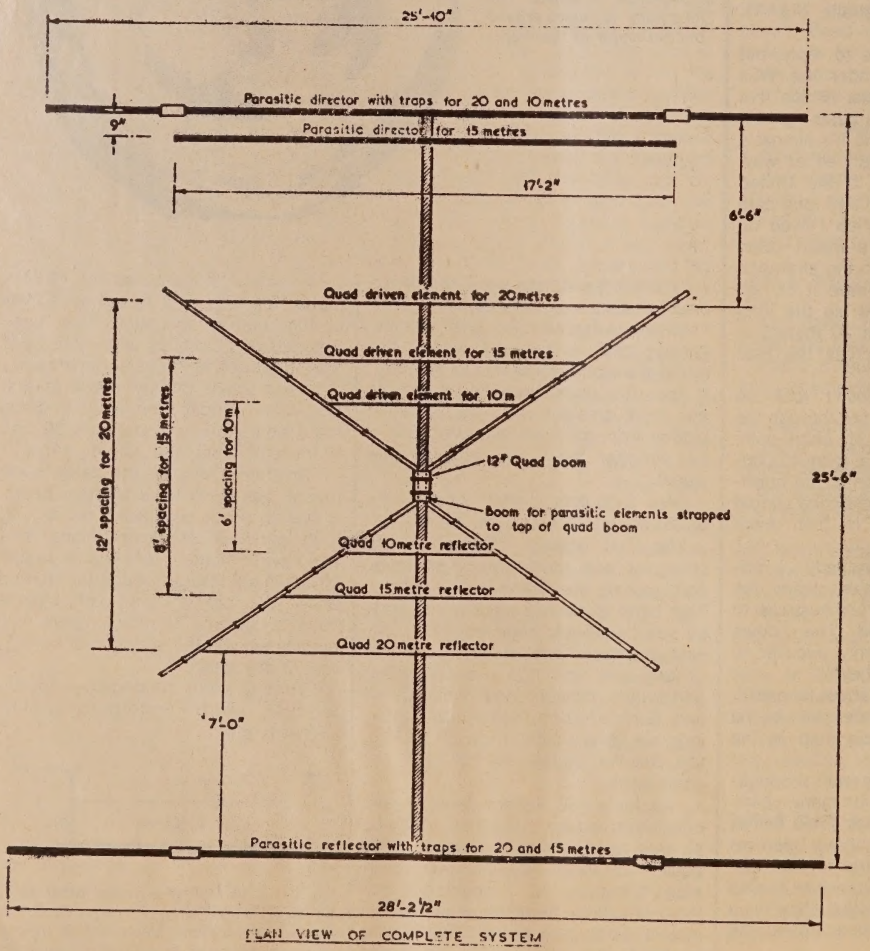


Fig. 4—The plan for the G3NVA "Quagi" antenna as described in the British "Short Wave Magazine." The two element spider Quad has Yagi-type reflector and director added for extra gain.

over the whole tuning range. The English design is automatically tuned when the frequency is changed, but in an amateur-built version, this is not necessary."

"Anything else of interest from the RSGB?", asked Pendergast, as he copied the antenna design into his overflowing notebook.

"One more item," I replied. "Look at fig. 3. This is a 2 meter "hat" antenna designed by G4BWE. This is a fine idea for a hand-held unit, as it puts the antenna as high as possible above ground and minimizes body absorption. G4BWE started with a leather "gaucho" (cowboy) hat. A home-made 19-inch whip is attached to a small coaxial connector which mates with a receptacle mounted on the edge of the hat. There's a ground plane made of aluminum foil in the domed crown of the hat which is attached to the shell of the plug. The ground plane is extended in area by weaving a length of insulated wire through a pattern of small holes around the perimeter of the brim; this counterpoise wire is also connected to the aluminum foil ground plane. Miniature coaxial line connects the hat antenna to the hand-held unit and a fancy chin strap keeps the hat antenna in place."

"Hooray!," cried Pendergast. "And how about a Tyrolean hat from Austria, with the antenna carefully threaded through the feather?"

"Why not?," I rejoined. 'Only thing is, don't put your head down, or you may catch your neighbor in the eye with the antenna. Make sure the tip of the antenna is bent in a circle, or has a ball on it."

"I gotcha," said Pendergast, as he made a qualifying remark in his notebook.

"One more thing before we leave England. There has been a lot of talk recently about using Yagi parasitic elements with a Quad driven element. The v.h.f. boys speak quite highly of such a design.

"The idea has merit, as it seems to provide additional gain over a similar antenna using a straight dipole element. And it eliminates the hassle with the bulky Quad reflector and director elements. Using a Quad driven element seems to add one or two decibels power gain to an equivalent Yagi design, so there's a lot to be said for the idea. Some fellows call the antenna a "Quagi" beam. There's a great article about the v.h.f. Quagi by my friend Wayne Overbeck, K6YNB, in the April, 1977 issue of *QST*. No doubt these principles could be applied to a 20 meter beam antenna.

"In truth, this has already been done. In May, 1963, G3NVA wrote a very comprehensive article about a combination Quad-Yagi in the British *Short Wave Magazine*. Look at fig. 4. This is a plan view of a tri-band beam for 20, 15 and 10 meters. Separate Quad driven elements and reflectors are used for the three bands, in combination with a trapped Yagi reflector for 20 and 15 meters and a trapped Yagi director for 20 and 10 meters. A separate Yagi parasitic director is used for 15 meters.

"This adds up to a formidable antenna. On 20 meters, there are two reflectors and two directors. That is, a Quad and a Yagi reflector and a Yagi director. On 15 meters, there are a Quad and a Yagi reflector, and a Yagi director, separate from the 20/10 meter director. On 10 meters there are a Quad reflector and a Yagi director. This will all sort into place if you study the drawing."

"That's a pretty impressive structure," admitted my friend. "And it all fits on a boom less than 26 feet long. A spider arrangement is used for the Quad elements, I see. In fact, the antenna could be made in two parts—the tri-band Quad, and the long boom with the Yagi elements. I would think that some enterprising owner of a spider Quad might like to make up a strap-on assembly with the Yagi elements and see if it does any good!"

"The Quad driven element does exhibit substantial gain over a dipole driven element," I admitted. "It might be interesting to substitute a Quad loop for the driven element in a Yagi. It's easy to do and the results would be very interesting."

Pendergast reached into his shirt pocket and brought out a drawing of

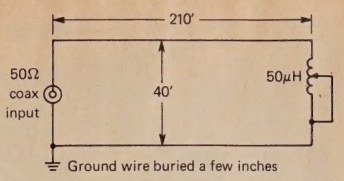


Fig. 5—The W6TYP "loop" antenna for 160 meters. The inductor is adjusted for lowest s.w.r. at the operating frequency. The antenna also works well on higher frequency bands.

an antenna. "I worked W6TYP on 160 meters a few months ago and he had such a robust signal I asked him what he was using for an antenna. And this is what he sent me." He tossed the drawing on the table (fig. 5.) "In addition to a good 160 meter signal, the antenna also works well on the higher frequency amateur bands. The inductor at the end is adjusted for lowest s.w.r. on 160 meters."

"I've heard W6TYP's signal on 160," I said. "What does he use for the ground connections?"

"He uses a combination of ground rods, cold water pipes and radials at the station end, and ground rods plus one or two radials at the far end. The grounds are connected together by a 210 foot length of wire buried a few inches below the soil. W6TYP measured the ground loss and figured the antenna to be about sixty-four percent efficient. And that's very good for 160 meters."

"Nice," I remarked. "I am always interested in 160 meter antennas. Low frequency antennas are always a prob-

(Continued on page 74)

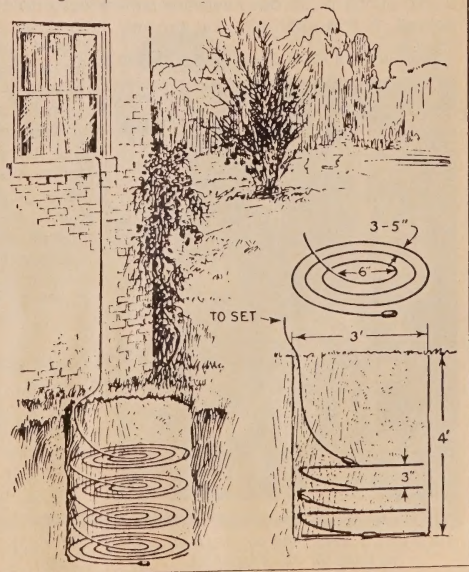


Fig. 6—The old-timer of 1928 knew all about underground antennas!

a monthly feature by

BILL DEWITT, W2DD

In Focus

Television on the Amateur bands

A New Year, A New Interest? How About SSTV?

As time rolls into 1978, it's a good time to think about trying something new. With thousands of amateurs all over the world swapping pictures and reports via SSTV, this is an opportune time to join in the fun that comes with this mode of communication. If you have hesitated getting into slow scan because you feel lacking in technical capability you should discard that feeling right now! It really isn't that complicated from an operational standpoint. If you are wondering "Who's on SSTV?" perhaps I can provide an answer that will encourage you to join the group.

Who's On Slow Scan Television? —Perspective

To answer the question, "Who's on slow scan television?" perhaps one should first answer the question "Who's an amateur radio operator?"

Amateur radio stands alone among hobby interests so far as the age span and heterogeneous mix of vocational backgrounds of its devotees are concerned. A five year old boy recently received his Novice license. At 80 years PLUS, two of the best c.w. operators I've ever copied are still cranking it out faster than I can write. With regard to vocational backgrounds—it's well known that all amateurs aren't technical geniuses employed in the electronics field.

Who's an amateur? Housewives, students, lawyers, farmers, doctors, musicians, merchants, truck drivers, artists, teachers, technicians, architects, insurance men—the list goes on and on—and THAT'S who's an amateur!

*2112 Turk Hill Road, Fairport, N.Y. 14450



Fig. 1—Bobby and Hank Hargis, W6WDL and W6WDB, took time out at an art show to pose for this snapshort.

Who's On Slow Scan Television —A Closer Look

The spectrum of ages is different for slow scan operators because of the requirement of a General or Advanced Class license (depending upon the operating frequencies).

Gord Patterson, a 14 year old in Niagara Falls, Ont., Canada, is building his own monitor. On the other hand, I am sure that many SSTV operators are pushing 70. (W2DD is 68 plus!) In any event, the range of ages from youngest to oldest on SSTV must be about 50 years! Maybe we should undertake to find out who ARE the youngest and oldest slow scan operators!

So far as vocations are concerned, all slow scanners are NOT technical whiz bangs employed in the electronics field. Their vocations run the same gamut as amateurs in general. Some examples: W1VRK is in the newspaper business, WB5SAJ is an anesthesiologist; W6VLH is a movie director/writer; F6BDJ is a pharmacist; ZS6PP has an insurance agency; WA2ITK is a computer specialist.

That 14230.00 kHz Carrier

Thanks to Gene Hastings, N1BB/W1VRK, for a note indicating that he has finally nailed down the identity of the steady carrier on 14230 that QRMs SSTV and other DX QSOs.

Gene reports that the carrier is the second harmonic of Radio Portugal operating on 7115 kHz. He has appealed to the FCC and the ARRL to take action on this incursion into the 20 meter band. The problem can only be corrected through diplomatic channels, but it appears unlikely that any action will be taken on what is regarded as a very small problem. However, what is a small engineering problem in this case is a very large problem for the international community of amateurs.

Could this be a reason for trying some frequency other than 14230.000 kHz for SSTV?

Now for a "super" example of a non-technical person who's having a ball with SSTV, read about W6WDL, our SSTV station of the month.

Slow Scan Station Of The Month, W6WDL, "Bobby" Hargis, Of Glendora, CA.

One of the best known slow scan stations on the air today is operated by Barbara "Bobby" Hargis, W6WDL. When Bobby and her husband Hank, W6WDB, received their Novice tickets in mid-1957, they had no idea that they would ever be swapping pictures with amateurs in other continents some day.

Looking back to that question, "Who's on slow scan television?"—you could say that "slow scanner Bobby" is: the mother of three sons; a housewife; an artist; and, a very attractive lady! Bobby's first experience with electronic gear was when she opened up a Heathkit DX-35 transmitter kit, read the directions, and started wiring it! Hank did some of the wiring and checked Bobby's work. By the time their Novice licenses arrived in the mail, Bobby and Hank had an NC-98 receiver, a dipole antenna, the DX-35 in working order—and were "rarin' to go!"

In a matter of months on the air, Bobby took first place in the California Section of the Novice Round-Up. In less than a year from their first tickets, both Bobby and Hank had acquired the General Class license. Bobby has since received her Advanced Class license and Hank is studying for his. It takes a bit of drive and determination to get from one class of license

to the next. These two people have what it takes.

Bobby and Hank seem to be inveterate kit builders. After the DX-35, they built a DX-100 and its sideband adapter. They have built a rather complete roster of Heath test equipment. More recent projects include an SB-200, SB-104 transceiver, the SB-634 console, HW-2036 2 meter f.m. transceiver, and a Heath electronic keyer.

For a look at the energetic combination of W6WDL and W6WDB attending an art show where Bobby displayed her work, see fig. 1.

It was the desire to go "all out" on slow scan that pushed Bobby into getting the Advanced Class license. As an artist (with fine arts training) the idea of receiving and sending pictures appealed to her. After a demonstration at the Robot Research factory, Bobby knew that she was hooked on slow scan. Within a month the W6WDL shack housed an 80A camera, a 70D monitor, and a cassette tape recorder.

At this point, Bobby had only the General Class license. She found that 10 meter contacts were hard to come by. What to do? Give up slow scan? Not Bobby! She organized a 10 meter SSTV net that has had as many as 28 check-ins—and, in the meantime, she started studying for the Advanced Class ticket which permits operation on 10 through 75 meters. As of last March, Bobby passed the Advanced exam and has been going strong on all bands except 75. Fig. 2 gives you a close-up view of Bobby in the Hargis' well-equipped "shack".

(If you are wondering about the use of a solid state transceiver on SSTV, Bobby and Hank have found that the use of a small fan above the SB-104 provides sufficient cooling when transmissions are kept under three minutes. They have NOT wiped out any final transistors.)

Bobby's art work is frequently seen by other slow scanners. She employs a chimerical style that has attracted great favor in many art shows. For the benefit of those who have yet to QSO W6WDL—and non-slow scanners, some examples of her work are shown in figs. 3 and 4. Unhappily, it's just not possible to reproduce the delightful colors of these pictures in *CQ's* inner pages.

Yours truly would like to join Bobby's plea for more SSTV activity on 15 and 40 meters. Bobby thinks that Generals should be permitted to use SSTV in some portion of their 40 meter phone segment. Sounds like a good idea!

To wind up our story on this talented lady slow scanner, a direct quote from one of her recent letters: "SSTV



Fig. 2—One of the few members of the female sex active on SSTV. Bobby Hargis assembled and wired just about everything in this picture except the mike and the Robot monitor!



Fig. 3—A chimerical painting by Bobby, W6WDL, on the right and two SSTV drawings often seen via W6WDL on the air.



Fig. 4—The essence of Bobby's artistic talents, this sailboat scene would be a delightful addition to any living room.

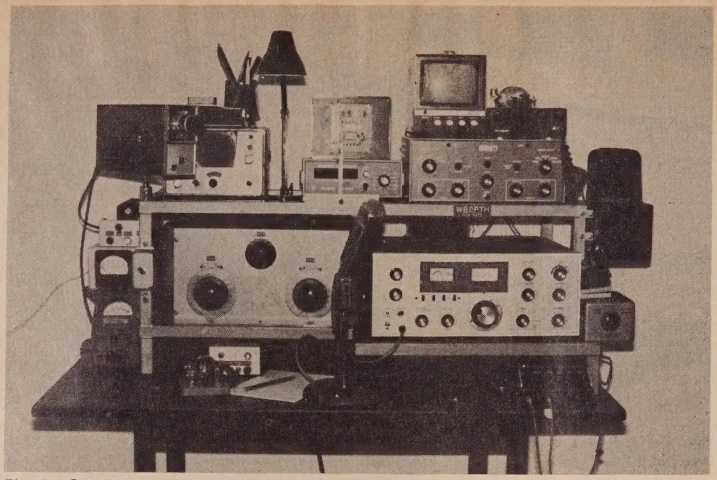


Fig. 5—Stu Rubens, WB2PTH, is a steadfast 3845 kHz. SSTV operator with this compact set up. Stu's slow scan pictures are very visible, but his antenna isn't. See text for details.

is the best thing that's happened to amateur radio!"

Visible Pictures With An Invisible Antenna, Magic At WB2PTH'S QTH!

If you don't think living in an apartment can present problems so far as amateur radio is concerned, just ask Stuart Ruben, WB2PTH, of Mt. Laurel, N.J.

Stu writes, "I am in an apartment, so antennas are a problem. My results on 80 meter SSTV have been excellent using 50 feet of No. 32 (!) magnet wire over a nearby tree. My rig uses sweep tubes, so I just run about 180 watts PEP input instead of 600. The unit to the left of the FTDX-560 (in fig. 5) is my homebrew matchbox. It will tune a bedspring! I use a Panasonic camera into the Robot 400 scan converter. The monitor is also Japanese-made."

Thanks to Stu for the excellent photograph showing how compact a complete SSTV station can be. Stu, next Spring we'd like a report on how many times you had to replace that No. 32 wire during the wild wintry months.

Picture Sources—K4FZ Offers A Few "Thoughtstarters"

Bob Weinig, K4FZ, of Naples, Florida is always on the look-out for new sources of picture material for SSTV transmission. A letter just received from Bob contains many ideas for anyone who's anxious to make up a good tape for SSTV. Here's Bob's letter in somewhat abbreviated form:

"Some months ago you raised the question in your column as to what might be done to enhance the value of SSTV.

"I believe that there is a great opportunity to improve the entertainment value of our picture transmissions, as well as interesting educational materials.

"Last winter during a visit to Disney World, I discovered that their materials are copyrighted. I have secured permission to transmit certain Disney material under practical conditions. There must be other opportunities that could be productively explored.

"A visit to the North Cape of Norway also provided much material of interest. Postcards, literature, and photos taken on the trip will provide still shots for SSTV purposes.

"Another trip to an aircraft museum yielded lots of good pictures for transmission.

"Others may encounter similar opportunities for collecting material for vacation tapes.

"It seems to me that the opportunities are limited only by our imagination and ability to explore.

"Do these ideas offer any worthwhile 'thoughtstarters'?"

Best regards
Bob, K4FZ"

Yes Bob, you sure are offering some thought-provoking suggestions for the slow scanner who wants to make up an interesting tape. Thanks for sharing your ideas with "In Focus" readers. If Bob's letter gives YOU some good ideas along this line, please let us hear from you.



Fig. 6—Neville Jackson, G3IAD, of Nottingham, England, has a ham "shack" to envy. Note the world maps conveniently arranged to encourage DX-pedition dreaming!

About Cop McDonald, Inventor Of Our SSTV System

Last month I mentioned that this month's column would include a story on Copthorne McDonald, now VE1FL, the inventor of our amateur SSTV system. On receipt of further information from Cop I decided that to do justice to the wealth of material that Cop has generously supplied, the article should be expanded. For this reason, the story on Cop and the very beginnings of slow scan will appear in an upcoming issue.

Slow Scan Station Of The Month, G3IAD

Neville Jackson, G3IAD, of Nottingham, England has finally received the

(Continued on page 74)

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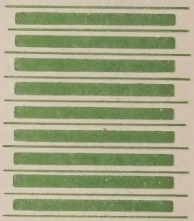
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IRWIN MATH, WA2NDM

Math's Notes

A look at the technical side of things

Now that the new year is upon us, we felt that to properly start 1978, we would begin to answer the many questions that have "piled-up" during the past few months.

Our column on operational amplifiers in May of last year prompted a number of people to write asking how to use these very versatile devices in many applications, particularly where higher power is involved. We have given this some thought and have come up with the circuit of fig. 1. This circuit has been presented before, but since it answers so many of the questions we have received we thought it would be a good idea to review it again.

As can be seen in the schematic, both a PNP and NPN transistor have been added to the basic op-amp circuit. The two diodes in the biasing network for these two transistors both conduct with zero output from the op-amp. Both transistors are therefore cut-off due to the very low voltage present from base to emitter. This makes the actual output of the circuit also zero. Now, when the op-amp output goes positive, the NPN transistor's diode becomes reverse biased and it begins to conduct, resulting in a positive output. Similarly, a negative voltage from the op-amp causes the PNP transistor to conduct and the output becomes negative. The output current capability of this circuit is limited only by the gain (h_{fe}) of each transistor and its maximum ratings. With a 2N3904 and 2N3906, a common inexpensive small signal transistor complementary pair, a 741 op-amp's output can be easily boosted to ± 50ma. If we were to use the new darlington transistors, with hfe's of 1000 or more (such as Motorola's MJE3000 and MJE2500), the same 741 could supply amperes of power.

As an example, fig. 2 is the schematic of the output stage of a 20 watt servo amplifier that operates at 115 volts output! Here a common 741 drives the very low impedance of a 10 V. filament transformer which then boosts the output voltage to 115 V.

*5 Melville Lane, Great Neck, NY 11020

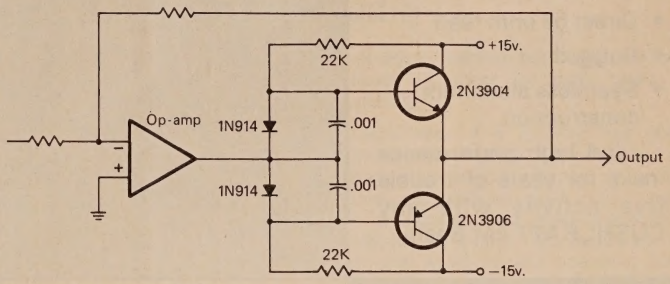


Fig. 1—A simple bipolar output current booster. The two capacitors smooth out irregularities of the diode switching points.

This same technique could of course be used to obtain almost any output voltage by driving the appropriate type of transformer. The only consideration is that the transistors have the proper ratings to meet the load requirements. In the case of the 20 watt amplifier, they must be attached to a heat sink. Notice also that the feedback resistor for the op-amp circuit is brought to the actual output point. This is to assure that the non-linearities and cross over point between the two transistors are both made insignificant by being within the feedback loop. By the way, this method would work quite well for building modulators or even h.f. amplifiers up to a couple of MHZ.

A second quite common question we get is for ways to drive external circuitry such as relays, lamps, LED's, stepper motor coils, etc. from low level logic signals.

In many of these cases, what is required is to simply use the actual logic signal to drive a transistor. This transistor can then be used to operate the external device. Fig. 3 shows all that one need know to apply this scheme with TTL circuits. In part (A) of fig. 3, the 5 volt positive output of the gate drives the transistor with approximately 5 ma of base current (5 volts ÷ 1000 ohms). If the transistor has a h_{fe} of 10, then 50 ma of current can be switched by the transistor. If a darlington transistor with an h_{fe} of 1000 is used, then 1000 × 5 ma or 5 amperes will be switched! In both cases, the V_{cc} supply of the transistor would be the level necessary to operate the device to be switched.

In part (B) of the figure, a PNP transistor is used where it is desired to have one side of the switched element grounded. In this case the transistor

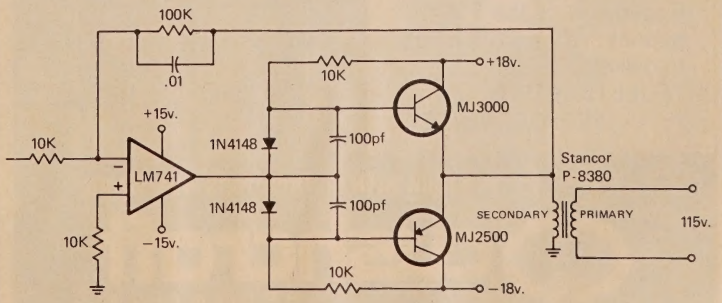


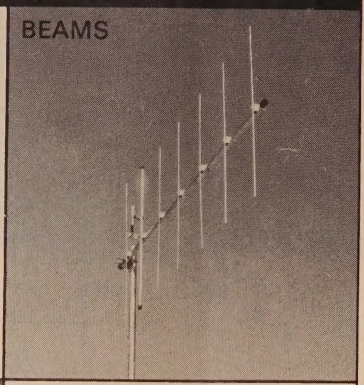
Fig. 2—The complete output circuit of a 20 watt 60 Hz servo amplifier.

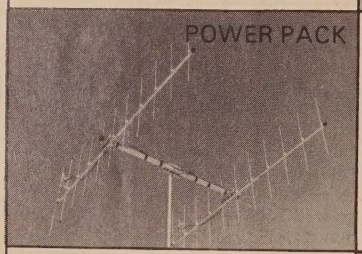
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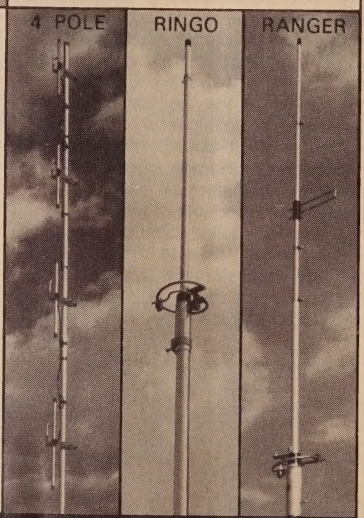
DIRECTIONAL GAIN ARRAYS

Stacked for increased performance, CUSHCRAFT Power Pack arrays come complete. Ready for use when full quieting results are needed to access distant repeaters or long haul simplex contacts.

OMNIDIRECTIONAL GAIN ANTENNAS

CUSHCRAFT'S
- Ringos
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- Stacked 4-pole

antennas are recognized world wide for their low angle of radiation, ease of assembly, and tremendous performance on all amateur FM frequencies. Regardless of the FM frequency, rely on Cushcraft to deliver "FULL QUIETING PERFORMANCE".



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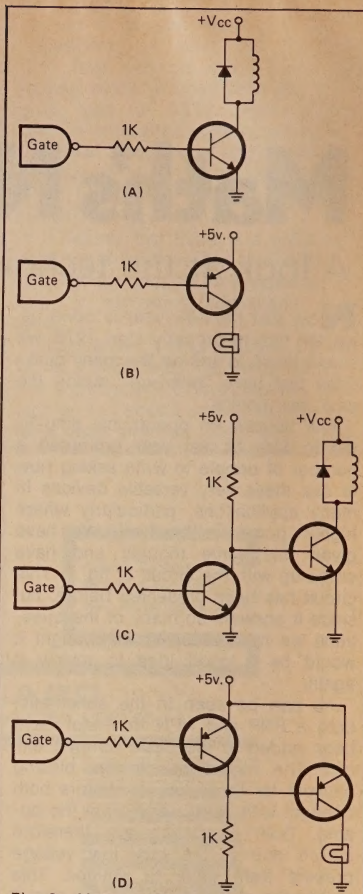


Fig. 3—Methods of driving external components with logic elements.

is switched when the output is low. If reverse switching is desired, the circuitry of (C) and (D) show how an extra inverting stage should be added to satisfy this requirement.

Other logic systems may be interfaced in this same way also. Be certain, however, that the value you choose for the base resistor be high

(Continued on page 70)

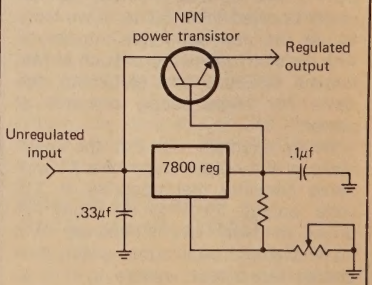


Fig. 4—A high current booster circuit for a three terminal regulator.

a monthly feature by

BILL WELSH, W6DDB

Novice

"How to" for the newcomer to Amateur radio

Novice—Amateur Radio Station Tips Part 3 Of 5

Introduction

The past two issues of this column contained information intended to help a Novice establish an efficient amateur radio station. There are 5 parts to this series and it is hoped that new amateurs will read all of them. However, each month's coverage contains helpful information that can be used without referring to the other parts in this series.

Receiver Considerations

As previously stated, the dominance of transceivers has resulted in very few receivers and transmitters being built in the last decade-plus. However, the few which have been produced are very good, and they are vastly superior to the older units. The difference between old and new receivers is much more pronounced than between old and new transmitters, as far as your Novice needs are concerned. Modern receivers are smaller, lighter, more stable, more selective, and more sensitive than their average counterparts of just 15 to 20 years ago. The most important improvement offered by today's good receiver is its sensitivity. Modern receivers let you hear and work stations that would not be heard with the older, less sensitive receivers.

Whether a receiver is housed in its own cabinet or is enclosed as part of a transceiver, it must be sensitive, stable, selective, and simple to operate.

Sensitivity

A sensitive receiver can produce a useful audio output even when the received signal applied to its antenna input is extremely weak. Several modern receivers are so sensitive that they will allow you to work stations which produce less than one-millionth of a volt (one microvolt) at the antenna connection. Simply stated, a sensitive receiver lets you hear extremely weak stations that would be difficult or impossible to hear with a less sensitive receiver. Sensitivity is the most important consideration in selecting a receiver because you just cannot work stations that you cannot hear. Naturally, the reception of a weak station that is marginal with a less sensitive receiver becomes much easier when a more sensitive receiver is used to produce a stronger output.

*2814 Empire Ave., Burbank, CA 91520

Selectivity

A minor disadvantage associated with using an extremely sensitive receiver in a crowded Novice band is that you can be greatly bothered by hearing several stations at the same time. A simple way to minimize this problem is to reduce the amount of frequency spectrum you hear, and this is what increased (narrower) receiver selectivity does for us. Some older receivers have adjustable selectivity that varies from as wide as 15 kHz to as narrow as about 5000 Hertz. One problem associated with several older receivers is that their sensitivity is greatly reduced as you switch in more selectivity. If a receiver has this deficiency, the operator would be unable to hear weak signals when using maximum selectivity. As previously mentioned in the transceiver coverage, lack of selectivity is easily overcome by using one of the fine external filters that are available at low cost. You will have no trouble connecting or using an external filter device. If you have a receiver or transceiver which has a code filter available but not installed, it is worthwhile to install it. Operating capability and pleasure are greatly improved by eliminating most (up to 98 percent) of the interference that could be bothering you from other stations and atmospherics. Good selectivity is the second most important attribute of a receiver to be used in the Novice bands.

Stability

Stability of two types must be considered; these are mechanical stability and electrical (thermal) stability. Some receivers have good mechanical and electrical stability but many are deficient in either (or both) types of stability.

Mechanical. If a receiver has good mechanical stability, it is not jarred off frequency when someone or something physically causes it to be moved. If a receiver has poor mechanical stability, it jumps off frequency as anyone walks by your operating position, leans on the operating table, or applies even a slight amount of pressure to the front panel or cabinet of the receiver. It is easy to determine whether or not a receiver has satisfactory mechanical stability. Select a steady signal, such as the WWV time and frequency standard on 2.5, 5, or 10 mHz. Then, set the receiver to its maximum (narrowest) selectivity position. Turn on the receiver's BFO (beat frequency oscillator); sometimes this is just a BFO ON/OFF switch and it can also be labelled VOICE/CODE on older units. In any case, turn the BFO on by setting the appropriate switch to ON or CODE. With receiver set up as described, and with volume high enough to hear the received signal, jar the receiver's front panel with your



Here is Bob Bedingfield (WA4OPN) of Greensboro, N.C. operating his HW-101. Bob is an 18-year-old textile chemistry student at North Carolina State University. Bob's top Novice thrill was when he worked 15 European amateurs in 8 countries during four hours of operation on the 15 meter Novice band.

hand. If the audible beat tone jumps with even a light touch of the hand, it has poor mechanical stability. If the received tone does not change pitch when the receiver is jarred, the receiver has good mechanical stability. The mechanical stability of some receivers is so poor that frequency shifts when any front panel control is touched, whereas others are so stable they won't shift frequency even when a corner is lifted and dropped. If you have a receiver with poor mechanical stability, you can learn to use it effectively, as long as it has adequate sensitivity and selectivity. This problem is partially overcome by setting the mechanically unstable receiver on a very solid table or desk, instead of something flimsy such as a card table. You can learn to minimize the pressure you apply to front panel controls as you operate the receiver. It sometimes helps to set the receiver on a cushioning material. It is nice to have a receiver with good mechanical stability, but this is one feature you can do without and still enjoy excellent operating results. If your funds are limited, remember that several otherwise excellent receivers are available at low cost because they do not have good mechanical stability.

Electrical. If a receiver has good electrical stability, it does not shift frequency very much between the time it is turned on and when it has heated to its normal operating temperature. It is easy to check the electrical stability of a receiver. As soon as you turn on the cold receiver tune it to a dependable fixed frequency station (such as WWV) and note the exact setting of the tuning control. As the receiver warms up you may find it necessary to adjust the tuning control to keep the station tuned in; this adjustment is due to electrical (thermal) instability. Record the amount of adjustment required every few minutes to keep the station tuned in. Even if a receiver is electrically unstable, it usually stabilizes fairly well after about 15 minutes of operation. Some receivers continue to have slow but gradual frequency shifts, no matter how long they are operated. If a receiver is electrically unstable, this problem can be minimized by leaving it turned on at all times. If a receiver is going to be left on when not in use, the standby-receive switch (if it has one) can be left in the standby position to minimize power consumption.

Simplicity

Simplicity of receiver operation is important to a new amateur. I have known a few Novices who had a very difficult time learning to properly operate receivers with a confusing assortment of about 30 front panel controls. An overly complex looking array of controls can decrease the confidence of a new operator and can contribute to poor operating results. There are some fine new and used receivers which do their job well with less than 20 front panel controls and the proper use of these simpler receivers is more easily mastered by the new Novice. Any new amateur using a receiver with a bewildering array of front panel controls should determine which controls can be left off or at zero, and leave them alone until their functions are completely understood. You should take the time to completely understand the exact function of each control on your station equipment and the instruction manuals provide this information. You must know your equipment very well to obtain optimum operating results when you use it.

Noise Check

Some receivers generate so much internal noise that weak received signals are covered up and lost. It is easy to check for this condition. Disconnect the antenna from the receiver and install a jumper wire across the receiver's antenna input. Adjust input (*rf/sensitivity*) and output (*af/volume*) controls fully clockwise for maximum output. Since there is no signal input in this situation, the noise heard from the speaker or headset is noise generated in the receiver. If power supply hum (60 or 120 Hertz) is particularly strong, it usually indicates a defective filter capacitor. The receiver will produce some noise, but it must not be so strong that it masks (overrides) weak signals from stations you want to work.

Receiver Accessories

Q-Multipliers

Some receivers have circuitry built in that enables the operator to boost a desired signal and to reduce an unwanted (interfering) signal. These devices are also available as separate external units and they are generally known as Q-multipliers. Proper use of a Q-multiplier enables an operator to obtain extremely good results from an otherwise mediocre receiver. Proper operation of these units is easy to master once you understand what is happening. Fig. 1 should be used in conjunction with the following explanation to learn what a Q-multiplier does. Part (a) of this figure shows a beginning undesirable condition with two equally strong signals being received in the bandpass of the receiver. If we want to copy the left signal (W6ABC) with minimum interference from the right signal (W6JEP), we can either peak the desired signal (part b) or null the unwanted signal (part c). One control is marked tuning (or something similar) and it is used to move the peak or null (whichever is selected) across the passband. The other adjustable control is marked gain, or something similar, and it is used to control the height of the peak or the depth of the null, depending on which is selected. Do not use any more peaking or nulling than you need to be able to copy the desired signal comfortably. The peak/null broadens out as more is used and you can easily boost or reject both signals if you are not careful. There are two other controls associated with this device; one is used to select peaking or nulling and the other simply turns the Q-multiplier on or off. I have noticed that most Novices find it easier to peak a desired signal than to null and undesired one. Many operators combine signal peaking with a reduction in rf (input) gain to further reduce interference. If you have this device with your receiver, practice using it several times before trying to use it in a real interference situation. It is easy to find pairs of interfering signals and a little practice will let you learn how to work stations despite extremely bad interference.

(Continued on page 70)

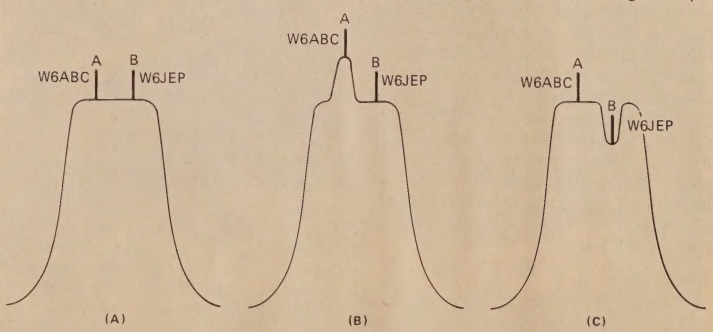


Fig. 1—Q-Multiplier function. See text.

This month by
ROD LINKOUS, W7OM

DX

News of communications around the world

A new year and a new log book. Hopes to fill the pages with rare and exotic calls are fired by forecasts of more sunspots. The promise of good things to come also brings a ghost of the past.

Okino Torishima

The item in this column on "Consistently Inconsistent" last May, coupled with the recommendation of QSO life span last August, brought a long letter from Yoh Hoshiyama, JA2JW. Like the Ghost of Christmas Past, Okino Torishima raises its serpent head from the sea and comes back to haunt us.

It was and is my desire to stimulate thought with the intention to improve DXing. Those two items did generate the letters, thus at least part of my goal was realized.

Yoh, JA2JW, a long-time friend and ichi ban DXer, is one of the vocal Okino Torishima advesaries. He points out (with supporting documentation) that the new country (7J1RL) status was a "one-time violation" of DXCC criteria.

Regardless of the way the country came about, the large dissent by the JA DX community, and the number of DXers confirming the country, new questions must be asked.

If this was a "one-time violation" to commemorate the 50th anniversary of JARL, we have certainly accomplished the mission. Now a very fundamental question is arising: *Should we consider future contacts?* What is the real significance to the retention of the country on the ACTIVE DXCC countries list?

It appears that Yoh's recommendation (a recommendation supported by many of the major JA DXers) to delete Okino Torishima is timely. Yes, this is one best handled by a QSO having a finite life span. If it is deleted, the quest for the honor roll drops by one and harmony may again prevail. At minimum, the Japanese DXers will have one bitter day committed to history and both sides will have succeeded.

Deletion is really simple at first glance, especially in the case of Okino Torishima. But, look a little closer. Do we expose ourselves to the case of one-time violations for the convenience of another set of circumstances? Yet, if the deletion recommendation is implemented without action to prevent future occurances, that may be the case. The action should prevent employees of radio organizations from setting policy—their job is to execute policy.

It must be noted, there has always been solid support by the JA DX community in the DXCC program. No other amateur endeavor is held in such high esteem by the JA's as DXCC. This is the main reason the JA DXers believe the DXCC rules must be sacred. Thus

*5632 47th Ave. S.W., Seattle, Washington 98136

The WAZ Program

Single Band WAZ

20 Meter C.W.

27...JA1BN

20 Meter Phone

58...JA7ZP
59...WB8LDH
60...OK3CAW
61...KG6RL
62...W2MPK

S.S.B. WAZ

1395...UA9CBO
1396...UK3ABB
1397...ZL1PN
1398...JA8EJH

C.W.—Phone WAZ

4134...UK2GBY
4135...UA9CAL
4136...UL7HD
4137...UC2AW
4138...UK5MAG
4139...UK5WBG
4140...DL5QM
4141...DL9PR
4142...DK6NP
4143...YU3TFB
4144...G2AMY
4145...N6JV/WA6JVD
4146...W6JOT
4147...OK3CAU
4148...YU1OCV
4149...WA5SDV
4150...YU2CAL

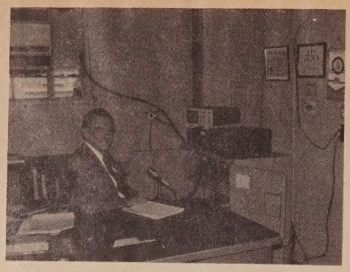
Phone WAZ

532...CX7BF

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



The first European to confirm 100 countries on 2-way SSTV is Neville Jackson, G3IAD. Neville isn't a newcomer to DX; many will recognize his old calls: VS6CE, VQ2GC, VQ3GC, VQ4GC, VQ5GC, 5H3GC, and 9J2VB. He also was the first European to win W.A.S. on SSTV. And he did the whole act with a rotary dipole.



A consistant 20 meter signal comes from the Seoul, Korea QTH of Don Deland, HL9TJ. Don is a temporarily transplanted Texan known to some as WB5MXW. The neat station appearance is due in part to security measures. (Photo W7PHO)

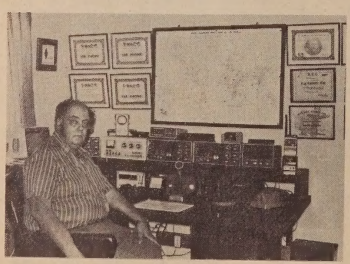
a lesson learned from the Asiatic philosophy—regardless of how noble the intent, a violation is inexcusable. Change the rules if you must, don't violate them for the convenience of the time.

It is interesting to note if they had changed the mileage rule from 500 to 400 miles, Okino Torishima would have met the criteria and the whole matter would be moot. Other islands might have become new countries as well. At least it wouldn't be an issue of violation and we would have more countries to chase.

DX Operation—By the Numbers

When the rare country gets on to work a few, the pileup often gets out of hand fast. One way many DX stations attempt to control the chaos is to use the call area scheme. Most of us have waited our turn, only to find propagation going out when it is our call area's turn. I'd like to share a few observations in hopes of evening the odds for us all.

The biggest shortcoming of the call area technique is speed. It is unlikely that the same rate can be sustained



The big voice of YB7AAA is John Van Lear (VE7IR) in Tarakan, Indonesia. John's current call is one of many DX calls he has held. He is currently mobiling in Europe on 2 meters. Between John and Walt, YB7AAU, Indonesia is active on all bands. John and Walt can be found frequently on the 14.225 MHz W7PHO net.

as "picking the loud one" from the pileup. The call area scheme is usually the result of the tranceiver operation of the user, thus it may be as fast, at least from his point of view.

For the DX station using this method several things should be kept in mind:

1. *The U.S.A. call areas vary in population.* There are more W6's than W1's. Thus five from each area is unfair to the W6 versus the W1. The number of U.S.A. amateurs by call area is approximately:

W1—20,646 (4)	W6—41,831 (8)
W2—33,495 (7)	W7—22,450 (4)
W3—21,269 (4)	W8—29,621 (6)
W4—45,855 (9)	W9—26,932 (5)
W5—29,687 (6)	WØ—27,425 (5)

So if you use the call area technique, ratio the contacts according to populations. A sample ratio is shown in parenthesis. (i.e.: 4—W1's; 7—W2's; 4—W3's; etc.)

2. *Consider propagation.* The Kingman Reef (KP6BD) crew used a variation on the technique. They worked the zones (areas) by geographical distribution. While the east coast was in, they worked W1, W2, W3 and W4 call areas only. Later as propagation shifted, they moved on to the W5, W8, W9 and WØ call areas; leaving the easier to work west coast (W6 and W7 areas) until last.

3. A crucial key to successful use of the call area techniques is *unwavering adherence* to the call area being worked. A recent DXpedition called for W2's, and then worked an occasional W6 among the calling W2's. Thus the pileup grew and chaos prevailed.

4. *Success is a function of cooperation.* This technique requires *everyone's* support. There will always be a late comer who joins the callers, not

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 319. 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.

C.W.

W6PT 319	W4YWX 308	W4IC 301	K6JG 297	W6NJU 284
K6EC 316	W2GT 307	W6ISQ 301	N6FX 297	WA6EPQ 282
ON4QX 314	W8LY 305	K6LEB 298	W4BQY 297	K9MM 279
W6ID 314	W9DWQ 304	WØAUB 298	VK3AHQ 292	DJ7CX 276
W8KPL 310	N6AV 302	DL3RK 297	WA8DXA 287	

S.S.B.

W2TP 318	W6EUF 312	I4ZSQ 305	W9QLD 298	YS1O 288
DL9OH 316	W6REH 312	KH6BB 305	F9MS 297	DK2BI 287
G3FKM 316	F9RM 311	W4IC 305	G3DO 296	K1KNQ 286
W3CWG 314	I8AA 311	K6WR 304	HP1JC 296	W6HUR 286
IØAMU 316	I0ZV 310	VE3WY 303	N6AV 296	DJ7CX 285
K2FL 316	IT9JT 310	VE3GMT 303	OZ3SK 296	OE3WWB ...285
WA2RAU 316	K4RTA 310	WA3IKK 303	WØSFU 296	G3KYF 284
TI2HP 315	W3DJZ 310	ZL1AGO 302	W2CNQ 295	N6FX 284
W4EEE 315	W6KTE 310	K9LKA 301	N4MM 294	N6AW 282
W3NKM 314	K6JG 309	OE2EGL 301	DJ9ZB 293	WB2RLK 282
W6RKP 314	K8DYZ 309	W6NJU 301	VE7WJ 293	YV1LA 282
W9DWQ 314	SM6CKS 309	XE1KS 301	K6AQV 292	WA4WTG ...281
XE1AE 314	SM6CWK 309	ZS6LW 301	K8PYD 292	WAØKDI 281
K4MQG 313	WA2EOQ 309	K6XP 300	WA2HSX 292	XE2YP 281
VE3MJ 313	F2MO 308	VE3GCO 300	VE7CE 291	N2SS 280
VE3MR 313	K6EC 308	W3GG 300	WØYDB 291	W9QQ 280
W3AZD 313	W4DPS 308	WB6DXU 300	W9YRA 290	DL1MD 279
W4SSU 313	WA6AHF 308	I5WT 299	DL6KG 289	K4SB 279
W6EL 313	I8YRK 307	W6KZS 299	G3WW 289	OK1MP 279
W9JT 313	K9WEH 307	W9OHH 299	OE1FF 289	W7OM 279
I8KDB 312	ZL3NS 307	WØSD 299	W6FW 289	VE7HP 277
K6YRA 312	I6FLD 306	YV1KZ 299	K4HJE 288	K8LJQ 275
W2QK 312	SM5SB 306	EA4LH 298	SP5BSV 288	G3RWQ 286
W4UG 312	W9KRU 306			

SSTV

W8YEK 108 G3IAD 100

The CQ DX Awards Program

S.S.B.

518...N9RF	522...UK5MAG
519...DJ2IJ	523...UR2QD
520...9H4L	524...UA3HB
521...W1GKN	525...UK5WAZ

C.W.

273...N9RF	281...UT5SM
274...UA4YV	282...UL7SJ
275...UL7TAM	283...UW3HQ
276...UC2WG	284...UK5WBG
277...UK2GBY	285...UA9YAR
278...UR2QD	286...UV3TC
279...UL7NAF	287...UW3UO
280...UO5AP	288...UA4ZA

SSTV

2...G3IAD

S.S.B. Endorsements

310...K4MQG	150...K2GI
310...K6YRA	150...UA3HB
310...W4SSU	150...W1GKN
200...W1GKN	28 MHz...UA3HB
150...JA5PUL	

C.W. Endorsements

310...W8KPL	150...UK5WBG
275...W4BQY	150...UT5SM
150...UA4ZA	3.5/7 MHz...UK5WBG

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.

knowing the call area restriction. But the constant calling by those who do not like the techniques only slows the system down. Sometimes it stops. Again this technique is dealer's choice, if you don't like the hand, it may be time to sit it out or look for another dealer.

This may be an operational technique that many deplore. Yet it may be the only way to work some stations.

The CQ WPX Program

Mixed

596....JH1OHD
597....GM4DKO
598....K6DT
599....DK5AD
600....WA2JOC
601....W1CNU
602....VE7IG
603....UK3AAC
604....UW3DR
605....K9MFY

S.S.B.

997....ZP5WU
998....HB9OK
999....DK5AD
1000....VE7IG
1001....UA9CBO
1002....UK3AAC
1003....UI8OM
1004....UW3BV

C.W.

1623....K6VY
1624....K6ARE
1625....DK5AD
1626....N3KK
1627....UA1TAL
1628....UA1ZAK
1629....UA3PN
1630....UA4SM
1631....UA9LJ
1632....UA0CBO
1633....UA0LU
1634....UB5FAQ
1635....UB5FH
1636....UB5HI
1637....UB5IAM
1638....UA3IBX
1639....UB5ICS
1640....UB5LCN
1641....UC2CX
1642....UD6DFY
1643....UI8IR
1644....UK3DCF
1645....UK3TAC
1646....UKØSAL
1647....UR2RDI
1648....UW3RE
1649....UW3WBO
1650....UW0LT
1651....UQ2IC
1652....EA2OP

WPNX

102....WB4KZL
103....WBØZSY
104....WB8TUQ

VPX

128....UC2-0061
129....UB5-078-373
130....UA2-125-183

Endorsements

Mixed: 1350 W2NC, 1116 F6BFH, 818 K6DT, 802 UK3AAC, 800 UK4WAC, 750 W2MP, 653 W1CNU, 650 WA0TKJ, HE9ILN; 607 UK5MAG, 503 W8ZPX, 500 K2XA, 455 UQ2IL, 450 OE1KJW, 459 UW9SG, 428 GM4DKO, 408 DK5AD, 407 JA1OHD, 405 WA2JOC, 403 K9MFY, 400 VE7IG.

SSB: 789 UW3IN, 702 I0MBX, 600 UK3AAC, 550 W2MP, UK4WAC, 481 UW3BV, 450 A9BXD, 436 I6ICD, 403 UA9CBO, 400 VE7IG, 372 HB9OK, 352 DA2KD, 322 UI8OM, 305 ZP5WU, 303 DK5AD.

CW: 1200 W2NC, 1025 WA2HZR, 930 K4IEX, 805 OK2BLG, 750 UB5WK, 714 UA3GO, 700 UK4WAC, OK1DH, 603 UA4SM, 602 YU1OCV, 599 UW3UO, 550 I1TLA, 500 N8ZZ, UB5VK, 445 UA0LU, 403 UY5GG, 401 UZ3ER, 400 I2DMK, K2UPR, 395 UA3PN, 360 UQ2IC, 351 UB5FAQ, 350 OE1KJW, 342 UI8IR, 340 UB5LCN, 314 DK5AD, 312 UB5HI, 311 UC2CX, UW3BO, 310 UA0CBO, UK3TAC, 307 UR2RDI, 306 UW0LT, 305 UKØSAL, 304 UB5IAM, 303 UW3RE, 302 UB5FH, UA3IBX, UK3DCF, 300 UA9LJ, UB5ICS, UA1ZAK, UA1TAL, UD6DFY, N3KK, K6VY, EA2OP, K6ARE.

10 Meters: UA9CBO.
15 Meters: JA5PUL, HE9ILN.
20 Meters: DK5AD, K2XA, UW0LT, SM4-3958, UK3AAC, UW3BV.
40 Meters: DK5AD, UK4WAC.
80 Meters: OE1KJW, DK5AD, VE7IG, UK4WAC, UK5WAZ.
160 Meters: OE1KJW.
Africa: ZL3GQ.
Asia: A9BXD, JA5PUL, VE7IG, UA0LU, UK4WAC, UY5GG, UA9CBO, UK3AAC, UW3BV, UK5MAG.
Europe: OE1KJW, DK5AD, VE7IG, UA0LU, UW3WBO, UA9NN, UA9CBO, UK3AAC, UI8OM, UW3BV.
No. Am.: HE9ILN, UA9NN.

Complete rules for WPX can be found in the May, 1976 issue of CQ Magazine. Application forms may be obtained by sending a business size, self-addressed, stamped envelope to "CQ WPX AWARDS," 5014 Mindora Dr., Torrance, CA 90505, U.S.A.

DX Awards Checkpoints

The CQ DX Department recognizes the Awards Managers of the various national amateur radio societies as valid checkpoints for our awards. In addition, individuals have been designated to check cards for the CQ DX awards program. They are:

Argentina—LU1DJU
Brazil—PT2JB
Chile—CE6EW
England—G3FKM
France—F9MS
Germany—DL3RK
Italy—I8KDB
Mexico—XE1AE
New Zealand—ZL2GX
Norway—LA4YF



The husband and wife team, Waltraud, DK5WQ and Horst, DJ1YH at their rig in West Germany. Both hold CQ DX awards in addition to WPX. Horst is a recent winner of WAZ. The Flemmer's are active members of the ISSB system.

Poland—SP5AD
Portugal—CT1OF
San Salvador—YS1O
South Africa—ZS1VA
Sri Lanka—4S7DA
Switzerland—HB9PQ
Venezuela—YV5AIP

DX Extras

DE K6XP — Was talking to a friend, Sus Musashi, WB9BGJ, and he was quite happy at the time because he had received a QSL card from the days when he was a SWL. Some 41 years before he became a ham he had an old receiver with a piece of wire and he used to listen to the guys on the west coast working DX. He had heard a W6 and VS3AE having a QSO. VS3AE later became 9M2JB and is now in the U.S. Sus sent off a SWL card to VS3AE. So now after 41 years he finally received a card from "Prince Ahmed". Darn near like putting a QSL in a bottle and throwing it into the ocean. AR (ed: Moral—have faith!)

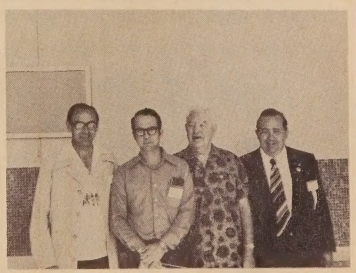


Tack Agiso, JHØALB, is the proud owner of this 20 watt station. He is often found on both 15 and 10 meters. Tack's ambition is to pass the high power exams so he can join the big DXers on 20 meters and chase the rare countries.

DE W6BYB/7 — John Mayes, W6BYB, of Prince Edwards Island (VE1-land) has now settled permanently in Billings, Montana. John will be on all the low bands in the coming contests. He made WAC from PEI on contests. He made WAC from Pei on 160 meters and now needs Europe for 160 meter WAC from Montana. AR Attention you 5BWAS chasers.

DE I1FNX — The DXpedition to Formica Island, I1DFS/IA5, had over 1,000 QSO's with 50 countries. Only 406 USA stations worked this rare prefix. A great job considering only 50 watts to an inverted vee. AR

DE EP2VW — Roger, EP1IA, after several months of waiting finally received his call in Tehran. Roger, like EP2VW, operates 99.9% c.w. In the first three weeks on the air, Roger logged over 1,500 QSO's. Carrol, EP2MO, is the only YL operator in Iran. She is the wife of Larry, EP2LA, and they live in Shiraz. AR



The Northwest DX Convention was the gathering of many of the well known calls. The foursome (l to r) includes: Len Kaufer, KG6SW; Bill Rhoar, W7IJ of VKØWR (Heard Island) fame; Bill Bennett, W7PHO; and John Devoldere, ON4UN.



The small station of George DeVilbiss, W4EV/VP9, has given over 25,000 contacts to DXers around the world. His great QSLing habits are a lesson for many.

DE I7DPO — Ste Peter Island, one of the Cheradi Islands in the Jonio Sea, under separate administration by the Navy Authorities was activated by Enzo, I7VCA; Joe, I7DPO and Vince, I7DLV. They made over 8,000 contacts as IJ7EX and over 1,000 as IJ7OUN. Jan, I7PHH, provided the c.w. activity. AR

DX Hot Spot

If you check many 5BDXCC applications you will find several things in common. The most frequent is a common call. The DXer with Bermuda on more than one band is sure to have W4EV/VP9.

George De Vilbiss, W4EV, is not only an active operator, but he QSL's. During his stay he has over 25,000 QSO's, mostly via the contest route. He has been a consistent performer on 160 through 10. At this writing, he needs three states for 6BWAS.

George is an interesting story in himself. He retired from the Navy as an engineering officer (Commander). He received his BS in Electrical Engineering at the age of 49, and a MS at 53. While in Bermuda, he was the Resident Manager of Tudor Hill Laboratory, which is a field activity of the Naval Underwater System Laboratory.

The Tudor Hill lab in Bermuda exists to provide man a better understanding of the complex behavior of sound in the sea. Bermuda has a remarkable mix of environments for acoustic research. The laboratory is less than 10 miles from the 1,000 fathom depth curve. Thus, deep-water instrumentation can be operated economically from shore.

The photo of George's shack is deceiving. The FT-101 is highly modified, including an added speech processor. The antenna on 160-80-40 is a vertical 60 foot piece of 3 inch aluminum irrigation pipe. A tribander yagi handles the high bands.



The Hong Kong crew of John, VS6GG (left rear) is John, VS6GP (right rear); Richard, a SWL (left front) and Tom, VS-6BB. (Photo WB4FJO)



The proud owner of DXCC MILLIWATT number 1 trophy for 1.0 watt or less is Ron Moorefield, W8ILC of Dayton, Ohio. The 150 countries via QRP power is an accomplishment many kilowatt DXers envy. Ron is the living example of dedication and skill in the art of DXing.

It is a pleasure to write about a DXer who has provided many of us a country on five bands and the cards to prove it. When the scientist returned from Bermuda, we missed that multiplier and consistant performer. Fortunately there are several other VP9's to fill in for George's missed activity.

Tricks of the DX Trade

Again, inputs add to the list of rules and hints which are provided to improve DXing. Those who submit rules and hints that are used will receive a copy of all the Tricks of the DX Trade published to date.

Rule 11. Be polite and courteous, no matter how much difficulty you are having or how many lids are on frequency.

Rule 15. Be honest with signal reports. The only way a DX station can judge how he is getting out, is the reports he receives. (I remember a station giving a 59 report to a DX station who then wasted an hour trying to work others in that area. Unfortunately he couldn't be heard.)

Rule 16. Don't waste time repeating *his* call sign. He already knows it.

Hint 19.1. When working in a split-frequency DX pileup, do not change frequency with every call. Stay put for awhile; let the mob move leaving you a partially clear spot and a better chance.

Hint 19.2. If you are calling and not getting results, listen. Observe the DX station's tuning procedure; if he is listening off his own frequency, spot the station he is answering, determine if he is tuning up or down the band, and keep ahead of the pileup.

Hint 30.9B. Always identify your report on c.w. with your call sign to get a "R". This saves you a returned card with 'SRI OM, NOT IN LOG", when you thought you had him cold. (Thanks W4WHK.)

Feedback

DE W2RS—Regarding the QSO life span item in the August column; a useful compromise might be to give *countries* a life span rather than QSO's That is, if a country has been inactive (ie., if no *legal* operation has taken place) for five or more years, the country is deleted. AR Ray's comment is very key to the point and is a valid approach, if the DXCC can keep the records straight. It should be noted that the ARRL DX Advisory Committee (DXAC) rated a similar recommendation high on their recent list of considerations. The DXAC also recognized the problem of getting to the Honor Roll due to the inactivity of certain countries.

Today, the DXCC Honor Roll is an accomplishment of dedication and tenure. The current DXCC Honor Roll requires you work 310 of 319 possible countries. There are currently more than ten inactive countries. Many have been inactive for several years. Thus the climb to the top is not only a case of skill, equipment, and dedication, it is also one of endurance. Many years of endurance are required to get to the top and achieve one of hamdom's great fetes. Is it an unrealistic goal?

Country life span is not without challenge either. What category does the twenty QSO 3Y5CC, Bouvet, operation fit? Three categories of countries: active, inactive and deleted, might be the answer if someone solves the horrendous manual bookkeeping problem. Got any ideas?

Japan's Most Wanted

A recent poll of JA DXers with 200 or more countries resulted in a list of interest. In order of most wanted:

1. Bouvet—3Y
2. Clipperton—FO
3. So Sandwich—VP8
4. China—BY
5. Iraq—YI
6. Albania—ZA
7. Malpelo—HK0
8. French Guiana—FY
9. Aves Island—YVØ
10. Abu Ail; Jabal at Tair—ET/A

The list is an interesting example of relativity. While the U.S. enjoyed the fine operation of FY7AK (2,950 QSO's in the 1976 CQ WW phone contest alone), the big JA DXers couldn't make it through to the Caribbean. Seven or eight appear on most top ten lists. At last report, even with the HKØTU operation, most still need Malpelo.

DX Club—1978 Style

Another year and the newly elected vice president for programs thinks he has to take on Attila the Hun with a fly swatter. Getting DX programs for club meetings isn't all that hard. Here are some more sources:

The DXpedition provides the single best source for programs of interest to all. Even the XYL and harmonics are intrigued by a program on some nuts going to an isolated spot to operate. Most DXpeditions take along a camera to record the great events. So write to the DXpedition crew.

The common DXpedition program format is a set of 35 mm slides and an audio cassette. So, you get a program for the price of postage. There are some problems however. One is that the best known DXpeditions are booked for several months in advance. Get your bid in early. The second problem is often too much narration. I remember one great program about a well known DXpedition which had 18 minutes of narrative to go with one slide showing the crew in the departing airport. Preview the program. Edit if you desire using a *second* tape recorder.

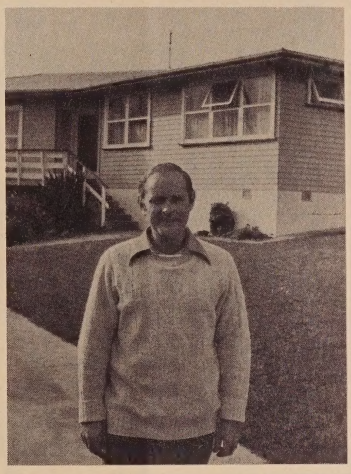
Another great source is amateur magazine articles. Yes, a good detective can find clues to great programs in the amateur magazines. Everyone recalls the hot air balloon story in the August 1977 CQ. Again there is a 35 mm slide and cassette program available for the postage.

The great thing about the slide and cassette program is the ability to fill in at the last minute. If your live program cancels at the last minute, use the slide show. Several are available simply by making a telephone call.

If you haven't seen Don Riebhoff's (K7ZZ, CT4AT, etc.) super 8 mm movies, you've missed a real eye opener. (ed: Preview first!)

Another program you might have missed is "Power Line Noise". Most power companies have a noise chasing crew. Get a hold of the power company's PR representative and tell him several of their customers would like to know what the company is doing to identify and solve noise problems. The cooperation will astound you.

Most power companies are interested in educating the public on their services. In return they gain by you, being better able to identify noise sources. When the power company has a noise problem, the problem is usually costing them money, they are



Deryl Duffy, ZL1BOQ stands proudly in front of his Auckland, New Zealand, home. Deryl's big signal proves that a vertical can join the big DXers on 20 meters and the world. He is currently devoting his time to 40 meters, having worked 80 meters pretty hard this last season.

glad to have the amateur's help in identifying the cause. But not always, in which case, the program may be the first step in establishing better working arrangements between your club members and the power company.

Thanks!

The DX news and QSL managers were supplied by many. To those already mentioned we wish to add the DXer Magazine (W4BPD), NFDXA News (N4UF), LIDXA Bulletin (W2IYX), WCDX Bulletin (WA6AUD) and the WWDXC Totem tabloid (WA7RVA); all of which add measureably to the content of this column. Our thanks to them all. Keep the DX news coming and we will share it with our readers.

73, and the best of DX, Rod W7OM



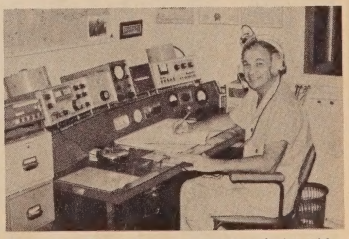
Stan Krumpholc, OE1SKC, is one of Austria's most active DX and QSLers. In the last two years since taking up DXing, Stan has worked over 4,500 stations including 135 countries. He is an electronic engineer in Wien where he runs his Sommerkamp FT501 to a 2 element quad, a W3DZZ and vertical antennas.

QSL Information

The Africana Net has been reactivated and can be found on 21355 KHz daily from 1700Z/1900Z. Net Control stations are W2PPG, "Cal"—W0GX "Leo"—WA6BJS "Herb." Be further advised that the logs and QSL's for the FH0FX operation (Al Fox, WA4CWG) are in the possession of W2PPG for the QSO period of Sept. 24th, 1977 - Oct. 14th, 1977. For those requesting QSL's at the very least please send SASE to "Cal"—W2PPG.

A6XB—To K1DRN
A9XK—To K2NJ
AP2TN—To W8QFR
C31CW—To F5EQ
C31FO—To F3BW
C31HD—To F6BII
C31MJ—To EA3NE
C31OH—To F6DNW
C31ON—To F2VX
C6ABC—To WB4YHN
CN8CC—To F6CVE
CP1AT—To W0GX
CT2BZ—To WA4FVT
CT3BQ—To OZ1LO
EA6EO—To DB3ES
EL2ET—To W3HNK
EP2IA—To W4YE
EP2LA—To WB8DKQ
EP2MO—To WB8DKQ
EP2TT—To JR3WRG
EP2VW—To W4YE
FB8YE—To F6BFH
FY7AE—To WA4WTG
GJ5CCP—To ON6NH
HI8SRH—To W2KF
HI8XDJ—To K3SWZ
I1DFS/IA5—To I1FNX
IØKLV/IH9—To IØKLV
IJ7EX—To I7VCA
IJ7OUN—To I7VCA
J28AC—To DJ1TC
J28AY—To F6ETO
JA8UI/PZ—To JA8AHA
JY9VK—To W1HSS
K4IIF/C6A—To W4KA
K4YT/8RI—To W2GHK/4
K5CO/5A—To K5CO
KC3F—To W3TEF
KC6KO—To WA2EOQ
KG4OO—To KØPMZ
KG6RI—To K7NF
KP4AM—To KP4BDL
KV4IF—To W2AAF
M1C—To I4EAT
M1I—To IØBNZ
MP4BIN—To K2NJ
OF1AJ/OHØ—To OH1AJ
OF9DX—To OH5MJ
OX3MW—To SMØBVK
S79S—To W6SP
SU1JA—To JAØYJK
TA2BK—To DJ0UJ
TJ1BF ('72)—To WA4WTG

(Continued on page 69)



Norberto Vidal has moved his Beira, Mozambique operation as CR7FR to Portugal. Like many of the CR6 amateurs who relocated, Norberto is now active as CT1AV. (Photo W7VRO)

a monthly feature by

A. EDWARD HOPPER, W2GT

Awards

News of certificate and award collecting

The, "Story of the Month", courtesy of Bill Nash, W0OWY and Jack Scroggin, WØSJE is:

The 1977 County Hunters Convention, Rochester, Minnesota

"The date of the Convention was June 30th through July 3rd, with some arriving earlier and some staying later.

Needless to say, a great amount of fun was had by all and we are looking forward to the '78 County Hunters Convention.

The Committee members who worked so hard to make it a success were:

WØLRH—Prize Chairman.
WAØRJJ—Entertainment Chairman.
WØKMH—Publicity Chairman.
WØKYG—Program Chairman.
WAØODW—Registration Chairman and Treasurer.
WAØSGJ—Communications Chairman and Secretary.
Refreshments Chairman—WAØLMK.
Committeemen—WØFCO, K9DAF, WØBKS, WBØABM, WØUM.

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



State Capitals Award.

Official Photographer—
John Franklin.

Bill, WØOWY 1977 County Hunters Convention Chairman and MARAC National Annual Convention Coordinator.

Amateurs not registered and attending were: WAØBPE, KØGA, KØTVY.

Amateurs registered and not attending were: W1AQE, WA2GPT, W4LZR, W5FS, WAØATI, WAØEVO, WØRLR.

Amateurs with prize tickets only and not attending were: W1LQQ, WA1UVX, W2MCY, W3FVU, W4IGW, W7GHT, W7KOI, W7PXA, N7SU, K8OOK, K8WXJ, KØJJV, WØKN, WBØOSV, WØRMG, KØRSJ, WØTHY, WBØUYW and Al Foster SWL.

Amateurs originally registered but cancelled out were: K4DLC, W4EHN, W9HAT, W9NSM.

Statistics show: 266 Jr. Ops., XYLs, YLs, Amateurs, SWLs and friends attended, 163 registration cards were returned, another 4 cancelled — 213 Badges were made up for the Convention—238 Banquets were served Saturday night; 198 Buffets were served Friday night; 67 Breakfasts were eaten Friday morning; 102 Breakfasts were eaten Saturday morning; 111 toured the Mayo Clinic; 87 toured the Mayo Museum; 150 took the River Cruise; 143 Licensed Amateurs registered and attended; 3 Licensed Amateurs attended but didn't register; 7 Licensed Amateurs registered but could not make it; 19 Amateurs bought tickets but could not make the Convention; 1 Million tins of fun were given away and no one fell into the swimming pool; over 2000 Prize tickets were donated for the regular door prizes; 200 plus tickets were obtained for the Special Prize drawing.

Those who attended but did not seem to be in any of the 4 photographs include: K1VKY, WB2INE, K2PFC, K2TPS, K3QJJ, K4ISF, WB4RTC, WB6ERF, W9CNG, WA9CZI, WB9NOZ, WB9OOE, W9OP, WB9QDX, WB9QGW, WB9WBB, WØAM, WAØAVW, WDØBBZ, WBØJUS, WBØMNE, WBØSZQ.

The prizes are too numerous to mention except for the 3 BIG ones:



Group 1—1977 CH Convention Committee

Special Honor Roll (All Counties)

#176—Don Guy, WB9DCZ, 9-9-77

USA-CA Honor Roll

3000		2500		2000		1500		1000		500	
WB9DCZ	195	WA1UVX	247	W3FVU	286	W3FVU	334	W3FVU	452	W3FVU	1193
		WAØJNF	248	WA1UVX	287	WAØJNF	335	WAØJNF	453	PY1BAR	1194
				WAØJNF	288	K9DZG	336	K9DZG	454	N9TN	1195
										WAØJNF	1196
										K9DZG	1197
										OK1KTL	1198

Kenwood TS-520, pre-registration prize won by K8ODY.

Kenwood TS-520, main door prize won by WB9OOE.

Kenwood TS7200A, door prize won by K2PFC.

The photographs taken by John Franklin are:

Group 1 — Convention Committee,

Front row L to R — Noel, WBØABM; Bob, K9DAF; Ev, WØKYG; Sr. Alverna, WAØSGJ; Dick, WAØDCQ; Vern, WAØRJJ.

Back row L to R — Doug, WØBKS; Cecil, WØUM; Bob, WØKMH; Bill, WØOWY; Wally, WAØODW; Tom, WØLRH; LeRoy, WAØLMK.

Group 2 — YLs and XYLs,

Front row L to R — Maureen McGowen & Allen, WBØEXQ; Marion Dunn, XYL, WBØJYB; Lou Ella Brege, XYL, K8ODY; Hazel Cain, K9QGR; Virginia Lyon, XYL, W9LHG; Sandy Kemp, WA4QER; Sue Corning, XYL, KØQIX; Donna Lutsey, XYL, WBØABM; Jessie Vermilyea, WA2RYQ; Janice Karjalahti, XYL, WAØODW; Nancy Olson, XYL, WAØRJJ, Earleen Nash, XYL, WØOWY.



Group 2—YLs and XYLs at the convention.



Group 3—Holders of the All Counties Award.

2nd row L to R—Jenny Lauterbach, Jr Op, WB9NUL & WA9BHH; Joyce Lauterbach, WB9NUL; Connie Prowchaska, XYL, W9ABM; Kea Diagre, XYL, WA4ZYU; Joan Michel, XYL, W9OP; Barbara Fuss, XYL, W2HIH; Gail Brown, XYL, WA3VLB; Katie Duderstadt, XYL, WØLRH; Deloris Glasscock, XYL, WØFF; Alena May Jablonsky, WØMRJ; Rose Miller, XYL, WØGV; Betty Mead; Dagmar Vincent, XYL, WØUM.

3rd row L to R—Mildred Coleman, XYL, K4IUO; Marilyn Roberts; Elsie Stottlemyre, XYL, W5TQE; Leanne Grew, Jr Op, W9GBI; Mabel Schmarder, XYL, WA2AEA; Avis Miracle, W8WUT; Violet Dunn, XYL, W1DIT; Lorraine Bachman, XYL, K9DCJ; Laura Dyson, XYL, KØAYO; Lyn Welliver, WB4RVW; Ruth Veverka, XYL, WØFBB; Sr. Alverna O'Laughlin, WAØSGJ; Jolene Ross, XYL, K9GTQ; Barbara Bowman, WBØVUO.

4th row L to R—Wanda Hanson, XYL, WØKMH; Sandy Grew, XYL, W9GBI; Gladys Finchum, XYL, W6HO; Dixie Johnson, XYL, K9DZG; Boobie de Graff, XYL, W4ISF; Mary Smith, XYL, W8RKL; Dana Bagely, Jr Op, WBØELJ; Pat Bagely, XYL, WBØELJ; Karen Veverka, Jr Op, WØFBB; Dorothy Anderson, XYL, KØGA.

5th row L to R—Gerri George, XYL, WA5YSC; Ann Secrest, XYL, WA8ASV; Susan Hall, XYL, WA4UNS; Helga Skaptason, XYL, VE4SK; Fay Isle, WA4BDE; Peg Johnson, XYL, K2TPS; Val Hanson, SWL; Geneva Boatman, XYL, W5AWT; Vi Woelk, XYL, WØDSY; Karen Thorne, WB9ZNA; Pauline Park-

(Continued on page 68)



Group 4—Nearly everyone who attended the convention.

a monthly feature by

GEORGE JACOBS, W3ASK

Propagation

The science of predicting radio conditions

The new year should be a good one for high frequency propagation conditions.

The present sunspot cycle, which began during March, 1976, climbed very slowly during 1977, and is expected to rise rapidly during 1978.

The year should begin with a solar level in the upper 30's, and rise to at least the mid-50's by the end of the year, with a good chance that the cycle might climb to as high as 80. This means a considerable improvement can be expected in propagation conditions on the h.f. amateur bands during 1978.

The following is a summary of h.f. band conditions expected during January, 1978. For specific times of DX openings refer to the *DX Propagation Charts* which appeared in last month's column. This month's column contains *Short-Skip Propagation Charts* for January and February, as well as Charts centering on Hawaii and Alaska. The Short-Skip Charts contain propagation forecasts for circuits varying in length between distances of 50 and 2300 miles.

10 Meters: Some fairly good openings should be possible to southern and tropical regions during the daylight hours. Some openings towards Europe and the east should be possible between 8 and 11 a.m., and towards the Far East during the late afternoon. Look for some short-skip openings between distances of about 1300 to 2300 during the afternoon hours. Openings over shorter distances may be possible during periods of ionospheric storminess.

15 Meters: Good DX conditions are forecast for this band to most areas of the world during the hours of daylight. Signals from Europe and the east should peak before noon; from the south during the afternoon hours, and from the west and north during the late afternoon. Expect good short-skip openings, ranging between 1000 to 2300 miles, during most of the daylight hours.

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

LAST MINUTE FORECAST

Day-to-Day Conditions Expected For Jan. 1978

Propagation Index	*Expected Signal Quality* (4)	(3)	(2)	(1)
Day				
Above Normal: 17, 25	A	A	B	C
High Normal: 4, 12, 16, 18, 21, 24, 31	B	B	C	D
Low Normal: 3, 5-6, 10-11, 13, 15, 19-20, 23, 26-27, 30	B	C	D	E
Below Normal: 1-2, 7, 9, 14, 22, 28-29	C	D	E	E
Disturbed: 8	D-E	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 Propagation 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 any day of the month. For example, an opening shown in the charts with a *propagation index* of 3 will be poor on Jan. 1-2, fair (C) on the 3rd, good (B) on the 4th and fair (C) again on the 5-6, etc.

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.

20 Meters: Good DX conditions to most areas of the world are expected to continue on this band from shortly after sunrise to an hour or so after sunset. Expect signals to peak for about an hour or two after sunrise and again during the afternoon. The band may occasionally remain open towards South America and the South Pacific area to almost Midnight. Good short-skip openings, over distances ranging between 750 to 2300 miles, should also be possible during the daylight hours.

40 Meters: Look for the first signs of DX from Europe and the east during the late afternoon hours, with conditions improving with darkness. The band should open to most areas of the world during the night, and remain open until shortly after sunrise. Atmospheric noise, or static, should remain at low seasonal levels during January, and signals may often be exceptionally strong. Good short-skip openings are also forecast during the hours of daylight over distances ranging between approximately 150 to 750 miles. As darkness falls, the short-skip range should increase to between 1000 to 2300 miles.

80 Meters: With low static levels continuing through the month, fairly good DX openings are expected to many areas of the world during the hours of darkness and the sunrise period. During the daylight hours, short-skip openings should be possible up to about 300 miles. During the hours of darkness, skip should increase to distances between approximately 400 to 2300 miles.

160 Meters: Look for some DX on this band from a few hours after sunset to shortly before sunrise. Remember that DX conditions tend to peak on this band when it is *sunrise* on the *eastern* terminal of a path. Short-skip openings up to the geometric limit of 2300 miles should be possible during the hours of darkness. Because of extremely high solar absorption in this frequency range, ionospheric propagation generally is not possible during the hours of daylight, although it may sometimes occur over very short distances.

V.h.f. Ionospheric Openings

Not too much ionospheric propagation is expected on the v.h.f. bands during January. Auroral activity is usually at a seasonal low, and there is usually little sporadic-E ionization. Best bet for ionospheric openings is on those days when h.f. conditions are expected to be BELOW NORMAL or DISTURBED. Check the "Last Minute Forecast" at the beginning of this column for the days during January that are expected to be in these categories.

There is a fairly good chance for some meteor-scatter type openings during the QUADRANTIDS meteor shower which should take place be-

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tween January 2 and 4. Look for a peak of about 40 meteors an hour on January 3. 73, George, W3ASK

HOW TO USE THE SHORT-SKIP CHARTS

1. In the Short-Skip Chart, the predicted times of openings can be found under the appropriate distance column of a particular Meter band (10 through 160 Meters), as shown in the left hand column of the Chart. For the Alaska and Hawaii Charts the predicted times of openings are found under the appropriate Meter band column (15 through 80 Meters) for a particular geographical region of the continental USA, as shown in the left hand column of the Charts. A ** Indicates the best time to listen for 10 meter openings; * best times for 160 meter openings.

2. The *propagation index* is the number that appears in ( ) after the time of each predicted opening. On the Short-Skip Chart, where two numerals are shown within a single set of parenthesis, the first applies to the shorter distance for which the forecast is made, and the second to the greater distance. 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) " " " between 14 and 22 days
(2) " " " between 7 and 13 days
(1) " " " on less than 7 days
Refer to the "Last Minute Forecast" at the beginning of this column for the actual *dates* on which an opening with a specific propagation index is likely to occur, and the signal quality that can be expected.

3. Times 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. On the Short-Skip Chart appropriate *daylight* time is used at the *path midpoint*. For example, on a circuit between Maine and Florida, the time shown would be EDT; on a circuit between N.Y. and Texas, the time at the midpoint would be CDT, etc. Times shown in the Hawaii Chart are in HST. To convert to daylight time in other USA time zones, *add* 3 hours in the PDT zone; 4 hours in the MDT zone; 5 hours in CDT zone, and 6 hours in the EDT zone. *Add* 10 hours to convert from HST to GMT. For example, when it is 12 noon in Honolulu, it is 15 or 3 P.M. in Los Angeles; 18 or 6 P.M. in Washington, D.C.; and 22 GMT. Time shown in the Alaska Chart is given in GMT. To convert to *daylight* time in other areas of the USA, subtract 7 hours in the PDT zone; 6 hours in the MDT zone; 5 hours in the CDT zone and 4 hours in the EDT zone. For example, at 20 GMT it is 16 or 4 P.M. in N.Y.C.

4. The Short-Skip Chart is based upon a transmitted power of 75 watts c.w. or 300 watts p.e.p. on sideband; The Alaska and Hawaii Charts are based upon a transmitter power of 250 watts cw or 1 kw p.e.p. on sideband. A dipole antenna a quarter-wavelength above ground is assumed for 160 and 80 meters, 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.

5. 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.

CQ Short-Skip Propagation Chart
January & February, 1978
Local Standard Time at Path Mid-Point
(24-Hour Time System)

Band (Meters)	Distance Between Stations (Miles) 50-250	250-750	750-1300	1300-2300
10	*Nil*	*Nil*	10-15 (0-1)	08-10 (0-1) 10-15 (1-2) 15-17 (0-1)
15	*Nil*	10-16 (0-1)	08-09 (0-1) 09-10 (0-2) 10-15 (1-3) 15-16 (1-2) 16-18 (0-1)	07-08 (0-1) 08-09 (1-3) 09-10 (2-3) 10-15 (3-4) 15-16 (2-3) 16-18 (1) 18-19 (0-1)
20	*Nil*	08-10 (0-1) 10-14 (0-3) 14-16 (0-2) 16-18 (0-1)	06-07 (0-1) 07-03 (0-2) 08-10 (1-4) 10-14 (3-4) 14-16 (2-4) 16-18 (1-2) 18-19 (0-2) 19-21 (0-1)	06-07 (1) 07-08 (2) 08-10 (4) 10-14 (4-3) 14-16 (4) 16-17 (2-4) 17-18 (2-3) 18-19 (2) 19-21 (1)
40	07-08 (0-1) 08-09 (1-2) 09-10 (2-4) 10-16 (3-4) 16-17 (3) 17-19 (1-2) 19-21 (0-1)	07-08 (1-2) 08-09 (2-3) 09-11 (4) 11-15 (4-3) 15-17 (3-4) 17-19 (2-3) 19-21 (1-2) 21-02 (0-2) 02-07 (0-1)	07-08 (2) 08-09 (3-1) 09-11 (4-1) 11-15 (3-1) 15-17 (4-2) 17-19 (3-4) 19-22 (2-4) 22-02 (2-3) 02-07 (1-2)	07-08 (2-1) 08-15 (1-0) 15-17 (2) 17-19 (4-3) 19-22 (4) 22-02 (3-4) 02-04 (2-3) 04-07 (2)
80	07-08 (1-2) 08-09 (3-4) 09-19 (4) 19-21 (3-4) 21-23 (2-1) 23-03 (1-2) 03-07 (1)	07-08 (2) 08-10 (4-2) 10-16 (4-1) 16-18 (4-2) 18-21 (4) 21-23 (3-4) 23-03 (2-3) 03-07 (1-3)	07-08 (2-1) 08-10 (2-0) 10-16 (1-0) 16-18 (2-1) 18-20 (4-3) 20-23 (4) 23-05 (3) 05-07 (3-2)	07-08 (0-1) 08-16 (0) 16-18 (1-0) 18-20 (3-2) 20-23 (4) 23-03 (3) 03-05 (3-2) 05-07 (2-1)
160	09-17 (1-0) 17-19 (3-2) 19-05 (4) 05-07 (3) 07-09 (2-1)	17-18 (2-1) 18-19 (2) 19-21 (4-3) 21-05 (4) 05-06 (3) 06-07 (3-1) 07-09 (1-0)	17-18 (1-0) 18-19 (2-1) 19-21 (3-1) 21-03 (4-3) 03-05 (4) 05-06 (3-2) 06-07 (1)	18-19 (1-0) 19-21 (2-1) 21-03 (3) 03-05 (4-2) 05-06 (2) 06-07 (1-0)

ALASKA
January & February, 1978
Openings Given in GMT

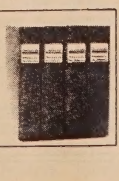
To:	10 Meters	15 Meters	20 Meters	40/80 Meters
Eastern USA	*Nil*	18-20 (1) 20-22 (2) 22-23 (1)	16-22 (1) 22-00 (2) 00-02 (1)	04-13 (1) 07-12 (1)*
Central USA	20-23 (1)	19-22 (1) 22-00 (2) 00-01 (1)	17-23 (1) 23-01 (2) 01-03 (1)	03-14 (1) 07-12 (1)*
Western USA	20-00 (1)	19-22 (1) 22-00 (2) 00-02 (1)	18-20 (2) 20-01 (3) 01-02 (2) 02-04 (1)	04-05 (1) 05-12 (2) 12-15 (1) 15-16 (2) 16-17 (1) 05-12 (1)* 12-15 (2)* 15-17 (1)*

HAWAII
January & February, 1978
Openings Given in Hawaiian Standard Time

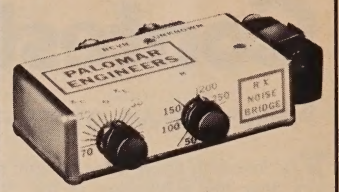
To:	10 Meters	15 Meters	20 Meters	40/80 Meters
Eastern USA	08-13 (1)	06-08 (1) 08-12 (2) 12-15 (3) 15-16 (2) 16-17 (1)	06-08 (2) 08-12 (1) 12-15 (2) 15-16 (3) 16-17 (2) 17-19 (1)	17-19 (1) 19-21 (2) 21-00 (3) 00-03 (2) 03-04 (1) 19-21 (1)* 21-01 (2)* 01-03 (1)*
Central USA	07-09 (1) 09-12 (2) 12-14 (1)	06-07 (1) 07-08 (2) 08-13 (3) 13-15 (4) 15-16 (2) 16-18 (1)	06-07 (1) 07-10 (2) 10-13 (1) 13-14 (2) 14-17 (3) 17-18 (2) 18-20 (1)	17-19 (1) 19-20 (2) 20-03 (3) 03-04 (2) 04-06 (1) 19-20 (1)* 20-22 (2)* 22-01 (3)* 01-03 (2)* 03-05 (1)*
Western USA	09-11 (1) 11-14 (2) 14-16 (1)	06-07 (1) 07-08 (2) 08-14 (4) 14-15 (3) 15-16 (2) 16-18 (1)	06-07 (2) 07-10 (4) 10-14 (3) 14-16 (4) 16-17 (3) 17-18 (2) 18-20 (1)	16-18 (1) 18-19 (2) 19-22 (4) 22-02 (3) 02-04 (2) 04-09 (1) 19-20 (1)* 20-22 (2)* 22-04 (3)* 04-05 (2)* 05-07 (1)*

See explanation in "How To Use Short-Skip Charts" in box at the beginning of this column.
* Indicates best time for 80 Meter openings. Openings on 160 Meters are also likely to occur during those times when 80 Meter openings are shown with a propagation index of (2), or higher.
Note: The Alaska and Hawaii Propagation Charts are intended for distances *greater* than 1300 miles. For shorter distances, use the preceding Short-Skip Propagation Chart.

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FRANK ANZALONE, W1WY

Contest Calendar

News/views of on-the-air competition

The following errors were brought to light after the publication of the CQ World Wide Contest results in the September issue.

VU2ACD was incorrectly listed in the c.w. results. Mike's operation was in the phone section and his 106,920 points on 14 MHz puts him at the top in that category for India.

VE7DAJ was also listed as a c.w. entry. His all band score of 312,828, however, should have been in the phone results, right under VE7KB the winner. (That makes VE7IQ the c.w. winner.)

There was a typo error in WA3WRD's call, also in the c.w. all band section. It appeared as WA3WRO.

Under Multi-Operator, Single-Transmitter, certificate winner, UK3ABB's score was not included. His score is as follows: 1,298,800—1462—96—286. In the same section, the score for UK1-MAA, who won for Karella-Finnish—SSR, was also deleted. It is: 184,804—643—49—139. And lastly, the score for UK5EDB, Ukrainian SSR, which was deleted is: 106,812—454—36—102.

Another and interesting Trophy. This one sponsored by the Southeastern DX Club in the club category. The award will be made on the following criteria: 1. The winner must be a bona fide club entry. 2. The winner in each year's CQ WW Contest would have the highest combined CW/Phone score improvement over the previous year's combined score. 3. Minimum score will have to be at least 5 million points for each year on which the improvement is based. (i.e.: 5 million for the previous year, 5 million plus for the current year.) This should be an incentive for some lesser active clubs who have been in the shadow of the PVRC, FRC and others for these many years.

The response for a C.W. WPX Contest were quite favorable and we are looking into the possibilities of running one, but not for the 1978 season. There are too many factors to be taken into consideration.

73 for now, Frank, W1WY

*14 Sherwood Rd., Stamford, Conn. 06905

Calendar of Events

	Jan. 7-8	ARRL CD Phone Party
	Jan. 14-15	YU 80 Meter C.W. Contest
†	Jan. 14-15	DL QRP C.W Contest
†	Jan. 14 & 22	RTTY Flash Contest
	Jan. 21-22	ARRL VHF Sweepstakes
	Jan. 21-22	ARRL CD C.W. Party
	Jan. 27-29	**CQ WW 160 C.W. Contest**
†	Jan. 28-29	French C.W. Contest
	Jan. 29-30	Classic Radio Exchange
	Feb. 4-5	ARRL DX Phone Contest
	Feb. 4-12	ARRL Novice Contest
	Feb. 11-12	QCWA QSO Party
	Feb. 11-12	Ten-Ten QSO Party
	Feb. 18-19	ARRL DX C.W. Contest
	Feb. 18-19	YL - OM Phone Contest
	Feb. 25-26	French Phone Contest
	Mar. 4-5	ARRL DX Phone Contest
	Mar. 4-5	YL-OM C.W. Contest
	Mar. 18-19	ARRL DX C.W. Contest
	Mar. 25-26	**CQ WW WPX SSB Contest**
	Apr. 1-3	ARCI QRP QSO Party
	Apr. 11-12	DX to W/VE YL C.W. Party
	Apr. 25-26	DX to W/VE YL Phone
	Apr. 29-30	PACC Contest see instructions

† Not Officially Announced.

YU 80 Meter C.W. DX Contest

Starts: 2100 GMT Sat. Jan. 14
Ends: 2100 GMT Sun. Jan. 15

The YU DX Club is again sponsoring this contest to stimulate more activity on 80 meter c.w. Both single and multi-operator operation is permitted.

Exchange: RST plus QSO no. (001 and etc.)

Scoring: Contacts between stations in the same country 1 point. With other countries on the same continent 2 points. With countries on other continents 5 points. With YU stations 10 points. (Only one QSO with the same station.)

Multiplier: Each DXCC country including your own, and each YU prefix worked.

Final Score: Multiply total QSO points by sum of DX countries and YU prefixes worked.

Awards: Certificates to the top scorers in each country, 2nd and 3rd place awards where justified. Call areas in W/K, VE, PY, VK, ZL, JA, and UA9 & UAØ will be considered separate areas for awards. There are also Trophies for continental leaders.

Include a summary sheet and the usual signed declaration with your entry. Check log for duplicate contacts. Taking credit for duplicate contacts in excess of 3% of the total made may mean disqualification.

Mailing deadline is March 1st to: YU DX Club of SRJ, P.O. Box 48, 11001, Belgrade, Yugoslavia.

DL QRP Activity C.W. Contest

Starts: 1500 GMT Sat., January 14
Ends: 1500 GMT Sun., January 15

Power input for this contest is limited to 10 watts or less, single operator and on c.w. only. QRO stations may participate but only contacts with QRP stations are valid.

Limit your operation to 15 hours. The 9 hours off may be taken in two parts. Contacts may be made on any five bands in the 1.8 to 28 MHz spectrum.

Exchange: RST plus QSO no. and power input. Add "X" if crystal controlled. (579001/8X) Stations using more than 10 watts indicate QRO instead of power figure.

Scoring: Contacts with stations in same country 1 point. Other countries but same continent 2 points. DX on other continents 3 points. If QSO is with another QRP station add 3 points.

Stations using less than 3.5 watts get credit for 1 handicap point, and another handicap point if rig is crystal controlled. Double the above points if both stations meet above handicap requirements. (8 to 12 final points possible)

Reducing input power of a commercial rig does not qualify it for handicap bonus.

Multiplier: Each DXCC country worked, one if on own continent, two if on another continent. Plus call areas of JA, PY, VE, VK, W/K, ZS.

Final Score: Total QSO points from all bands times the multiplier points from each band. (Scoring for QRO stations same.)

Include a summary sheet showing the scoring, equipment description and the usual signed declaration.

Mailing deadline Feb. 15th to: Hartmut Weber, DJ7ST, D — 3201 Holle, Kleine Ohe 5, West Germany.

Giant RTTY Flash Contest

Two Periods
1500—2300 GMT Sat., January 14
0700—1500 GMT Sun., January 22

This is the 10 RTTY contest sponsored by the IATG of Italy, called Flash because of the two short periods of operation.

All bands may be used, 3.5 thru 28 MHz and also via Oscar, in that portion of the bands used by RTTY stations. The same station may be worked on each band for exchange and multiplier points.

Exchange: Call, RST and CQ Zone.

Scoring: Contacts with stations in own Zone 2 points. With stations outside own Zone, according to the value in the "exchange point table". Oscar contacts double in point value.

Multiplier: Each DXCC country and W/K, VE and VK call area worked on each band.

Final Score: Total QSO's × exchange points × total multiplier. There is also a handicap of 2% to 12% deducted from the final score based on the position of winners in previous contests.

Awards: Gold, Silver and Bronze medals for first three places. The 4th to 7th place winners, a year's subscription to *CQ Electronic* magazine, 8th to 10th place a 6 month's subscription.

Points and position achieved in this contest will be included for the World RTTY Championship for 1977. (This is last for 1977)

The contest is also open to SWL RTTYers with the same scoring system.

It is suggested you write to Prof. Fanti for a more detailed rules sheet with an "exchange point table", handicap table and sample forms.

Logs must be received no later than Feb. 28th and go to: Prof. Franco Fanti, via Dallolio 19, 40139 Bologna, Italy.

French DX Contest

C.W.: Jan. 28-29 Phone: Feb. 25-26
Starts: 0000 GMT Saturday
Ends: 2400 GMT Sunday

The following rules were received just in time to make this issue. They are more or less the same as in previous years except for some changes in the scoring and countries that can be worked for French credit. (No mention was made of ON, HB, LX and etc.)

Contest exchange is not limited to European French stations only, you can also work French overseas departments (FG, FM, FY, FR) and territories (FB8W, FB8X, FB8Y, FB8Z, FK, FO, FP, FU, FW, FHØ).

Operating time for single operator stations is limited to 36 hours. (Evidently multi-operator stations can operate the full 48 hours.)

French stations will be permitted to use 160 c.w., only on 1.826 MHz.

The same station can be worked on each band for QSO and multiplier credit.

Exchange: RS(T) plus QSO no. (579001) French stations will also send two figures after their call to identify their department. (F6ZZZ/67)

Points: Contacts with French stations, and departments and territories on the same continent are worth 3 points. On stations in other continents, 10 points.

Multiplier: Each French department, (95) and each overseas department and territory worked on each band.

Final Score: Total QSO points times the sum of the multiplier from each band.

Awards: Certificates to the top scorers in each country and each USA call area. In the past contest QSOs were honored for the many French awards. DUF, DPF, DDFM, DTA, DNF. However no mention was made about it this time.

This year logs go to a new Manager. REF Traffic Manager, Michel Menetrier, F5IN, 2 Square Trudaine, 75009 Paris, France.

Classic Radio Exchange

Starts: 2000 GMT Sun., January 29
Ends: 0300 GMT Mon., January 30

The Southeast A.R.C. of Cleveland, Ohio is again sponsoring this unusual activity.

Object is to restore, operate and enjoy older equipment with like minded amateurs.

A classic rig is defined as any gear built since 1945 but at least 10 years old. An advantage in the contest but not required in the exchange.

The same station may be worked on each band, mode, and different equipment combinations. Non-contestants may be worked for credit.

Exchange: Name, RS(T), state, province or DX country and receiver and transmitter type. (i.e.: home brew, 807 final and etc.) Also any other interesting information.

Scoring: Multiply total QSOs by (receivers + transmitters + states + provinces + DX countries) worked on each band. Multiply that total by your Classic multiplier. (Total years old of all receivers and transmitters used. Three QSOs minimum per unit.) If transceiver, multiply age by two.

Frequencies: C.W.—60 kHz from low edge of each band. Phone—3910, 7280, 14280, 21380, 28580. Novice/Tech.—3720, 7120, 21120, 28120. Listen on the half hour for "coast to coast DX" on 20 meters.

Results 1977 French Contest U.S.A.

C.W.

W1MDO	20880	WA9VOL	5994
W1OPJ	27	WØPRY	10662
WA2EJZ	396	WØBK	1684
W3ARK	6336		
W3FCI	1425		
W3EUJ	432		
WB4OGW	36087		
WA4ZHU	15048		
WB4FHI	4143		
K4OAQ	3159		
N4MM	2687		
WB4WHE	216		
W8VSK	13884		
K8CW	10260		
WA8KME	1377		
K8LUU	3645		
WB8WTD	810		
W9OHH	23166		

PHONE

WA1WFS	11244		
F2YS/W2	12069		
WA2EJZ	356		
LU1BAR/W3	7401		
W3FCI	4785		
W3AKD	1485		
N4MM	17286		
WA4SHL	9408		
K4KZP	3276		
WA4LOF	3207		
WB4OGW	4017		
WB5MSU	225		
WA9FZQ	1876		

Awards: Certificates will be awarded for the highest scores, longest DX and "Unusual achievements."

Send logs with comments, pictures, anecdotes and etc. to: Stu Stephens, K8SJ, 2386 Queenston Rd., Cleveland Heights, OH 44118. A s.a.s.e. will get you the results.

CQ WW 160 C.W. DX Contest

Starts: 2200 GMT Fri., January 27
Ends: 1600 GMT Sun., January 29

Rules are the same as in previous years and were completely covered in last month's Calendar.

This year however more emphasis will be put on penalties and disqualification for excessive duplicate and unverifiable contacts.

Since this is a single band activity with a limited QSO and multiplier total, it really should not be that difficult to keep an accurate log.

Primarily this is a single operator contest but multi-operation will be accepted and certificates will be awarded on the same basis as for single operator.

Note that two new plaques are being awarded by the West Gulf A.R.C. for the Top U.S.A. and European single operator scores.

The winners in the 1977 Bermuda Contest were G4CNY (93,555 points) for the United Kingdom. VE3KZ (68,145 points) for Canada. And K2UR (40,400 points) for the U.S.A. VP9IG was top man for Bermuda. (679,470 points) Last year's contest was a combined phone/c.w. affair. The above winners made the trip to Bermuda as guests of the Radio Society of Bermuda, for the Trophy presentation at their annual banquet in October.

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NOTES
1. Models prefaced ' ** ' will be available 1/77.
2. All models above are furnished with crimp/solder lugs.
3. All models can be furnished with a SO-239 female coaxial connector at additional cost. The SO-239 mates with the standard PL-259 male coaxial cable connector. To order this factory installed option, add the letter 'A' after the model number. Example: 40-20 HD/A.
4. 75 meter models are factory tuned to resonate at 3950 kHz. (SP) models are factory tuned to resonate at 3800 kHz. 80 meter models are factory tuned to resonate at 3650 kHz. See VSWR curves for other resonance data.

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MODEL	BANDS (Meters)	PRICE	WEIGHT (Oz/Kg)	LENGTH (Ft/Mtrs)
40-20 HD	40/20	$49.50	26/.73	36/10.9
**40-10 HD	40/20/15/10	59.50	36/1.01	36/10.9
80-40 HD	80/40 + 15	57.50	41/1.15	69/21.0
75-40 HD	75/40	55.00	40/1.12	66/20.1
75-40 HD (SP)	75/40	57.50	40/1.12	66/20.1
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
**80-10 HD	80/40/20/15/10	76.50	50/1.40	69/21.0

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Again we admonish you not only to keep the "DX Window," 1825 to 1830 kHz, free of W/K and VE operation, but also not to operate too close to 1825 or 1830. Strong signals are bound to over-lap into the "Window." That's where you will find the DX calling. They will be operating split-frequency and looking for you down at the lower edge of the band. The more knowledgeable stations will look for a clear spot and specify the frequency they will be listening.

Look for KH6 type at the top of the band, 1990-2000. They will also be listening for you down at the low end. However they are also now permitted to operate in the 1800-1810 segment but it is hoped that they will continue to use the old format.

Don't overlook the 1830-1850 portion of the band, activity there is usually much lighter than the bottom 25 kHz. (Check U.S. 160 Regs. for availability and restrictions.)

We also hope that the Phone men will be as cooperative as they have been in the past. Its only for two weekends a year fellows. (ARRL 160 in Dec. too)

Log and summary sheets and U.S. Regulations for 160 may be obtained from CQ by sending a large s.a.s.e. with sufficient postage to cover your request. (13¢ postage will cover 5 sheets)

Mailing deadline for contest entries is February 28th to: CQ 160 Contest, 14 Vanderventer Ave., Port Washington, L.I., N.Y. 11050.

Awards *(from page 63)*

er, XYL, K9CSL; Dottie Relf, XYL, W5HDK; Shirley Smith, XYL, WA7UWC; Julie Avit, Jr Op, WAØUPL, Sharon Dyson, Jr Op, KØAYO; Florence Coseglia, WD4CUG.

Top of Stairs Down—Mary Guy, XYL, WB9DCZ; Dorothy Johnson, WB9RCY; June Scothorne, XYL, K1UNM; Martha Allison, XYL, WB6EXT; Fran Allen, XYL, WØDG; Dorothy Rounds, XYL, W1SXX; Virginia Alvord, XYL, WØACK; Harriett Member; June Moon, XYL W9NS; Glenn Labahn, XYL, WBØGRN; Dorothy Scroggin, XYL, WØSJE; Maragaret Skaptason, XYL, WAØWOB holding Matt Avitt, Jr Op WAØUPL.

Group 3—All Counties Holders

1st row L to R—WAØDCQ, K9HRC, K9QGR, WA0YJL, W8WUT, WAØKQQ, W9ABM, W0SJE, W5HDK.

2nd row L to R—W4GGU, W5TQE, W8ZCV, W5AWT, W8CXS, W9DRL, K8ODY, KØAYO, WØGV (Standing).

3rd row L to R—W1DIT, WØBK, K9DCJ, WAØCEL, WB9NHM, WA3VLB, WA5YSC, WAØUPL.

4th row L to R—VE4QZ, WØFBB, WAØGZA, W6CCM, W9ZD, WB6EXT, WAØWOB.

Group 4—All County Hunters

1st row L to R—K4ZA, WØKYG, WBØEXQ, W9DRL, W8CXS, K2PBU, WØDG, K4ODU, WØSJE, VE4XN.

2nd row L to R—WAØRJJ, WD8MCL, WØGV, W9CTA, W9KIL, WØMRJ, KØAYO, WA8ASV, WØFBB, W4YWV, W8ZCV, WA4UNS.

3rd row L to R—WAØUPL, WAØKQQ, WØBK, W1SXX, WAØYJL, WBØCPC, WAØSGJ, WBØELJ, WB4RVW, WA7UWC.

3½ row L to R—K9DZG, WØACK, WAØCEL, WB9NHM.

Back Row Standing Near Planter L to R—WBØGRN, WBØLMD, WØFCO, K7LTV, WØBM, WA6CQW, WBØABM, KØTVY.

In Front of Back Row Standing L to R—WA3VLB, KØRRO, WØFF, W6CCM, WØBKS, KØGA, W8WUT, WAØODW, WAØOOU.

In Front of MARAC Display Standing L to R—WØDSY, WA4ZYU, WØKMH.

On Stairs Top Down—K9CSL, WØOWY, WB8JIX, W8RKL, WB9RCY, WAØUHC, WA2AEA, WBØCQO, KØQIX, WB4AIL, K9HFR, W5TQE, W4GGU, WAØDCQ, WBØJYB, WA4BDE, WØUM, WB5QLU, K4IUO, WA4QER, WA4CHI, K1GSK, W2HIH, W9CFS, W5HDK, W9LHG, K3VQO.

Upstairs Front Row, L to R—WBØQGW, WBØHLW, WAØVDO, KØPFV, W5AWT, VE4SK, K5WQM, K9GTQ, VE4QZ, WAØYFQ, K1UNM, K8ODY, W9GBI, W6HO, W9ABM, WAØGZA, K9DCJ, WB6EXT, WB9DCZ, WA9BHH, WB9NUL, W9ZD, W1DIT.

Upstairs Back Row, L to R—W9PJT, WBØSVI, W8NJC, WØHNV, WAØBPE, W9NS, W2PDM, N9TN, VE4KM, WØLRH, W8ILC, WA5YSC, W3RWJ, WØSZC, WB9ZNA, K9DAF, WAØLMK.

You will note that *ALL* ten U.S. call areas were represented, plus four of our Canadian friends.

Awards Issued

Don Guy, WB9DCZ was issued USA-CA-3000 endorsed All SSB and All Counties.

Bob McCarthy, WA1UVX picked up USA-CA-2000 and 2500.

Ralph Pokorny, WAØJNF obtained USA-CA-500 through USA-CA-2500.

Sheldon Davis, W3FVU qualified for USA-CA-500 and 1000 endorsed All SSB, All 20; USA-CA-1500 endorsed All SSB and USA-CA-2000.

Ken Johnson, K9DZG claimed USA-CA-500, 1000 and 1500 all endorsed All SSB, All Mobiles.

Rodrigo Jose de Lamare Leite, ("ROD") won USA-CA-500 endorsed All 2XSSB, #3 Award to PY.

Burwyn Thurman, N9TN (ex WB9-NOZ) gained USA-CA-500 endorsed All A-1.

The Radio Ciub TESLA applied for USA-CA-500 endorsed All CW.

Awards

State Capitals Award: Sponsored by The Newark News Radio Club which recently observed its 50th Year! It is available to amateur operators for working stations located in State Capital Cities of the United States after January 1, 1960 and is also available to SWLs on a "heard" basis. This Award is offered in three classes:

Class C—work 30 State Capital Cities
Class B—work 40 State Capital Cities
Class A—work 50 State Capital Cities

There are no special band/mode endorsements. Send GCR List and $1.00 to: SCA Custodian, S. J. Knox, WB2MRA, 212 North Jermoe Avenue, Margate City, N.J. 08402. No charge for additional seals for higher classes of Award, send s.a.s.e. only.

W.A.B. British Counties Award: In this Silver Jubilee Year (1977) of H.M. Queen Elizabeth II, the Worked All Britain (WAB) Organization introduces the WAB British Counties Award. QSOs with UK-stations count from May 1, 1974. QSLs not required, just a GCR-List giving date, GMT, station worked, both signal reports, County. Class 2 is for any 55 UK-Counties. Class 1 is for all UK-Counties + GM-regions + GD + GJ + *one* GU-Island, i.e. Guernsey, Alderney *or* Sark, a total of 76. Also available to SWLs. Cost of Award and postage world-wide is one pound, $2.00 US, or 20 IRCs. All claims to G4AVA, A. Brennend, 76 Deneley Av., Todmorden, Lancs., England. WAB Record Book (200 pages of info on WAB/HAB Awards) cost 2 pounds .60 or $5.00 US from G4CON. Profits (if any) from the WAB go to the Radio Amateur Invalid and Bedfast Club.

Notes

There's just enough space left to wish everyone much Happiness, Good Health and Good Hunting for 1978. Remember to write and tell me, How was your month (year?) 73, Ed., W2GT

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DX *(from page 61)*

TL8JW—To JA2CNT
VK4FJ/VK—To W7OK
VP2KT—To WB2TSL
VP2LJ—To WA4WTG
VP2LL—To W2MIG
VP2MBC—To W1CDC
VP2SQ—To W2MIG
VP5ZZ/mm—To WA2CPX
VP8PL—To G3LIK
VQ9HCS—To K1AGB
VR1AF—To WA2UUK
VS5XU—To DL1LD
VU2LE—To WA6OET
VU2LQA—To DK6TU
WA4RQK/VQ9—To W4FLA
WB5LBJ/DU6—To K7LAY
WB6EWH/VQ9—To WA4FVT
WB6IJI/VQ9—To WA4FVT
WS1ACR—To W1SYE
XP1AB (opr WA7ZLC—To WA3HJP
YS1O—To W2KF
YS1RRD—To W3HNK
YT3G—To YU3ZV
ZB2FX—To G3RFX
ZF1MT—To WA9UEK
ZP5CBL—To W3HNK
ZP5KB—To W3HNK
ZS2MI—To ZS6AVG
ZS3KC—To WA4MAV
ZS3LK—To DK3GI
3D6BD—To JA3CMD
3D6BP—To K1AGB
4X4NJ—To WA4WTG
4X4UF—To WA4WTG
4X4VB—To WA4WTG
4Z4DX—To WA4WTG
5Z4NI—To SMØKVJ
5Z4WL—To DL3WL
7X2AD—To K2NJ
7X5AB—To W2KF
7XØWW—To K2NJ
8P6AH—To WA4WTG
8P6BN—To WA4WTG
8P6CP—To WA4WTG
8P6FU—To W3HNK
8P6GN—To WB4RRK*
8P6IM—To N2BA*
8PØA—To WA4WTG
8Q7AD—To JA1UMN
9G1KB—To WA4MAV
9J2SJ—To N8JW*
9J2TJ—To N8JW*
9L1AD—To I3SCO
9L1SL/A—To WA3NCP
9U5CA—To WA2QNW
9Y4TR—To WA5GFS
N2BA—Box 12, Somerset NJ 08873
N4WW/CE0Z—Box 14882 Orlando, FL 32857
N8JW—3629 Delta River Dr., Lansing, MG 48906
T75AA—CRAG, Box 115, Guatemala City, Guatemala
VP2MB—Box 88, Plymouth, Montserrat, W. I.
VP2MGB—Ruby G. Bramble, Bethel P. O., Montserrat, W. I.
W6BYB/7—3815 Tanager Lane So., Billings, MT 59102
WB4RRK—105 Elizabeth, Paris, TN 38242
9L1SL—Chuck Jones, State Dept. (Freetown), Washington, DC 20520

NOTE: The following QSL managers offer their service to other DX stations—K9HCK, W4KA, W7VRO, WA4PYF, WA8VDC and WB4IQI. Write direct.
HELP WANTED: QSL route for VP8PM by XE1XR.

Novice *(from page 56)*

Audio Notch Filters

Sharp audio filters are available which can also be used to greatly increase receiver usefulness on crowded bands. This feature is built into some modern sets and it is also an easy accessory to attach and use. Simply stated, these filters permit one to move an extremely narrow notch across the audio receiving spectrum (300 to 3000 kilohertz) to minimize interference from a station very close to the frequency of the one being worked.

Preselectors

Preselectors sometime come to my attention as students rummage thru available used amateur equipment. A preselector can be a useful accessory if it is used in conjunction with a relatively insensitive receiver, but it is seldom worth getting for use with a sensitive receiver. The preselector is connected between the antenna and the receiver's antenna input and it amplifies the selected frequency spectrum before it is applied to the receiver. Preselectors are very easy to install and they are simple to use.

Converters

Another device that is sometimes brought to my attention is the frequency converter. A converter can be used to enable reception on bands not covered by the receiver being used. As an example, if your receiver just covers the 80 and 40 meter Novice bands, you can use a converter (with your receiver and an appropriate antenna) to listen to the 10 and/or 15 meter Novice bands. Converters simply beat the incoming frequency with another frequency to produce an output at some convenient frequency, such as in the 40 meter band. Converters require some thought and effort to obtain proper connections and a new operator will require some practice to become familiar with using them, but they are not difficult to install or use. Converters can be a real asset to anyone who wants to operate on a band covered by their transmitter but not on their receiver.

Transverters perform a similar function but they also process the outgoing signal.

Junk Equipment

Install the best station you can put together within your physical (space) and financial limitations. New amateurs often decide to get cheap (junk) equipment "just to get started," but this can prove to be a disastrous first step. Experienced operators can achieve remarkable operating results with less than satisfactory equipment. However, the beginning Novice has enough trouble achieving fair results even when using excellent equipment. Junk equipment and inexperienced operators almost always combine to produce very unsatisfactory operating results, usually resulting in a very discouraged Novice who quits operating and fails to upgrade. This subject is mentioned with the receiver coverage because it is usually junk receivers that are purchased or built. It is a simple fact that you can't work stations you can't hear. We need excellent ears (receivers) to have optimum results.

Part 3 Summary

I hope the preceding information has helped you gain a better understanding of receivers. The following stations were worked recently on the Novice bands: WB1EBO Kevin, Trumbull, Ct., WB2QFE Dolph, Oneida, N.Y., WB3EPR Earl, Baltimore, Md., WA4PXH Glen, Naples, Florida, WB5UBK Hardy, Eudora, Ark., WA6WWV Del, Menteca, Calif., WB7NDC Andy, Portland, Oregon, WD8DGU George, Lansing, Mich., WB9VEM John, Country Club Hills, Ill., WBØZXA Harry, Eagle Grove, Iowa, and KP4FEM Ruben, Perla Dsur, P.R.

Rules And Regulations

Part 97 of the FCC Rules and Regulations covers our Amateur Radio Service and every amateur should have a copy. A good way to obtain the latest issue of this information is to order it from the U.S. Government Printing Office, Superintendent of Documents, Washington, D.C. 20402. The GPO stock number for part 97 is 004-000-00338-1 and the cost is $1.30. Portions (or all) of part 97 appear in several amateur radio publications but they are not usually up to date, since there is a long time span between when a book is written and when it is sold. Amateur radio is dynamic and part 97 is often revised to reflect changes in our service.

Ten American Districts (TAD) Award

It is difficult to work all 50 states on the Novice bands to qualify for the ARRL Worked All States (WAS) award. As many of us know, it is even harder to get confirmation cards from the amateurs we've worked. We sometimes have to work several amateurs in a state before we receive a QSL to confirm our two-way radio contact with that state. Realizing how hard it is for a Novice to attain a WAS award, W6LS has made a stepping stone award available to amateurs. The Ten American Districts (TAD) award is a handsome certificate you'll be proud to display and it represents a real operating achievement since one must submit proof of two-way amateur radio contacts with other amateurs in all ten American FCC callsign areas to qualify for a TAD award. If you want a TAD award data sheet, send your written request and an SASE to the Lockheed Amateur Radio Club, 2814 Empire Avenue, Burbank, California 91504.

I am always glad to receive good black-and-white pictures of Novices at their operating positions. If you send one, it may appear in a future Novice column. Please enclose an SASE if your picture must be returned.

73, Bill, W6DDB

Math's Notes *(from page 54)*

enough to limit the output current from the gate to a safe value. If too high a value is needed, then two or more stages may be necessary to get to the proper drive level for the external device.

A third very common question is concerned with raising the output from the popular 7800 series 3 terminal regulators into the ampere range. There are several ways to do this but one of the easiest methods is shown in fig. 4. Here, the regulator is set up as a variable output device and an NPN transistor is connected an emitter follower. The point to remember is that the emitter voltage of a transistor is always .5 to .7 volts lower than the base voltage. Therefore, with the output of the 7800 set to .5 to .7 volts higher than the output we want, we get the correct value. The maximum current handling capacity of this circuit is determined by the h_{fe} of the transistor, and the maximum current available from the 7800. Since the 7800 can supply several hundred milliamperes, a common power transistor with an h_{fe} of 20 will get you into the 1-5 ampere range.

Darlington transistors can also be used in this application but the 7800 output voltage will have to be 1-1.5 volts higher than the output desired. When using any of these high current circuits, keep in mind the importance of wire sizes, heat sinking, etc.

In months to come, we will devote occasional columns toward answering questions in a format such as this one. Since the many letters that came often ask the same or similar questions, we will only answer those in this column that have wide interest. All special purpose questions will, of course, still be answered on a personal basis as time allows.

In the meanwhile, a very happy, healthy, and prosperous new year to all.

73, Irwin, WA2NDM

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"Using the CW-1 on my Kenwood TS-520. Absolutely Remarkable! Order enclosed for another one for my Drake R4B" . . . Bill, W4**

"That little unit is tops. The tone is just right for my ears. I'm amazed at how I can separate the signals in the pile ups" . . . Ned, K6**

"Congratulations, Skytec for pleasant CW! I didn't know what odd tones and grinding I had become used to. The clear tone of the CW-1 makes it the best addition I have made to my rig" . . . Reed, WA6**

"Terrific performance, careful construction, nice style — an excellent unit" . . . John, W3**

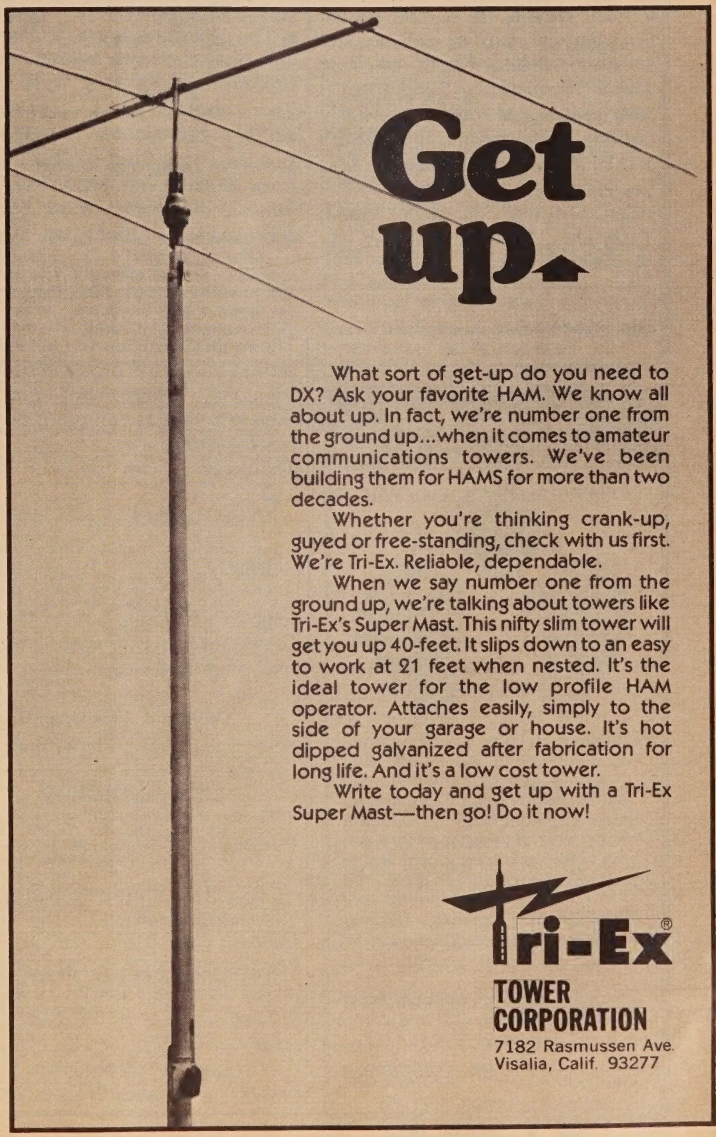
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Announcements *(from page 8)*

Marconi station location during this period. The Irish Radio Transmitters Society will be operating with an EI0 special event call from Marconi Station site in Clifden, Ireland. W and K stations QSL with a s.a.s.e. via: W1GAY, Duncan Kreamer, Main St., Vineyard Haven, Mass. 02568. DX QSL via W1 Bureau or W1GAY. KM1CC Mail Address: K1VV, R.J. Doherty, Control Operator-KM1CC, RFD no. 1, 14 Pine St., Sandwich, Mass. 02563 U.S.A.

• **Fort Wayne, IN** — The annual Fort Wayne Hamfest will be held at Shiloh Hall, North of Fort Wayne, on January 22nd from 8 AM until 4 FM local time. Early parking is available and 28/88 and 52/52 will be monitored. This yearly event is sponsored by the Allen County Amateur Radio Technical Society (AC/ARTS). Admission is $2.00 at the door. Table space is available at $1.50 per half table (about 4 feet). For info or table reservations (held until 9:30 AM) write: Hamfest Chairman, AC/ARTS; P.O. Box 342, Fort Wayne, IN 46801.

• **New York City, NY** — The 1978 Winter Meeting of the IEEE Power Engineering Society will be held January 29-February 3, 1978, at the Statler Hilton Hotel. The Winter Meeting is a general meeting and covers the entire field of power and its many areas of technical interest.

• The "Hunting Lions in the Air" will hold their 8th annual contest on Saturday, January 14th, 1978. This contest is a world-wide project coordinated by the Arpoador Lions Club of Rio de Janeiro, Brazil. The Arpoador Lions will verify point totals on logs submitted to them by participants. Participation in the contest is open to all duly licensed radio operators, Lion and non-Lion. The contest will start at 12:00 noon GMT and continue for a 24-hour period. Bands used will be 80, 40, 20, 15 and 10 Phone and CW bands. There will be awards given to 1st, 2nd, and 3rd place winners in both Phone and CW categories. For further info, contact: Contest Committee, Hunting Lions in the Air, Lions Club of Rio de Janeiro (Arpoador), Rua Souza Lima n. 310, Apt. 802, Rio de Janeiro, 20.000, ZC-37, Brazil.

• **Glasgow, KY** — The Mamouth Cave Amateur Radio Club will hold their annual Winter Swapfest on Jan. 21 from 9AM to 6PM at the flea market building on highway 31-E. Admission is $2.00. Door prizes and auction. Talk-in on 34/94. Contact Gary Hext, WB4FLB, 101 Community Dr., Glasgow, KY 42141.

Our Readers Say *(from page 8)*

I urge you to reconsider this matter and respectfully suggest that you take time to establish the facts of the situation.

Leonard S. Yarbrough, W4GZM

October Zero Bias

Editor, CQ:

At your instigation, (Zero Bias, Oct. 1977), I wrote to Senator Hollings. I thought you might like to see the reply. The letter reads as follows:

Dear Mr. Prentice:

Thank you for your letter on Bill S. 864, introduced by Senator Goldwater and concerning radio frequency interference.
At present the FCC is working on two technical studies in this area. They will be examining the cost effectiveness and various aspects of the proposed bill. These reports should be complete by fall.
The subcommittee is very concerned about the problem of radio frequency interference and we hope the studies will point out the possible solutions.
Thank you again for your letter.

With kind regards.

Sincerely,

Ernest E. Hollings
Chairman-Subcommitee
on Communications

Willard J. Prentice, W3VBM
Timonium, MD

CQ Reviews Reviewed

Editor, CQ:

It was with interest that I read Kim Smith's review on the Heathkit HD-1416 code oscillator. In particular, was her comment on evaluating the Heathkit ER-3701 Novice Course in the Sept. 1977 issue of CQ.

I would only say that I purchased this Novice Course, used it, and passed my Novice exam at the age of 47. I found it to be everything Heath said it to be with one minor exception.

The code portion of the course was more than adequate to pass the 5 words/minute requirement for receiving, but I would recommend that one practice sending also before taking the test.

The theory & rules part of the course were very good and the information was retained quite well. The only exception I would make is that the course contain typical diagrams of tube type circuits only. It would, I feel, improve the course if the basic amplifier and oscillator circuits were also shown in their solid state versions. I believe this would help the novice particularly as the written test I took had questions on solid state circuits only.

I enjoy reading my son's copies of CQ, especially the Novice and Antennas features. Keep up the good work.

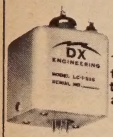
Edwin R. Lappi, WD4LOO
Carrboro, NC

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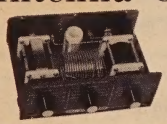
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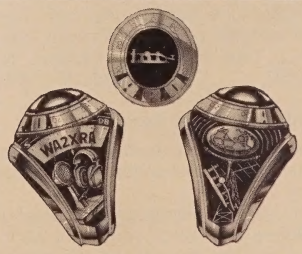
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In Focus *(from page 52)*

last QSL card needed for *CQ*'s 100 Countries-2 Way SSTV Award! I believe that Neville's will be the first claim for this award from Europe. This means a "double first" for good ole England, since G3IAD was also the first European to receive the WAS-2 Way SSTV Award. Congratulations Neville, well done!

Neville is an inveterate DXer whose expeditions around the UK and elsewhere have provided much sought "country" prefixes to hams everywhere. In 1975, as GD3IAD, Neville provided many slow scanners with QSOs from the Isle of Man.

At the present time, G3IAD is head of the Technical Studies Department in a college for the training of disabled people. Prior to arriving at his present location, Neville was really "on the move". Some of his previous calls are: VS6CE, VQ4GC, VQ5GC. VQ3GC, 5H3GC, 9Q2VB, and 9J2VB!

The accompanying photograph (fig. 6) shows Neville relaxing in his well-equipped "shack".

At this point, Neville's "country score" has climbed to 104, so it's a safe bet that one of the first "150 stickers" will find its way to Nottingham.

Final-Final

Don't forget that there are amateurs all over the world who want to know *what* you're doing, and *how* you're doing it. And, they want to know what you are doing *with* slow scan television. Please keep those letters and photographs coming my way. Same old address on our windswept hilltop, 2112 Turk Hill Road, Fairport. N.Y. 14450. Best regards, Bill. W2DD

Antennas *(from page 49)*

lem for most amateurs, who don't have unlimited ground space to play around with."

I handed Pendergast a brochure. "Before you leave, you might want to look at this. An outfit by the name of *Bartol Company* at 901 West Franklin Street, Kenton, Ohio 43326 makes very attractive residential flagpoles of tapered aluminum. They sent me their sales sheet on a 20 foot flagpole. It's made of 6063-T6 seamless extruded aluminum and tapers from three inches in diameter at the base to two inches in diameter at the top. It has a gold anodized ball at the top, with a pulley underneath it. At the base is a cleat for the rope for the flag. The flagpole rests in a steel pipe ground rod."

"Not bad," exclaimed my friend. "That would make a perfect 'invisible' vertical antenna. How much does it cost?"

"About one hundred and twenty five dollars," I replied. "And maybe they make 'em higher, too. It's worth investigating if you are interested in an attractive looking vertical antenna."

"Here's a *better* invisible antenna," remarked Pendergast. "My old buddy W6VAT sent me this drawing (fig. 6) of an underground receiving antenna. The drawing was published in a 1928 issue of *Popular Mechanics."*

I looked at it and asked, "How long is the lead-in from the underground antenna to the receiver?"

"You have a suspicious mind," rebuked my friend. "You assume the lead-in does the work?"

"It could be," I admitted. "Stop pulling my leg. I have some interesting information on underground antennas that I'll give you the next time I see you. The underground antenna is no joke."

* * *

(Note) . W6SAI is the author of two books that cover Quad and Yagi antennas. The books are available from Radio Publications, Inc., Box 149, Wilton, CT 06897. They are: "All About Cublical Quad Antennas" ($4.75) and "The Beam Antenna Handbook" ($4.95). Add 40¢ for postage and handling per book. 73, Bill, W6SAI

QRP *(from page 46)*

the common ground foil strip. The proper run of the ground foil can be figured out two ways: first, check the schematic, and locate the ground end of the specific components on the p.c. board design, and draw the ground foil in; 2.) check the p.c. board deign, and note those component "holes" which have nothing but the component connected there—these are where the ground foil should run. The foil can be drawn in according to the following directions: 1.) Draw a line from the loose end of the 12.1 V zener southwest, passing under R4, around "T", under R8, and connect to loose end of R3; 2.) Draw a line from loose end of zener south along side of board to its bottom, turn west, and connect to end of R10, northwest and connect to loose end of R6 (just above "C"), and then to C3, ground symbol, and end of R7. That will do the trick.

I certainly hope that any of you who tried to build the R.I.T. caught the omission of the ground foil strip and figured it out. It exasperates me to have put all that time into a circuit, and then have the effort nullified by an incorrect schematic or p.c. board template.

Conclusion

Well, gang, that it for this month. Keep the mail coming, but send it directly to *CQ* headquarters, rather than to me in SD. We will try to arrange things so that batches of mail can reach me periodically for inclusion in "operating reports" columns. For now, happy QRPp'ing and 73,

Ade, K8EEG

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An Audio Circuit *(from page 42)*

pacitors are plugged in using their full lead length; such a practice will not yield good results except in the case of simple d.c. circuits. Bypass capacitors leads especially must be trimmed to the length they would be on a PC board. In order to provide good direct grounding, the four pins from each vector block (which are part of two socket rows on each block) are connected directly to the chassis via a force fit through holes in the chassis. They are then epoxed in place for mechanical stability. The Continental Specialties strips do not have this pin feature. But, it can be added by carefully soldering suitable pins to the underside of the strips. Again, the importance of good direct grounding cannot be overemphasized if one is to duplicate a circuit presented as a finished product for PC mounting or if one wants to develop a circuit for eventual PC board mounting.

The audio amplifier used is shown in fig. 1. This is a straight-forward type circuit using a LM 380 IC and will develop up to 2 watts of audio at the full supply voltage. However, even using a simple 9 volt transistor radio battery for power, it will deliver sufficient volume for most purposes. It can also be easily powered by using a 12 v.d.c. plug-type transformer and adding a few thousand Mf of filter capacitance at the amplifier. The amplifier was constructed on an approximate 2 inch square PC board. The pins designated as heat sink pins are soldered directly to the foil side of the board. The internal power supply, be it a battery or transformer supply, can also be brought out to a binding post so it can power circuits under test. This was not done with the unit shown since test circuits were powered using a variable voltage power supply which was on hand and which allowed more versatility.

As shown in the photo, only an on-off toggle switch and a phono jack (for the amplifier input) were mounted on the top side of the chassis, besides the loudspeaker and the component blocks. After the unit had been in use a while, it became apparent that some modifications were necessary. A preamplifier was particularly necessary to test very low level output circuits and microphones and/or to prevent loading a circuit. The preamplifier of fig. 2 was added using top chassis mounted phono plugs for both its input and output so it could be used independently or in conjunction with the LM380 amplifier. Also, two headphone type jacks were added so one could either access the amplifier output with headphones or access the loudspeaker only to use it as a test substitution loudspeaker. The wiring of these two jacks is already shown in fig. 2.

The Audio Breadboarder's Delight is a deceptively simple unit but one keeps finding applications for it to the point where it starts to become an indispensable item on the test bench. For instance, to check microphones, try speech processing circuits, check audio filters before installing them in a receiver, simple tuning and control circuits, check defective stages in other audio equipment, etc. ■

A Marathon Heard *(from page 39)*

the finish line by Roger, WA2JCS, and Harvey, WA2JHT. Up the Willis Avenue bridge went the race with a wave from Mike, WA2TYV. Across the Bronx Bill Rogers was now out ahead by several blocks, and was waving at radio operators. He remembers seeing Ed, W2OC, at the water station, and I got a glance at the other Ed, WA2QEV. Past mile 23 and a tired Paul, WB2VUK, being held up by Williard, K2CFX, and if I could read lips, they said something about it all being over soon. Into the park past untold thousands of spectators, and Sid, WA2FXB. Sid is council treasurer, and I think that he may have figured a way to get all those people to donate to the Council, judging by the smile on his face. I could now begin to hear the finish line network. Going great guns with Gary, WA2BAU, firing off data to loggers WB2UVU, Paul, and verifiers John, WA2BAT, and Sylvio, WB2ITS. As the lead car rounded Columbus Circle heading for the finish line, Jerry, WB2ZEX, was seen doing his own running, This time for the finish line to help pull the gear from the lead car to get it into the command trailer.

Have you ever seen an aisle of people 20 deep? Or heard over 100,000 people yelling? It is an experience that has to be felt, not seen. This is what the finish line was like. The 11 press helicopters were back, as were the thousands of photographers, television camera crews, and radio reporters describing the finish in several languages live to their listeners. Bill Rogers, superior marathoner from the Boston area won the race. Jerome Drayton of Canada was second, and for many of the 3600 others who finished, it was a monumental mark of their own endurance. For four hours after the winner came across breaking the gold ribbon the amateur radio system took numerous problems and solved them. They kept water stations going, cleared traffic, gave medical help where needed, offered encouragement to those who slowed, and kept every point on the course in touch with every other point. As the final runners went by the lower mile markers, the amateurs helped restart traffic.

The finish line network did not close down until over 5 hours after the winner had come across. This started phase three. The runners had to be fed after the race, and stations were established at the two restaurants to keep things flowing. Race director Lebow was amazed at how well he was able to keep in touch with all areas of such a complex event through amateur radio. It more than met his expectations.

The marathon finally ended for all as evening fell over the city. Race officials, and city officials alike went out of their way to praise the work of the amateur radio community, and the Road Runners keep looking at the list of amateurs involved and saying, "now next year . . ."

If public service is, indeed, a reason for the amateur radio service, the public was well served on this day! A word of thanks must go to all of the TSARC coordinators who together put in over 1000 man hours of work, to the TSARC repeaters that volunteered their facilities, and to the over 200 amateurs who turned out to make Marathon 1977 the success it was. You see a marathon starts 6 months before the race begins, but that's another story. ●

CQ Reviews *(from page 29)*

easy to add a switch to the front panel and have a display hold mode like that used by Kenwood on the TS-820 digital display. They will gladly tell any purchaser where on the circuit board to connect the switch, should he desire this feature. In my opinion the frosting on the cake is the fact that the RFE-100 can be used as a standard frequency counter up to 40 MHz by merely connecting a probe to the center input connector on the back of the unit. Average sensitivity is 150 Millivolts. In the near future RF Engineering will have a low cost pre-scaler that will allow the RFE-100 to be used as a standard counter up through 250 MHz. A very nice idea indeed.

High quality components, a Mil Spec circuit board, neat construction and a good basic design have resulted in a digital frequency display package that is equal in performance to any incorporated in the current crop of transceivers. When you consider its capability of functioning as a frequency counter on the service bench, it's an even better buy at $199.95. For further information contact RF Engineering Corporation, P.O. Box 9123, San Jose, California, 95157. ■

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SELLING Drake TR-4, RV-4, AC-4, DC-4 $525; 2 Motorola HT 200 2 meter handi-talkies $225 each or $415 both. I will ship UPS USA. Looking for National NC100 Rec. Jack, WA7NNH, P.O. Box 8171, Boise, Idaho, 83707.

HELP! A would-be ham who unfortunately is a mechanical engineer desperately needs private tuition to enable me to qualify for a Canadian amateur licence examination. Then I can install an Atlas 215X on my Sailboat. I will pay whatever is deemed a fair fee. If you live in Toronto area and can devote one evening a week or more contact Steve Roberts at 3664 Autumn Harvest Drive, Mississauga, Ontario, L4Y 3S3 Telephone 416-279-4388.

SIX METER, Folded Dipole Yagi Antenna. Unused 5 element Gov't Surplus in original box with instructions and blueprint $175.00 F.O.B. WB0ZSA; 10925 Morris Ave., S.; Bloomington, MN 55437.

SOUND SWITCH: Trigger circuits by clapping your hands, whistling, etc. - Control lamps, appliances or use as effective burglar alarm. Completely assembled, with microphone: ONLY $5.00. Michael, POB 3382-Q, Station 'B', Calgary T2M-4M1, Canada. (Guaranteed).

NUDE BEACHES: Complete Maps and Detailed Report. - U.S.A., CANADA - Only $3.00; POB 3382-Q, Station 'B', Calgary T2M 4M1, Canada.

PHOTO STAMPS: Your photo on sheet of 100 stamps; gummed and perforated. Send any photo (returned) and $5.00 to Michael, POB 3382-Q, Station 'B', Calgary T2M-4M1, Canada.

CUSTOM EMBROIDERED EMBLEMS, your design, low minimum, Emblems, Dept. 10, Littleton, New Hampshire 03561.

NEEDED: T599 Kenwood operators manual buy or copy, have service manual, exchange. Jung Y. Lem, WA6ROJ, 5222 Coringa Dr., Los Angeles, CA 90042.

WANTED: Schematic and /or Tech manual for BC-348-Q reciever. A. McGinnis, WA2DTQ, 55 Patton St., Iselin, NJ 08830.

FOR SALE: SB-300 (tuning mechanism sticks), $150; SB400 (very good condx), $225. WA3FUV, Don Weyel, RD 1, Conneaut Lake, PA 16316. (814) 382-2774.

FOR SALE: Hallicrafters SX140 receiver; HT40 transmitter. Both are in good shape and I'm asking $100 for the set. Michael Henon, Rt. 9, Box 86, Rome, GA 30161.

S.A.S.E. my crystal list. K8LJQ, 355 Mower Rd., Pinckney, MI 48169.

HIGH SPEED practice tapes from Bohme Keyer, perfect. 30 minutes each side. 30/40, 40/50, 50/60, 60/70, 70/80 wpm. Inquire K4KHT, 4330 N.E. 13th St., Ocala, FL 32670.

ROTRON: Muffin, fans, series M, 747, 115 volt, 14 watt. Five dollars, UPS postpaid. John Savonis, 410 Blake Rd., New Britain, CT 06053.

WANTED: SBE, SB 450 transceiver, 450 MHz amplifiers. Pre-amps, and converters. Also Hand keys, 160 and 80 meter xtals. K8LJQ, 355 Mower Rd., Pinckney, MI 48169.

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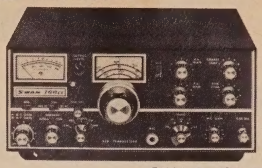
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WANTED: RCAF ATR-11 surplus scvr. Made by RCA, 2.4-6.7 mc. WW11. B. Shaw, VE6 AGH, 1726-18th Ave., S. Leth, Alt. Canada T1K 1C3.

ANTENNA TUNER inside Heath SWR. 3 parts. Palns $1. Free list of ham hear, photo, test, audio, DEC computer modules and peripherals. K2DCY, 11 Squire Hill, N. Caldwell, NJ 07006.

FOR SALE: Pos I check element 9 study guide for commercial license. $3. ppd. James S. Looney, Route 1, Box 260-A, Grundy, VA 24614.

WANTED: 500 to 1000 w. amplifier. 80-10 meters in good operating condition. Fred A. Wright, Jr., Rt. 11, Box 311A, Tyler, TX 75709.

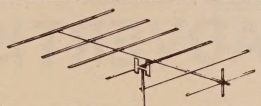
SELL: Mint Yaesu 200R synthesized 2 meter FM xcvr, NPC 104R AC/PS, 1/4 whip. Cost $515. $350 or best offer. R. Hajdak, 1644 Morris St., S.E., Mineral Ridge, OH 44440.

WANTED: Tempo DC supply and mobile HF antenna system/Genave portable battery pack. Will Roberts, WA4PSL, P.O. Box 907, Roseboro, NC 28382.

KENWOOD R599 operators manual and Eico 710 frid dip meter. Buy or copy and return. Tung Y. Lem, WA6ROJ, 5222 Coringa Dr., Los Angeles, CA 90042.

LINEAR BUILDERS—Send SASE for list of Goodies and Hi Power stuff. Mace, 8600 Skyline Dr., Los Angeles, CA 90046.

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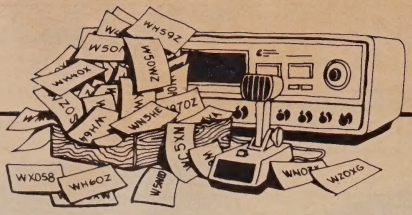
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FOR SALE: Old issues of Ham Radio, 73, QST, CQ. Some complete runs. Send s.a.s.e. for lists and prices. A. Dorhoffer, K2EEK, CQ Magazine, 14 Vanderventer Ave., Port Washington, NY 11050.

CAN ANYONE HELP? Need a 3RP1A CRT to repair my scope. Schultz, W4FA, US Consulate, Box "L", FPO New York 09544.

SACRIFICE: Drake T-4X, R-4B, Speaker-MS-4 with power supply, $595. Atlas 210X with console, $685. All in mint condition. Jose L. Bucksbaum, CB Mart, Box 5024, Conalville, IA 52241.

HW-202 w/built-in Sandlin scanner, crystals; ITC Multi-2000; Bearcat 101 Scanner. All in good condition. Karl Thurber, W8FX/4, 233 Newcastle Lane, Montgomery, AL 36117.

WANTED: Extra coils for SW-3 receiver. I have odd-ball coils and need your single extras to make up complete set. Buy or trade. Bill Orr, W6SAI, c/o Eimac, 301 Industrial Way, San Carlos, CA 94070.

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To speed information to you on products shown in CQ advertising, a new computerized Reader Service System has been designed. For additional information on a particular ad in this issue, tear out the Reader Service postcard bound between pages 72 and 73, and circle the numbers on the card which correspond with the Reader Service numbers listed in the advertiser's index below. DON'T CIRCLE THE PAGE NUMBERS! Fill in your name and address, and mail. We'll have your information on the way in short order.

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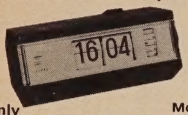
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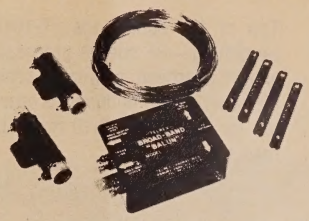
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Zero Bias *(from page 5)*

amateurs. Of course, they would have to sacrifice (or should I say, you would have to sacrifice) their classified ad department in *QST*. So what if you can't get rid of that extra piece of equipment. It's not that important that you get a chance to pick up a bargain and save some money. The classified ad department is still advertising and everyone would have to sign the Code of Ethics who wanted to use it. Then the League would have to use some sort of enforcement or informer network to make sure it was kept on the up and up. Too much trouble . . . might as well eliminate it to make things easier.

The Code of Ethics as presented by the ARRL is perhaps an over-reaction on their part to a more far reaching problem. As authored (by their Advertising Manager, Lee Aurick, W1SE) it is perhaps representative of their naive attitude towards real life situations and problems. As the FCC and the Government have not seen fit to step in and determine who can buy what or sell which in electronic equipment, does not automatically create a void that Mr. Aurick can quickly fill. He is neither the FCC nor the Government and he is certainly not Ralph Nader. We do not need protection at the cost of free choice and a free marketplace.

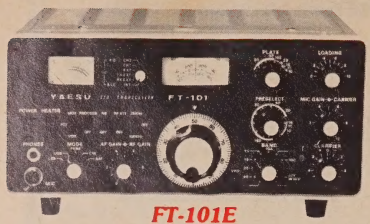
What we need to recognize is something that I have been writing about for months . . . demanding the monies to enforce existing legislation. If the 14,000,000 or whatever number of CBers wanted to buy amateur equipment and use it blatently . . . they could. Who's to stop them? Not the FCC. Not the Federal Government. Not *QST*. No one can stop them. But it's also interesting to note that these same great numbers of CBers haven't elected to buy amateur equipment in droves and pile onto the amateur bands. Maybe in time they might, but as of now they haven't. Now is the time to work for stricter enforcement of our real Laws not to give rise to a vigilante form of code which is really another form of censorship. We don't need blacklists, we don't need stigmas, we don't need an organization thinking for us instead of with us. We have one White House in Washington, we certainly don't need an annex in Newington.

I used to joke about the phrase "Today it's Newington, Tomorrow the world!" but it doesn't seem so far fetched now. The League's actions during this past year have been less than admirable. Starting with their ploy to gain control of amateur licensing from the FCC, right up through their abysmal handling of the RFI matter, at the Subcommittee on Communications hearings, at the FCC this past September. The League's irrational behavior of late makes me think that perhaps John Huntoon retired a little too early. I think it might be time for all League members to question where the leadership is taking them and what will it cost? It might also be a good time to see who can do the job netter. We need a League that works for us and truly represents its members. What we seem to be getting from Newington is despotism. Lets work to change that.

By the way, re-read or read for the first time the article on the Code Of Ethics which appeared in the November issue of QST. Sounds good doesn't it? Well, check their classified ads on page 166 of that same issue. If I'm not mistaken, isn't that an ad for CB linears about half way down?

73, Alan, K2EEK

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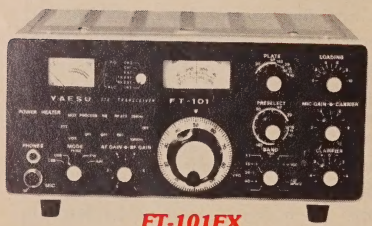
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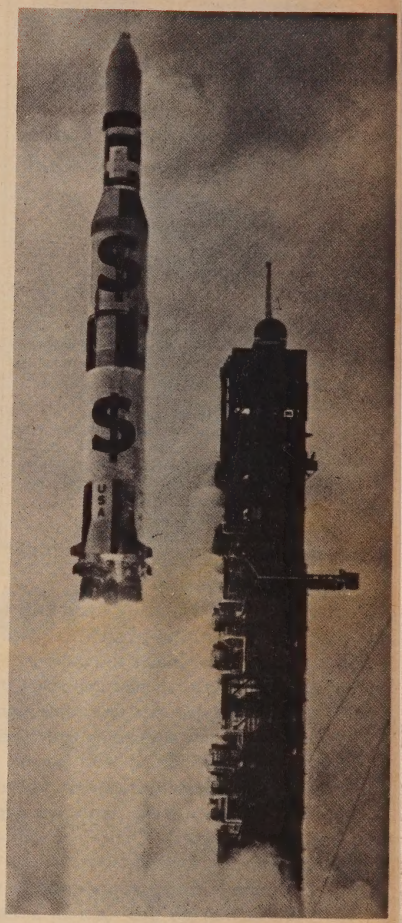
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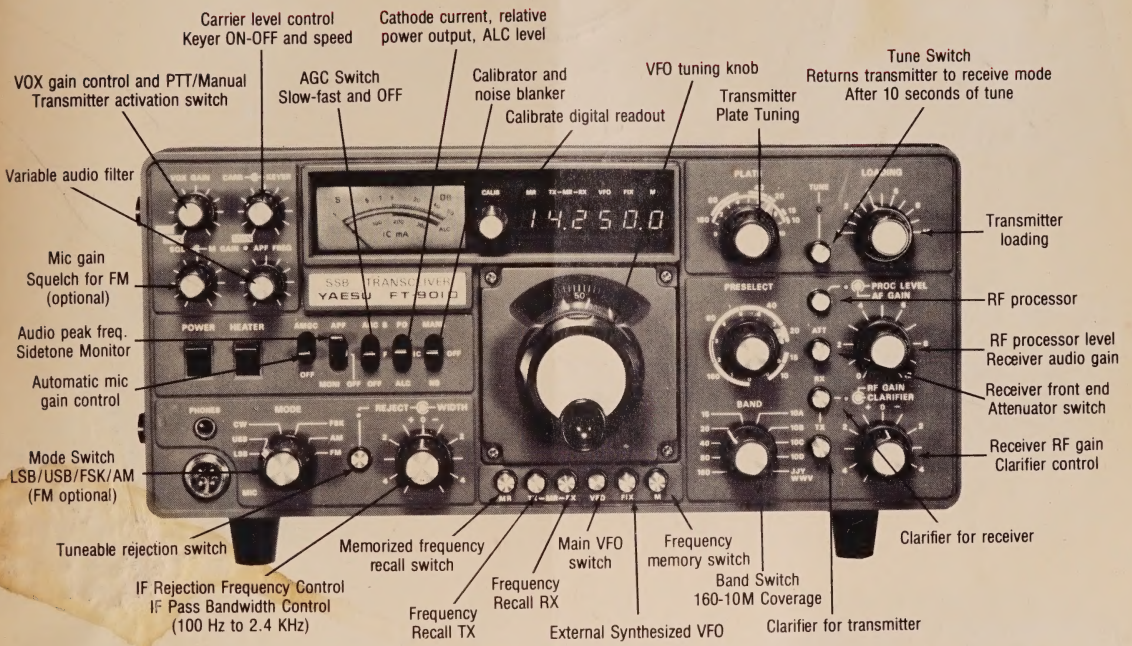
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