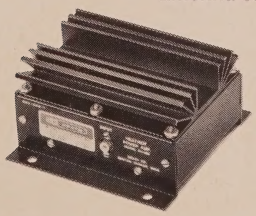

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The Radio Amateur's Journal

Put together the top-value Heathkit 2-meter package!



Add 40 watts of output

The Heathkit HA-202 2-Meter Amplifier works with any 2-meter exciter delivering 5-15 watts, while pulling a meager 7 amps from any 12 VDC system. No additional power supplies are required. All solid-state components mount on a single circuit board for easy two-evening assembly. Manual shows exact alignment procedures using a VOM or VTVM. Connnecting cable and antenna cable are included.



Kit HA-202,
4 lbs.
69.95*

HA-202 SPECIFICATIONS — **Frequency range:** 143-149 MHz. **Power output:** 20W @ 5W in, 30W @ 7.5W in, 40W @ 10W in, 50W @ 15W in. **Power input (rf drive):** 5 to 15W. **Input/output impedance:** 50 ohms, nominal. **Input VSWR:** 1.5:1 max. **Load VSWR:** 3:1 max. **Power supply requirements:** 12 to 16 VDC, 7 amps max. **Operating temperature range:** −30°F. to +140° F. **Dimensions:** 3″ H x 4¼″ W x 5½″ D.

Tune-up with maximum precision

The Heathkit VHF/SWR Bridge tests transmitter output in power ranges of 1 to 25 watts and 10 to 250 watts ±10% of full scale. 50 ohm nominal impedance permits placement in transmission line permanently with little or no loss. Built-in SWR bridge for tuning 2-meter antenna for proper match, has less than 10-watt sensitivity.



Kit HM-2102,
4 lbs.
29.95*

HM-2102 SPECIFICATIONS — **Frequency range:** 50 MHz to 160 MHz. **Watt-meter accuracy:** ±10% of full-scale reading.* **Power capability:** To 250 W. **SWR sensitivity:** Less than 10 W. **Impedance:** 50 ohms nominal. **SWR bridge:** Continuous to 250 W. **Connectors:** UHF type SO 239. **Dimensions:** 5¼″ W, 5¼″ H and 6½″ D, assembled as one unit.

*Using a 50 Ω noninductive load.

Start with the Heathkit HW-202 2-Meter FM Transceiver.

It's an all solid-state design that you can build and completely align without special instruments. And this compact little beauty gives you independent pushbutton selection of 6 transmit and 6 receive crystals. 10 watts minimum output. Will operate into an infinite VSWR without failure. And for the ultimate in convenience there's the optional tone burst encoder for front panel selection of four presettable tones. The HW-202 kit includes two crystals for set-up and alignment and simplex operation on 146.94; push-to-talk mike; 12-volt hook-up cable; heavy duty clips for use with temporary battery; antenna coax jack; gimbal bracket, and mobile mounting plate.

HW-202 SPECIFICATIONS — RECEIVER — Sensitivity: 12 dB SINAD* (or 15 dB of quieting) at .5 μV or less. **Squelch threshold:** 3 μV or less. **Audio output:** 2 W at less than 10% total harmonic distortion (THD). **Operating frequency stability:** Better than ±.0015%. **Image rejection:** Greater than 55 dB. **Spurious rejection:** Greater than 60 dB. **IF rejection:** Greater than 75 dB. **First IF frequency:** 10.7 MHz ±2 kHz. **Second IF frequency:** 455 kHz (adjustable). **Receiver bandwidth:** 22 kHz nominal. **De-emphasis:** −6 dB per octave from 300 to 3000 Hz nominal. **Modulation acceptance:** 7.5 kHz minimum. **TRANSMITTER — Power output:** 10 watts minimum. **Spurious output:** Below −45 dB from carrier. **Stability: Better than ±.0015%. Oscillator frequency:** 6MHz, approximately. **Multiplier factor:** X 24. **Modulation:** Phase, adjustable 0-7.5 kHz, with instantaneous limiting. **Duty cycle:** 100% with ∞ VSWR. **High VSWR shutdown:** None. **GENERAL — Speaker impedance:** 4 ohms. **Operating frequency range:** 143.9 to 148.3 MHz. **Current consumption: Receiver** (squelched): Less than 200 mA. Transmitter: Less than 2.2 amperes. **Operating temperature range:** −10° to 122° F (−30° to +50° C). **Operating voltage range:** 12.6 to 16.0 VDC (13.8 VDC nominal). **Dimensions:** 2¾" H x 8¼" W x 9⅞" D.

*SINAD = $\frac{\text{Signal + noise + distortion}}{\text{Noise + distortion}}$

Kit HW-202, 11 lbs., less encoder **179.95***

Kit HWA-202-2, Tone Burst Encoder, 1 lb. . . **24.95***

Kit HWA-202-1, AC Power Supply, 7 lbs. **29.95***

Kit HWA-202-3, Mobile 2-Meter Antenna, 2 lbs. **17.95***

Kit HWA-202-4, Fixed Station 2-Meter Antenna, 4 lbs. **15.95***

Order Crystal Certificates with your HW-202

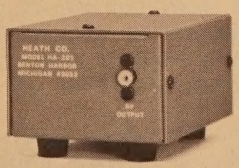
Crystal certificates are available directly from Heath Co., entitling you to the crystal or crystals of your choice. Your certificate will be sent to you postpaid. You fill in crystals desired, mail the certificate to the crystal manufacturer, who in turn will mail the crystals to you postpaid. All crystals meet rigid Heath quality standards to maximize performance from your HW-202.

HWA-202-6, one Transmit Crystal Certificate, postpaid **5.95***

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The new Heathkit HA-201 delivers up to 10 watts for a 1½ watt input...8 watts for 1 watt input...ideal for handheld, portable and mobile rigs. Completely automatic operation...all solid-state transmit-receive switching eliminates relays. Will withstand an infinite VSWR load without failure. Tuned input and output maximize efficiency and reduce spurious emissions. Assembly is a quick 1-2 hours. Operates from any 12-16 VDC supply, such as the HWA-202-1 or automobile battery.



Kit HA-201, 3 lbs., mailable **25.95***

HA-201 SPECIFICATIONS: Frequency Range: 143-149 MHz. **Power Output: (at 13.6 VDC input):** 8 W @ 1 W in; 10 W @ 1.5 W in. **Power Input (rf drive):** 1-3 W. **Input/Output Impedance:** 50 ohms. **Input VSWR:** 1.5:1 maximum. **Maximum Load VSWR:** Infinite. **Power Supply Requirements:** 12-16 VDC, 2.2 A maximum. **Dimensions:** 5⅛" L x 3⅝" W x 2¾" H. **Net Weight:** 1 lb.

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City_____ State_____ Zip_____

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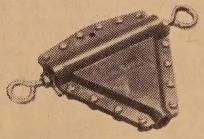
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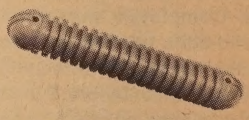
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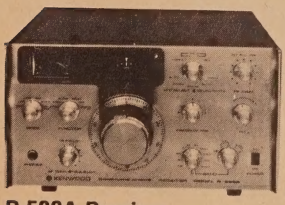


TS-520 Kenwood's go every place . . . do everything transceiver

The new TS-520 is the transceiver you have wanted, but could not buy until now. It is a non-compromise, do everything, go everywhere 5 band transceiver for SSB or CW that performs equally well at home, in an automobile, airplane, boat or trailer. The TS-520 features built-in AC power supply, built-in 12 volt DC power supply, built-in VOX with adjustable gain delay and anti-VOX.
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The R-599A is the most complete receiver ever offered. It is solid state, superbly reliable, small and lightweight, covers the full amateur band . . . 10 thru 160 meters, CW, LSB, USB, AM, AM.N and FM.
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The T-599A is mostly solid state . . . only 3 tubes, has built-in power supply, full metering (ALC, Ip. RF output & high voltage), CW-LSB-USB-AM operation.
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T-599A Transmitter

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Message from the Publisher

This issue of CQ contains the smallest number of total pages we've run for many years. At the same time, the subscription rates have been raised approximately 25 per cent. On the surface, this might appear quite paradoxical, but the underlying reasons are quite simple.

The Amateur Radio industry is far from booming; during the past decade we've watched dozens of old line equipment manufacturers withdraw from the market, and with them, many fine long-standing dealers and distributors. And paradoxical though it might seem, the industry is still too crowded for the amount of dollars that can be spent on ham equipment and accessories.

CQ is but one of four monthly publications serving the ham population, along with several other splinter publications catering to specific interests. There just aren't enough advertising dollars available to support all these magazines in an industry that's facing a business slow down. And the subscription and single copy sales don't offer a publisher enough income to cover the gap.

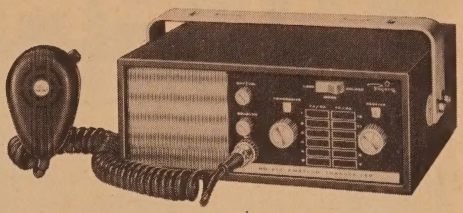
Therefore we intend to publish CQ on a basis that will keep the magazine self sufficient, not dependent on our other publications. We won't make a phony effort to indicate prosperity, where it just doesn't exist. Unfortunately, our overhead is far greater than that of the competition because we offer far more service than either Ham Radio or 73, and we don't enjoy the tax benefits, postal reductions or free editorial that's granted QST.

So CQ will continue to provide readers with the same high quality of editorial material with a few less total pages. We will no longer run free classified ads, and we will no longer offer subscriptions at a price below our cost. The increasing prices on paper, printing and postage make this no longer feasible.

The purpose of these economies is not to take unfair advantage of our readers. The object is simply to allow CQ to continue as a viable force in the amateur radio marketplace, and to do this we must reverse the economic trend. For those readers who subscribed only for the previously offered free classified ads, we'll refund subscription money if requested on a pro-rata basis. CQ will continue on a self-sufficient basis, and we hope you'll bear with us during these lean times.

Richard A. Cowan, WA2LRO
Publisher, CQ

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The Incomparable 12 Channel 2 Meter FM Transceiver

Here's an outstanding value that delivers 20 Watts of 2 meter FM power. The unique front panel mode switch enables predetermined or independent paired frequency operation. LOCK mode provides full 12 channel transceive on frequency pairings normally used in your area.

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OUR READERS SAY

Canada: Not Alone

Editor, *CQ*:

Though I love *CQ* with all my heart and transceiver, (I've even renewed once), I fear that I must inform you that you are in direct conflict with a resolution of the Continental Congress of June 14, 1777. In this act, it is clearly stated that the flag of the United States shall "be 13 stripes alternate red and white..." These 13 stripes represent the 13 original colonies, but it looks like my encyclopedia is wrong. From the July cover we had 15 colonies. But don't take it too hard, it's still a great magazine for a great hobby.

Scott M. Yost, WB8HSL
Kalkaska, MI

Good grief! How many more errors are our eagle-eyed readers going to detect in a single *CQ* cover? Well, that's the price we pay for a little artistic creativity. — Editor

Betty Crocker to the Rescue

Editor, *CQ*:

Talawanda High School has a very active amateur radio club. Both the school and many of our members subscribe to your magazine. At this time the club has no single side band gear in it's general class station. In order to defray the cost of purchasing such equipment the club is holding a coupon drive. We are seeking approximately 130,000 *Betty Crocker Coupon* units. These coupons are found on many *General Mills* food products and can usually be identified by a green border.

The drive has been approved by the school principal and General Mills. Our club would appreciate your magazine mentioning our efforts so that other hams across the nation can take part in this big task. Any coupons and requests for further information should be sent to this address:

Talawanda High School Amateur Radio Club
Talawanda High School
Oxford, Ohio 45056

Our club members have found your magazine to be most helpful and informative in the past and would like to thank you for it.

Matt Ziegler, WB8KZO
President

Hot Radials

Editor, *CQ*:

Bill Orr, W6SAI, on page 47 of the July issue of *CQ* Magazine in his continuing series on antennas says "If you have access to the roof, an antenna may be laid directly on the surface of the roof."

I am sure Bill didn't mean this literally, because the ends of radiators and resonant radials are extremely hot and are fire hazards.

I once had an old shingle roof catch fire where the end of a dipole was in contact with the roof. With QRP of course anything goes.

I enjoy the light-hearted style from the old pro.

Katashi Nose, KH6IJ
Honolulu, HI

CQ ALL DXERS

de W3KT QSL SERVICE

You need a DX QSL service—although you may not realize it!

What is a DX QSL Service?
A QSL service will take your DX QSLing off your hands by forwarding your QSLs to DX stations.

Why can't you do it yourself?
You can, if you have lots of time, money, and all the information on where to send the cards.

But why the W3KT QSL SERVICE?
W3KT has been running his QSL service for over 12 years. In the meantime other such services have come and gone, while W3KT QSL SERVICE keeps getting bigger all the time. There must be a reason.

What is the reason?
The W3KT QSL SERVICE has proven to be dependable and efficient. Handling QSLs is W3KT's full time activity. He is an active DXer. He has 351 countries confirmed and is tied for the top position on the CW/Phone DXCC Honor Roll. He has also earned 5 Band DXCC.

How does this service work?
You send the QSLs for your DX QSOs to W3KT. Do not address them. If the DX station has a stateside (or VE) QSL manager, your QSL will be sent to him with an SASE. The reply which comes back to W3KT will be passed along to your ARRL QSL Bureau. Other QSLs are sent to the foreign QSL Bureaus, or, if necessary, direct. The large volume of cards received makes it possible (and necessary!) to send out your cards promptly.

How much does it cost?
Twenty cards per dollar, if whole dollars are sent, and you need not send all 20 cards at the same time. For sums less than a dollar the rate is 6 cents per card. There is no membership fee.

Why don't you try this service?
Thousands of DXers use it.

W3KT QSL SERVICE
Box 66, Valley Hill Road,
Malvern, PA 19355

The Millen 2 KW Transmatch

Super Heavy-Duty

① Matches 10-300 ohm unbalanced loads to 50 ohm transmitter output, 80 through 10 meters (1300 ohms on 80 and 40).

② Handles the amateur legal power limit.

③ Built-in sensitive trough-line Reflectometer.

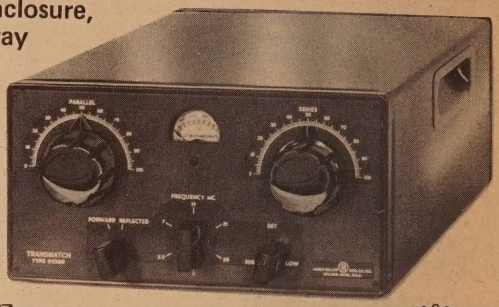
④ Tight-fitting copper plated enclosure, shielded meter, minimizes stray radiation.

⑤ Double-wiping dual break heavy duty band switch.

⑥ Low-level coax output for scope sampling.

⑦ Compact: 14" w. x 7" h. x 13 5/8" d.

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Announcements

El Paso, Texas

The El Paso, Texas Hamfest and Swapmeet will be held on Saturday and Sunday, October 12th and 13th, 1974. Seminars, fleamarket and prizes. For more information, contact WB5CMB, 7772 Gran Quivira, El Paso, Texas, 79904.

Gaithersburg, Maryland

The Foundation for Amateur Radio will hold its annual Hamfest at the Gaithersburg Fairgrounds Gaithersburg, Maryland, on Sunday October 20th 1974. There will be a fleamarket, exhibits, and many prizes. All events are indoors and parking is free. For information write or call Bill Miller, K4MM, 10919 Woodfair Road, Fairfax Station, VA 22039, (703)273-0112.

Hamilton, Ontario, Canada

On October 25, 26, and 27th 1974, the Hamilton Amateur Radio Club, Inc. will sponsor the R.S.O. Convention. It will take place in the Holiday Inn, Hamilton, Ontario, Canada. For registration forms, write: P.O. Box 836, Burlington, Ontario, Canada.

ST. Georges, Bermuda

The week of October 13th thru October 20th, 1974 has been proclaimed as Amateur Radio Week, throughout the Islands of Bermuda, by His Excellency The Governor. For more information write to The Radio Society of Bermuda, P.O. Box 275 Hamilton, Bermuda. Travel and lodging arrangements should be made through your local travel agent.

Orlando, Florida

The 1974 QCWA National Convention will be held in Orlando, Florida on October 25th and 26th at the Howard Johnson Florida Center. It is located at the intersection of Interstate-4 and S.R. 435. There will be prizes, exhibits and a banquet on October 26th. For more information, contact: Lew Sieck, 12270 4th St., East, Treasure Isle, FL 33706.

Manila, Philippines

On November 8th and 9th, 1974, the South East Asian Net Convention will be held in Manila. All interested Hams should write to DU-1-JO, P.O. Box 386 MCC, Makati, Philippines, for reservations and other inquiries.

Geneva, Switzerland

The International Amateur Radio Club in Geneva introduced, in 1964, a Special Award, having a scientific purpose: the CPR (Contributed to Propagation Research).

Since the processing of this voluminous data is progressing very slowly and the number of reports collected is sufficient for the purpose of our study, it has been decided to cease issuing the CPR diplomas, as from December, 31, 1974. Miroslav Joachim, OK1WI, President, I.A.R.C.

How to win the fist fight... with CW equipment from HAL.



The economical HAL 1550 keyer.

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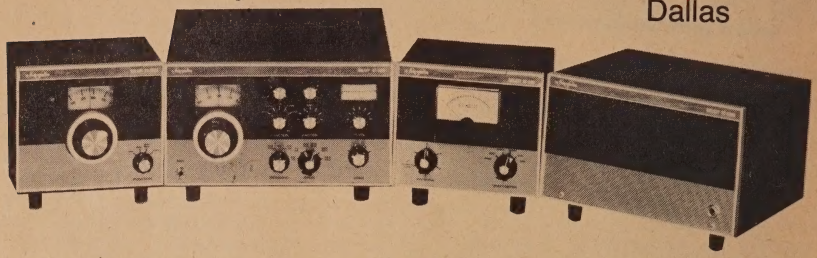
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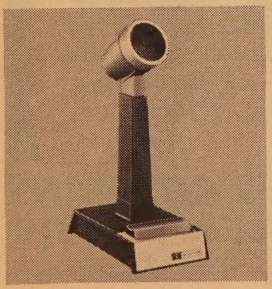
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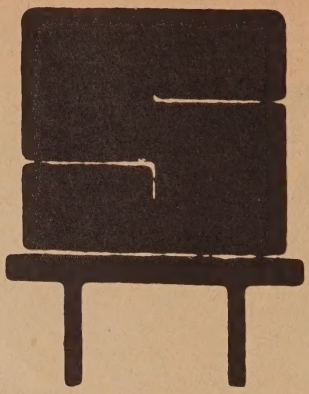
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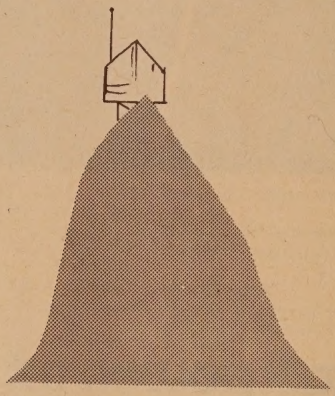
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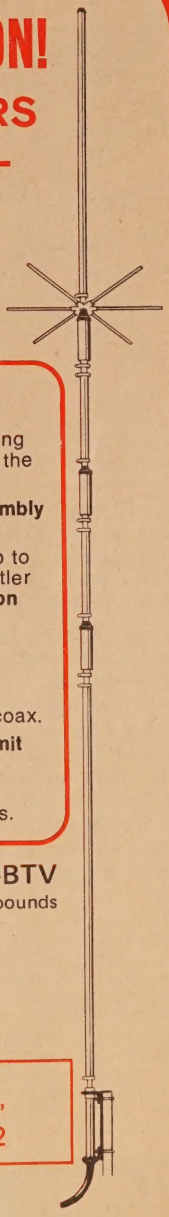
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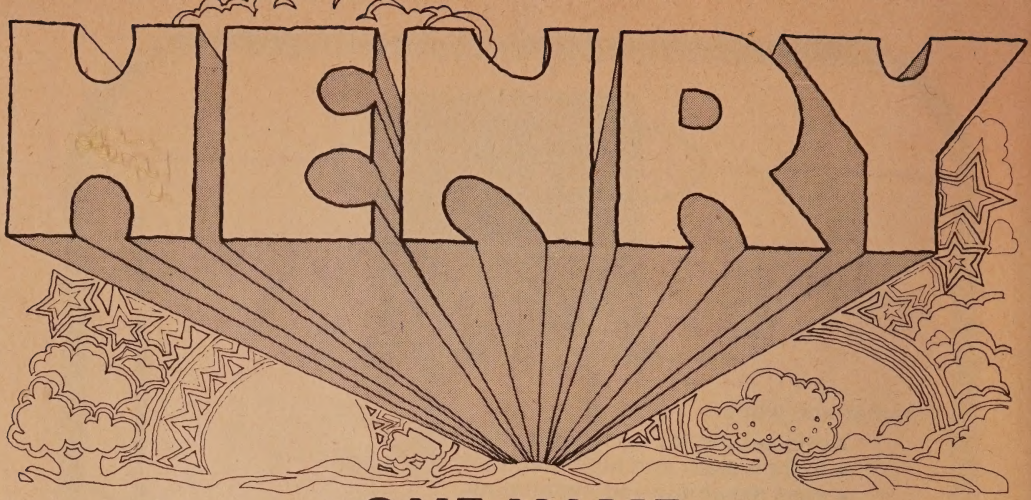
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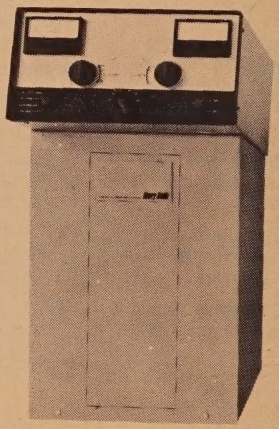
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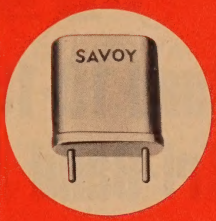
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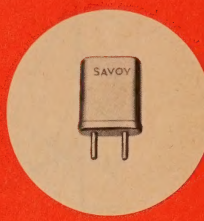
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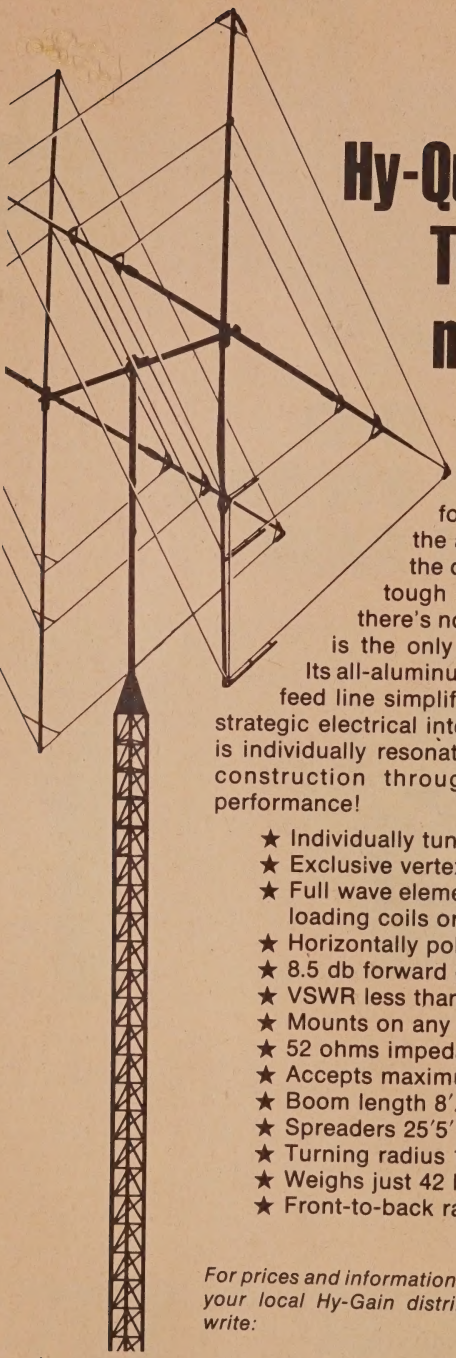
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OSCAR-7! Should Be In Orbit This Month!

BY GEORGE JACOBS,* W3ASK

ALTHOUGH always subject to last minute delays and schedule changes, it looks almost certain that the AMSAT-OSCAR 7 radio amateur satellite will be launched into space during late October most likely October 28, sometime between 1600 and 1800 GMT.

In late August, as this is being written, the satellite is fully assembled and is going through the required battery of tests and inspections in preparation for its launch. When this article appears in print, AO-7 should be sitting snuggly aboard a giant NASA Thor-Delta two-stage booster, waiting for its piggy-back ride into space from the Western Test Range in California, along with an ITOS weather satellite and a Spanish-built INTASAT scientific satellite.

AMSAT—OSCAR 7, which will be its designation once successfully in orbit, will have two repeaters aboard. One is similar to the very successful 2-to-10 meter repeater aboard OSCAR-6, but with twice the power. The other will repeat from 432 mHz-to-2 meters. There will be at least three beacon-telemetry-Codestore transmitters aboard, operating on 29.50, 145.980 and 435.100 mHz.

OSCAR-7's orbit is expected to be almost identical to that of OSCAR-6, but delayed by a half-period, or about 57½ minutes, so that the same tracking systems and methods may be used. It should cross the equator 28.75° further to the west every 115 minutes. Since OSCAR-6's 2-to-10 meter repeater is still functioning, this will be the first time that two radio amateur satellites will be in orbit and operating.

For the first day or two after launch, only OSCAR-7's 435.100 mHz beacon will be operating. This will permit the array of solar cells mounted on 90% of the satellite's eight illuminated surfaces, to properly charge the on-board batteries. Then it is planned to operate each repeater on *alternate* days, but on the *same* day of each week. This leaves a seventh day free each week for battery recharging, and for special experiments, but not for general communications.

Table 1 summarizes for ready reference the key points of both the OSCAR-7 and OSCAR-6 satellites. More complete details for working through the OSCAR-7 satellite are given in this article.

Table 2 gives the receive-transmit frequency relationships for each repeater aboard OSCAR-7 and OSCAR-6, and can be used for ready reference when working through either satellite.

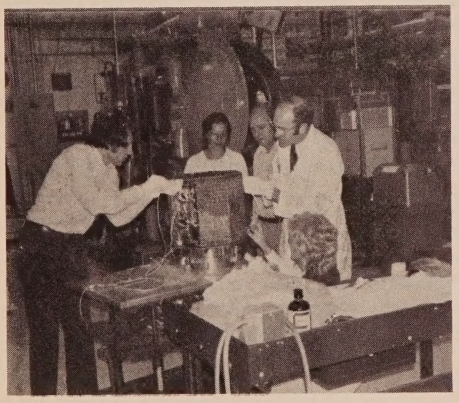
The actual countdown and an on-the-scene description of the launch of OSCAR-7 will be reported live from W6AB on 14240 kHz. It will also be relayed on the AMSAT net frequencies of 3850, 7280, 14280 and 21280 kHz, and by W1AW.

For several days prior to, and after launch, AMSAT information concerning OSCAR-7 will be exchanged daily on 14280 kHz beginning at 1800 GMT, and on 3850 kHz beginning at 0100 GMT. W1AW also plans daily information bulletins beginning in eary October.[1] Radio amateurs within range of Washington, D.C. can check the AMSAT 25-85 repeater for the latest information concerning OSCAR-7.

AO-7's Orbit

OSCAR-7's orbit is planned to be almost identical to that of OSCAR-6, close enough so that

*Space Communications Editor, *CQ*, 11307 Clara St., Silver Spring,MD 20902



The completely assembled OSCAR-7 satellite shown being prepared for a required pre-launch thermal vacuum test. From l.-to-r. are Project Manager Jan King (W3GEY), Karin Meinzer (XYL of DJ4ZC), Karl Meinzer (DJ4ZC) of AMSAT Deutschland, who were responsible for the 432 mHz-to-2 meter repeater, Dick Daniels (WA4DGU) builder of the 2-to-10 meter repeater, and AMSAT aerospace technician Marie Marr.

[1]See W1AW Schedule in *QST*, Aug. 1974, p. 94.

Satellite	Operating Mode	Uplink Passband mHz	Downlink Passband mHz	Function	Satellite Power Watts	Req'd Earth Stat'n Power Watts-ERP
OSCAR-6	ON	145.90-146.00	29.45-29.55	Repeater	1.0	100
"	ON		29.45	B,T,C[1]	0.10	—
OSCAR-7	A	145.85-145.95	29.40-29.50	Repeater	2.0	100
"	A		29.50	B,T,C[2]	0.25	—
"	B	432.125-432.175	145.975-145.925	Inverted Repeater	10.0	400
"	B&C		145.980	B,T,C[2]	0.20	—
"	C	432.125-432.175	145.975-145.925	Inverted Repeater	2.5	400
"	A&D		435.100	B,T,C[3]	0.40	—
"	A,B,C&D		2304.10*	B,T,C[4]	0.10	—

[1]Beacon, Morse Code telemetry and Codestore (c.w. mode).
[2]Beacon, Morse Code telemetry and Codestore (c.w. mode) and teleprinter telemetry (a.f.s.k., 850 Hz, 60 w.p.m.).
[3]Beacon, Morse Code and teleprinter telemetry, Codestore (f.s.k. mode, 850 Hz).
[4]Beacon, HI generator and Morse Code telemetry (f.s.k. mode, 170 Hz).
*If authorized by the FCC.

Table 1: Summary of key OSCAR-6 and OSCAR-7 communication parameters.

the same receiving, transmitting and tracking systems and methods can be used for each.

If the launch goes according to plan, OSCAR-7 will be at an altitude of approximately 910 miles, out of step with OSCAR-6 by a half orbit, or 57.5 minutes. From this height it will be able to "see" almost 2400 miles in all directions along the earth's surface. Stations as far apart as 4800 miles should be able to communicate through the new satellite, when it is within mutual radio range.

The satellite's inclination, or the angle at which its orbit will intersect the earth's equator, should be 101.77°. OSCAR-7 will intersect the equator twice during each orbit; once heading north, or ascending and once heading south, or descending. By definition, a new orbit begins everytime a satellite crosses the equator while heading north, or during its ascending node. The new satellite should complete an orbit every 115 minutes and cross the equator 28.75° further to the west with each successive orbit.

In the United States, the satellite should be within communication range for at least three successive descending orbits during the morning hours and three ascending orbits during the evening. It should remain within range for up to 20 minutes on nearly overhead passes.

Table 3 contains the daily initial, or reference orbits for OSCAR-6 for October, 1974. Because of the regularity and stability of this orbit, it is only necessary to keep adding 115 minutes and 28.75° to each equatorial crossing, to determine successive orbits for each day. See OSCAR-6 NEWS, *CQ*, Feb. 1973, p. 38 for examples for determining which orbits will be in communication range. Table 3 can be used to determine OSCAR-7's location by taking into account the difference between its and OSCAR-6's orbits. It is planned for OSCAR-7 to be a half orbit, or 57.5 minutes out of step with OSCAR-6.

AO-7's Hardware

The 2-to-10 meter repeater was designed by AMSAT, the Radio Amateur Satellite Corp. It operates in a linear mode similar to the one aboard OSCAR-6. S.s.b. and c.w. are the recommended operating modes. The repeater receives signals in a passband between 145.85 and 145.95 mHz, and re-radiates them between a corresponding linear passband of 29.40 to 29.50 mHz, with a power output of 2 watts, pep. A beacon, Morse Code telemetry and Codestore transmitter operates in a c.w. mode on 29.50 mHz, and it can be commanded to transmit teleprinter telemetry at 60 w.p.m. in a.f.s.k- 850 Hz shift.

The same equipment used to communicate through OSCAR-6 will be suitable for this new satellite. A sensitive communication receiver is required, with a preamplifier if possible, as well as a suitable 10 meter antenna. Since OSCAR-7 will be using a linearly polarized 10 meter an-

F_r is receive, or downlink frequency in mHz
F_t is transmit, or uplink frequency in mHz
F_d is Doppler shift, in kHz

OSCAR-6: $F_r = F_t - 116.456 + F_d$
where F_t is between 145.90 and 146.00 mHz F_d varies between ± 4.5 kHz

OSCAR-7: $F_r = F_t - 116.450 + F_d$
where F_t is between 145.85 and 145.95 mHz F_d varies between ± 4.5 kHz
$F_r = 578.1 - F_t + F_d$
where F_t is between 432.125 and 432.175 mHz F_d varies between ± 11.3 kHz

Table 2: Receive-Transmit frequency relationship for OSCAR-6 and OSCAR-7.

tenna, ground station antennas should preferably be circularly polarized. Linearly polarized receiving antennas can be used, but reception will be subject to a greater amount of fading.

The transmitting equipment required to work through the satellite's 2-to-10 meter repeater should be capable of about 100 watts of *effective radiated power*. To achieve this, it is operationally preferable to use a transmitter with an output power rating of about 100 watts, and a simple ground plane or turnstile antenna for 2 meters. This will eliminate the need for tracking the satellite which would be required if a lower power transmitter was used with a higher gain, but directional antenna.

The 432 mHz-to-2 meter repeater was assembled in Germany, and was supported by the western European radio amateur community. The repeater has an input frequency passband between 432.125 and 432.175 mHz, and a corresponding *inverted* output passband between 145.975 and 145.925 mHz. Upper sideband signals transmitted to OSCAR-7 on 432 mHz will be received in the 2 meter band as lower sideband. The relationship between input and output frequencies is such that a transmitted signal on 432.125 mHz will be repeated on 145.975 mHz, and similarly, a transmitted signal on 432.175 mHz will be repeated on 145.925 mHz. So it will be necessary to tune up the band from 432.125 mHz and down from 145.975 mHz.

The repeater will operate on either 10 or 2.5 watts p.e.p., determined by ground control. A beacon, telemetry and Codestore transmitter will operate on 145.980 mHz in a c.w. mode, and will also transmit teleprinter telemetry data at 60 w.p.m. in an a.s.f.k.- 850 Hz shift.

It will require an e.r.p. of about 400 watts to communicate through the 432 mHz-to-2 meter repeater. Satellite tracking will not be required if a transmitter with an output of 400 watts is used with an omnidirectional antenna. The use of lower output transmitters with higher gain directional antennas will require tracking the satellite.

S.s.b. and c.w. are the recommended operating modes for the 432 mHz-to-2 meter repeater.

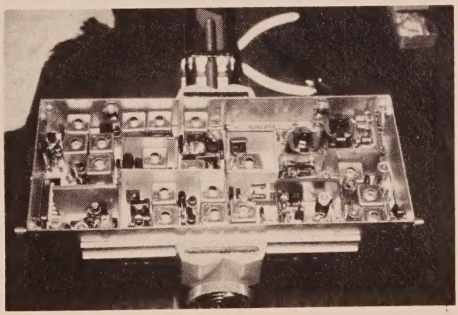
Doppler shifts will be noticed on signals received through either repeater. On 10 meters, the total shift may be as much as $\pm$ 4.5 kHz, while on 2 meters it will be as much as $\pm$ 11.3 kHz, so be prepared to crank the receiver's tuning control during a pass.

A Canadian-built f.s.k. beacon transmitter will operate on 435.10 mHz when the 2-to-10 meter repeater is in use, but not with the 432 mHz-to-2 meter repeater because of potential interference to uplink reception. It will relay back to earth Morse Code and teleprinter telemetry information, as well as Codestore, on command, all with a shift of 850 Hz.

If the FCC grants authorization, a fourth beacon transmitter will operate on 2304.1 mHz. Built by members of the San Bernardino Microwave Society in California, it will transmit "HI" in Morse Code followed by twenty seconds of continuous carrier for tracking and propagation observations. It can also be commanded to transmit Morse Code telemetry. This beacon is designed to operate on f.s.k., with 170 Hz shift. The FCC has not yet given the green light for its operation, since it is not in a band allocated to the amateur satellite service.

Telemetry will be transmitted from OSCAR-7 by both Morse Code and teleprinter. The Morse Code telemetry format is identical to that transmitted from OSCAR-6. The system makes 24 separate measurements aboard the satellite. Each analog measurement is converted into a two-digit Morse Code number or "word." A third digit precedes the telemetry value and gives the line number in which the word is located. Format is arranged four words to a line, with six lines per telemetry frame. Each telemetry frame is separated from the next by the "HI" identifier. The Morse Code rate is commandable to either 10 or 20 w.p.m. Morse Code telemetry will be transmitted on the 29.50 and 145.980 mHz beacons as c.w., and on the 435.10 mHz beacon as f.s.k. with 850 Hz shift. If authorized by the FCC, it can also be transmitted on the 2304.10 mHz beacon as f.s.k., with 170 Hz shift.

Sixty channels of data will be monitored and encoded by a teleprinter telemetry system designed and built by radio amateurs in Australia. Each analog reading is converted to a three-digit number transmitted in Baudot Code. Each three-digit value is preceded by a two-digit channel number, making a five-digit telemetry "word." The data is arranged 10 words per line, and there are six lines per telemetry frame. Between each frame are two lines of digital data which provide information on the spacecraft clock and command status. Each line is followed by a carriage return, line feed and figures signal, in order to keep the printer in upper case. Transmission speed is 60 w.p.m. Teleprinter



A close-up view of OSCAR 7's 2-to-10 meter repeater module undergoing final testing before assembly. It was built by AMSAT under the direction of Dick Daniels, WA4DGU.

telemetry will be transmitted, on command, on the 29.50 and 145.980 mHz beacons as a.f.s.k., with 850 Hz shift. It will key the 435.10 mHz beacon with f.s.k. modulation, 850 Hz shift, at 45.5 Baud. It may be necessary to reverse the mark and space tones at the receiving station to receive the a.f.s.k. telemetry transmissions.

Write directly to AMSAT[2] for more complete details concerning both the Morse Code and teleprinter OSCAR-7 telemetry systems, including decoding information and reporting forms.

OSCAR-7 also contains a CODESTORE unit similar to the one operating on OSCAR-6. Upon command, it will load, store and forward messages on beacon transmissions at a speed of 13 w.p.m.

AO-7 Operating Modes

With the array of equipment aboard OSCAR-7, it will be necessary to very carefully determine what will be operating when, in order to avoid interference.

Mode A—is the operation of the 2-to-10 meter repeater and the 29.50 and 435.10 mHz beacons.

Mode B—is the high power operation of the 432 mHz-to-2 meter repeater, and the 145.98 mHz beacon.

Mode C—is the low power operation of the 432 mHz-to-2 meter repeater, and the 145.98 mHz beacon.

Mode D—is the battery recharge mode. Only the 435.10 mHz beacon will remain in operation while solar cells recharge the satellite's battery system.

If the FCC grants authorization, the 2304.1 mHz beacon can be operated in Modes A, B, C or D.

The satellite will normally operate in either Mode A or Mode B. An internal timer in the spacecraft generates a pulse every 24 hours which will cause the satellite to switch between these two modes. The timer will be set by ground control so that the mode change can be made at approximately the same time each day. Each repeater will be operational on alternate days, but always on the same days each week. This allows one day each week for taking the satellite out of general service, during which time it can be recharged, or used for special experiments. If for any reason the power on the satellite should drop below a predetermined level, operation will automatically switch to Mode D.

FCC Operating Waivers

AMSAT has been issued a special license for OSCAR-7, with the call sign W3OHI. This is the first time that a call has been assigned to a station in the amateur satellite service. Requirements for station identification (Sec. 97.87) were waived to the extent that only the last two letters, "HI," of the call need to be transmitted periodically by the satellite. The license is for a five year period, which represents the longest FCC authorization yet received for an amateur satellite.

Other rules that have been waived by the FCC to permit communicating through OSCAR-7 are:

Sec. 97.43:—The requirement for every amateur radio station to have one land location was waived.

Sec. 97.61:—Any mode of emission authorized on uplink frequencies may be retransmitted on the downlink.

Sec. 97.7 and 97.79:—Any transmissions to the satellite may be retransmitted by the satellite without regard to operator frequency privileges on the satellite's downlink frequencies. This will allow Technician Class licensees to use the 2-to-10 meter repeater.

Sec. 97.117 and 97.123:—Telecommand stations authorized by AMSAT may transmit coded telecommand signals to the satellite, without identifying their transmissions.

The Commission also authorized the use of the uplink passband between 432.125 and 432.175 mHz for the 432 mHz-to-2 meter re-

[2]AMSAT, P.O. Box 27, Washington, D.C. 20044

Date Oct.	Orbit #	Time GMT	Equator Crossing West Long. Degrees
1	8958	0111	65.7
2	8970	0011	50.7
3	8983	0106	64.4
4	8995	0006	49.4
5	9008	0101	63.1
6	9020	0000	48.1
7	9033	0055	61.8
8	9046	0150	75.6
9	9058	0050	60.6
10	9071	0145	74.3
11	9083	0045	59.3
12	9096	0140	73.0
13	9108	0040	58.0
14	9121	0135	71.7
15	9133	0035	56.7
16	9146	0130	70.4
17	9158	0030	55.4
18	9171	0125	69.2
19	9183	0025	54.1
20	9196	0119	67.9
21	9208	0019	52.9
22	9221	0114	66.6
23	9233	0014	51.6
24	9246	0109	65.3
25	9258	0009	50.3
26	9271	0104	64.0
27	9283	0004	49.0
28	9296	0059	62.7
29	0309	0159	76.5
30	9321	0054	61.5
31	9334	0149	75.2

Period: 115 Minutes
Inclination: 101.77 degrees
Equator Crossing: 28.75 degrees further to the west with each successive orbit
OSCAR-7 is expected to have the same orbital characteristics but is planned to be a half period (57.5 minutes) out of step with OSCAR-6.

Table 3: OSCAR-6 Initial or Reference Orbital Data-October, 1974.

NEW HT-144B

TWO METER F.M. PORTABLE



CRYSTAL SOCKETS INCLUDED ! .35 uV SENSITIVITY OR BETTER !
IMPROVED TRANSMIT AUDIO ! .25 SQUELCH SENSITIVITY !
UP TO 6 KHZ DEVIATION ! F.C.C. TYPE APPROVAL PENDING !

IMPROVED INSTRUCTION MANUAL !

KIT ONLY $129.95 COMPLETE less batteries
AND for a limited time only we will furnish
ONE SET OF CRYSTALS FREE !
Your choice of 94-94; 52-52; or 34-94

IT'S AN EVEN BETTER BUY NOW ! ! ! ! ! ! ! !

ACCESORIES: "Rubber Duckie" Antenna (BNC Connectors) $12.95
Nicad Batterie Charger ..... $ 4.95
Sealed 12 v Nicad Battery Pack $29.95

Please include $1.00 for Shipping and Handling - N.Y.S. residents add sales tax

Your BANKAMERICARD welcome here

VHF ENGINEERING
– DIV. of BROWNIAN ELECT. CORP. –
320 WATER ST. POB 1921 BINGHAMTON, NY 13902 607-723-9574

peater, although this range of frequencies is not in the band allocated to the amateur satellite service.

The Commission, in a separate action, also extended the same rule waivers for the OSCAR-6 satellite for another four years.

OSCAR-8

While OSCAR-7 may not yet be off the pad, AMSAT is getting ready to manage the design and construction of what eventually will become OSCAR-8.

It's much too early for details, but you can bet that OSCAR-8 will be bigger and better, and will serve more radio amateurs, than any previous OSCAR satellite—and it will cost considerably more to build.

Bill Eitel, WA7LRU/W6UF, and Herb Hoover III, W6APW, have generously offered to match, dollar-for-dollar up to a total of $25,000, donations to the ARRL Foundation which are earmarked for use in the amateur satellite program. Funds are urgently needed to support the construction of this new satellite, which is estimated will cost on the order of $100,000.

Radio amateurs everywhere are urged to support this amateur satellite program with a financial contribution, while matching funds are still available. In the USA, contributions to the ARRL Foundation are tax deductible under Sec. 170 of the IRS Code. Contributions, however small, should be sent to:

The ARRL Foundation, Inc.
225 Main Street
Newington, Conn. 06111

Like all of the radio amateur satellites that preceded it, OSCAR-7, in a very real way, belongs to radio amateurs *everywhere*. It is an *open* satellite, *freely* available to all radio amateurs on an equal basis. By mid-1974, for example, more than 2400 radio amateurs representing a total of 86 different countries in all corners of the world, had already succeeded in communicating through OSCAR-6, and a considerably greater number are expected to make use of OSCAR-7.

The OSCAR-7 satellite represents the coordinated efforts of radio amateurs throughout the world. Its subsystems were developed by amateur groups in the USA, Australia, Canada and Germany. The overall project was managed by the Radio Amateur Satellite Corp. (AMSAT), a non-profit organization of more than 1400 radio amateurs and interested non-amateurs, from 56 different countries of the world.

Learn more about how you can participate in this exciting new frontier of amateur radio through membership in AMSAT by writing to Membership Committee, AMSAT, P.O. Box 27, Washington, D.C. 20044 USA.

STAND BY FOR THE EXPECTED LAUNCH OF OSCAR-7 BETWEEN 1600 AND 1800 GMT ON OCTOBER 28. ■

antennas

BY WILLIAM I. ORR,* W6SAI

PENDERGAST hung up the telephone with a sigh and rubbed his ear.

"Who were you talking to?," I asked. "You've been on the pipe for over an hour. I drove over here to see if your line was out of order."

Pendergast sighed again. "That was Hardcore pounding my ear. That guy is continually enmeshed in antenna problems. He got beat out on 40 meters trying to work Kingman Reef. He's fit to be tied."

"Poor operating habits," I replied. "A friend of mine worked Kingman with 10 watts and an indoor dipole on 40 meters."

"Well," replied Pendergast crossly, "that wasn't *me*. I missed him on 40 meters, too. Just couldn't cut the QRM. I guess both Hardcore and I need 40 meter beams. Do you have any designs for a compact 40 meter beam, about as big as a 10 meter beam, and with 10 decibels gain and 50 decibels front-to-back ratio?"

*48 Campbell Lane, Menlo Park, CA 94025.

"Not yet," I laughed. "Remember my beam antenna theory: the gain and effectiveness of a beam antenna is proportional to the size and to the time and trouble it takes to erect it."

"That sounds like the v.h.f. man's theory: if the antenna doesn't come down in a storm, it isn't big enough!," replied Pendergast.

"Right," I said. "However, to get back to Hardcore's problem, I suggest that he should think about a compact, two-element 40 meter beam. The crux of the problem, of course, is how 'compact' is compact? How much can you 'shrink' a beam before it becomes merely a toy? I've seen some pretty small beam designs that are extolled as being effective, but when the chips are down, they don't perform as well as a dipole.

"Problem is, the radiation resistance of a full-size two or three element beam is only 20 to 25 ohms at best. When you start reducing the size of the beam by introducing loading coils, the radiation resistance drops rapidly. While I've seen no information on the reduction of radiation resistance for miniature beam antennas, I do know that reducing the size of a vertical antenna by one-half drops the radiation resistance by two-thirds. An eighth-wave vertical antenna, then, has a radiation resistance of about 10 ohms, as compared to 35 ohms for a quarter-wave vertical."

"Do you think the same reduction factor applies to a beam antenna?," asked Pendergast.

"Well, perhaps not exactly," I replied, "But the reduction factor is of the same order of magnitude. If so, a half-size two or three element beam has a radiation resistance in the neighborhood of seven to eight ohms."

"Nonsense!," replied Pendergast. "Most minia-

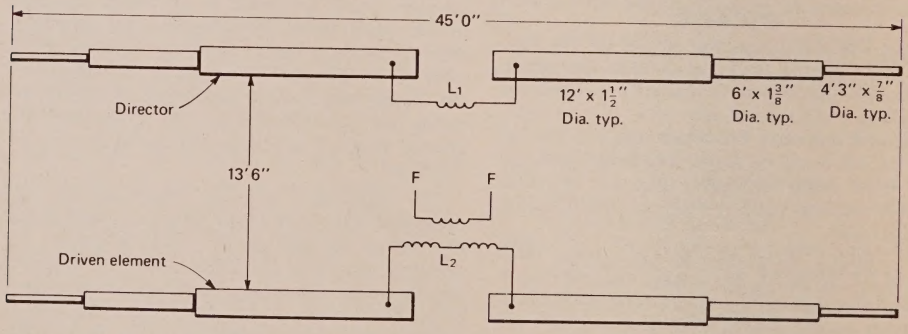


Fig. 1—Electrical layout of compact 40 meter beam. This center loaded beam provides good front-to-back ratio and about 4 db power gain over a 100 kHz segment of the band. Director and driven element are equal lengths. Coil L_1 has 12 turns of #10 enamel wire or 3/16" copper tubing, 2½" diameter and about 4" long. Coil L_2 has 14 turns of # 10 enamel wire, or copper tubing, 2½" diameter, with a one-inch gap at the center. Coil is about 5" long. The 4 turn link is tightly coupled at the center of the coil. The link is #10 insulated house wire. Elements are telescoping, with shims used as necessary to provide tight, rugged joints. Hose clamps, or similar devices should be used at each joint. The boom (not shown) is a 14' section of 3" diameter aluminum irrigation pipe, or equivalent. The coils are mounted on ceramic standoff insulators and connection to the elements is made with copper strap. The beam is fed with a 50 ohm coaxial line at points F-F.

ture beams provide a very good match to a 50 ohm coaxial line."

"You forget the miniature beam uses loading coils or other devices to establish resonance," I countered. "Loading coils can be very lossy, and the loss resistance must be added to the radiation resistance to give a true picture of the feed point resistance of the beam. The loss resistance can be as high as, or higher than, the radiation resistance. Most of the applied power is used up in warming the loading coils. You have to be very careful to design high-*Q* loading coils for *any* miniature beam, otherwise the miniature beam will exhibit signal loss, instead of signal gain."

Pendergast paused as I pulled a photograph and a drawing out of my brief case. "Here's a good design for a compact 40 meter beam that you can pass along to Hardcore (fig. 1). It is a center-loaded beam that provides good front-to-back ratio and about 4 decibels power gain. It is a rugged beast, and only a little larger than a typical triband beam. Best of all, it is easy to construct and adjust and won't come down in a storm, if it is properly built."

I pointed to the drawing. "A beam antenna of this design was used by Project Oscar station W6EE for their 40 meter RTTY schedules a few years ago. Anyone who heard the W6EE signal on the east coast, and in Europe on 40 meters can tell you that this beam has real punch!"

Pendergast studied the drawing as I continued, "The beam is built on a 14 foot long boom made of 3-inch diameter aluminum irrigation pipe. Each element is insulated from the boom and loaded at the center with a high-*Q* loading coil. The elements are broken at the center and an insulating plug is used to hold the halves together. The W6EE design used a piece of fibreglass tubing as the center insulator, but any material such as hard wood, micarta or the like can be used, as long as it does not absorb water.

"Each element is 45 feet long. The inner sections are 1½" diameter tubing, the next sections are 1⅜" diameter and the tips are ⅞" diameter. This makes a surprisingly rigid element that doesn't have much sag to it."

"You say both elements are the same length?," asked my friend. "How, then, good Sir, does this device act as a beam?"

"The elements are resonated to the proper frequencies by means of the center loading coil," I replied. "The director coil has 12 turns and the driven element coil has 14 turns. Each coil is 2½" in diameter and about 4" long. Number 10 wire is used for the coils, which are air-wound.

"The coils are mounted on 3" high standoff insulators and connections are made from the coil to the element with ½" wide copper straps. Each strap is 5" long."

Pendergast scribbled furiously away in his notebook, as I continued. "The driven element coil has a one-inch space at the center, and a 4 turn link is placed in this gap. The link is directly attached to the 50 ohm coaxial transmission line. The link is wound of #10 insulated house wire and is positioned so that it falls neatly inside the space in the center of the coil."

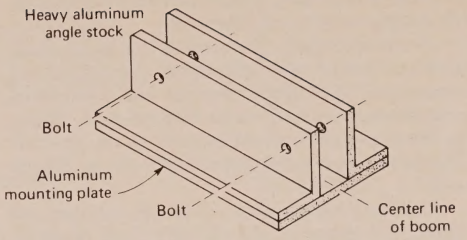


Fig. 2—Mounting bracket for beam. An aluminum "cradle" can be assembled out of a flat aluminum sheet and two pieces of heavy aluminum angle stock. The pieces are held together with heavy bolts. The boom fits snugly between the plates and is held in position with two bolts passed through the boom. The aluminum plate can be fastened to the support structure by conventional means. When the bolts are withdrawn, the boom may be slid back and forth in the cradle so that the operator may make adjustments to either the driven element or the director. A safety strap may be passed over the cradle to hold boom in horizontal position.

After a pause, Pendergast inquired, "Is that all?"

"That's all," I replied. "The usual details of mounting the elements to the boom, and the boom to the mast I leave to your imagination."

"Hold on!", shouted Pendergast. "How do you adjust the beam?"

"The beam should be on the tower, or at least in the clear, and elevated 20 or 30 feet above the ground. The director is self-resonant about five percent higher in frequency than the chosen design frequency. The operational bandwidth of the beam is about 100 kHz; fifty kHz either side of the design frequency. The SWR on the transmission line is less than 2 over these limits. If, for example, your design frequency is 7250 kHz, the director element is self-resonant at approximately 6890 kHz. The turns on the loading coil are expanded or compressed until this frequency is achieved."

"How do you determine this adjustment," asked Pendergast.

"With a grid-dip meter," I said. "Listen to the grid-dip meter in a nearby, well calibrated receiver. Couple it lightly to the loading coil of the director and tune for the resonance dip. Note the frequency of the dip on the receiver. If you do this carefully two or three times, you can estimate the resonant frequency of the director within two or three kilohertz. Adjust the coil—or the element length—until resonance is achieved."

"And the driven element?," asked Pendergast, scribbling away in his notebook.

"Same technique. The coaxial line is removed, and the center coil adjusted to the design frequency of 7250 kHz. Then the line is attached and the beam hoisted to its final position. Minor adjustment can be made by moving the position of the link coil with respect to the main loading coil."

"And how do you make these foxy adjustments when the beam is atop a fifty foot tower?," demanded Pendergast.

"That's one of the prices you must pay for a good, compact beam that *works,*" I replied. "If you don't want to adjust it, why don't you go out and buy a pre-adjusted beam?"

Pendergast did not reply, so I continued. "One way of adjusting the elements for resonance is to make the boom-to-mast joint adjustable. Look at fig. 2. By removing two bolts, the boom can slip back and forth in a collar. You want to adjust the director? Fine, pull the bolts, and slide the boom in, bringing the *director* close to the tower. You want to adjust the driven element? pull the bolts and slide the boom out, bringing the *driven element* close to the tower.

As I closed my brief case, I said, "Don't forget to get this baby up in the air. A half-wavelength on 40 meters is about 70 feet. If this beam is much lower than that, you won't get maximum performance out of it."

"Hardcore has a 72 foot crank-up tower," replied Pendergast. "He can put the beam on when the tower is cranked down to 22 feet, then run it up to full height. He'll blow your head off when he gets this working!"

"Before I leave, I want to show you a drawing of the great antenna installation that W6CYL has on his mobile home. This is a real clever answer to a tough problem (fig. 3).

"Bob has a sixty-foot mobile home in a classy trailer park. And the owner doesn't permit any ham antennas! In fact, the owner of the park is ex-Navy and he can spot a ham antenna a mile away. Well, Bob is ex-Marine, and he doesn't take any static from a Navy man, so he's on the air with a disguised antenna installation that is a real winner! The owner of the trailer park allows TV antennas, since there's no cable TV. So Bob disguised his ham antenna to look like a TV installation. In fact, that's what it is! Look at this."

I waved the photograph under Pendergast's nose. "Observe the twenty foot mast with a v.h.f. and u.h.f. TV stack at the top. Observe the black box under the antennas. That looks like a TV rotator, but it is a decoy, made of aluminum and wallboard, and has a balun inside it for the ham antennas."

"Where are the antennas," asked Pendergast. "Does Bob use the mast for a vertical?"

"No way," I replied. "He tried that, but had too much TVI. So he uses the guy wires. There are four top guys, each one runs to a corner of the mobile home. Two of the guy wires form a 20 meter dipole and two of them form a 40 meter dipole. And two of the lower guy wires form a 10 meter dipole. The 40 and 20 meter dipoles are connected in parallel at the feedpoint and are fed through the balun. The 10 meter dipole has no balun, but is fed directly with a separate coaxial line."

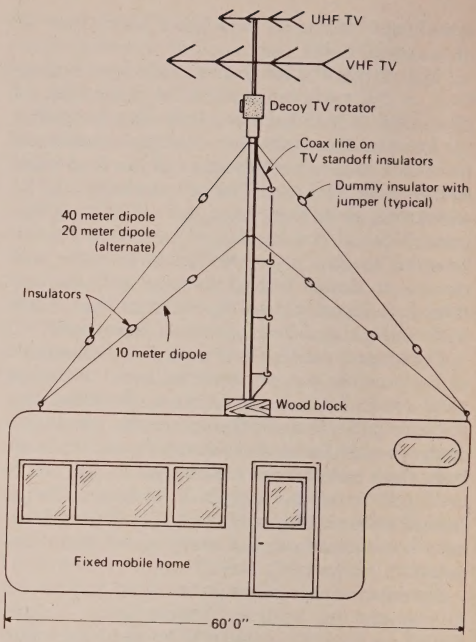


Fig. 3—The Mobile Home Antenna installation of W6CYL. No ham antennas allowed in this classy trailer park, but TV antennas are OK! So W6CYL made his TV installation into ham antennas for the hf bands. See text for construction details.

"But they can't be dipoles," protested Pendergast. "The guy wires are all broken up with egg insulators!"

"Ah, yes," I replied. "But all of the egg insulators are *decoys,* except the ones at the end of the dipoles. The antenna wire merely passes *through* the phoney egg insulators and continues on its way."

"So the guy wires are the dipoles," exclaimed Pendergast.

"Right. Bob has trimmed the 40 meter dipole so it also works on 15 meters, on the third harmonic. The feedlines for the antennas, and for the TV antennas as well, are brought down the mast on standard eye bolts. The whole works looks like a TV installation, even to the dummy rotator atop the mast.

"And to add insult to injury, Bob uses the plumbing system for a ground and then loads the

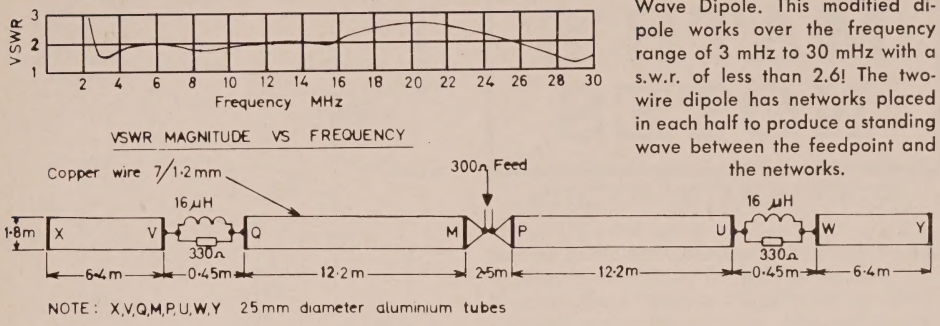


Fig. 4—The Australian Travelling Wave Dipole. This modified dipole works over the frequency range of 3 mHz to 30 mHz with a s.w.r. of less than 2.6! The two-wire dipole has networks placed in each half to produce a standing wave between the feedpoint and the networks.

dipoles on 80 meters! He ties the braid to the center conductor at the bottom end of the feedline and, in conjunction with a loading coil, works the 40 meter dipole as a top-loaded antenna on 80 meters! The feeline does most of the radiating, and the dipole merely acts as top loading."

"How about TVI on 80 meters?," asked Pendergast.

"Bob says he has a slight herringbone on his own TV set, but his next door neighbor reports clear reception."

"Amazing," said Pendergast," especially since the TV down lead is within inches of the 80 meter radiator!"

"Yes, it is," I admitted." Bob has a high-pass filter on his TV set, and a low-pass filter on his transceiver. So he is pretty clean. But he can work all bands from 80 to 10 meters. And do you know what?"

"What?," breathed Pendergast.

"To top it all off, Bob uses the v.h.f. TV antenna for 2 meters and works into all the local repeaters!"

"How does he do that?," asked Pendergast. "The TV antennas are horizontally polarized!"

"Who knows?," I replied. "All I know is that everything *works*, and Bob is on the air, under the very nose of the ex-Navy trailer park owner, who makes formal, white-glove inspection every day!"

The woods are full of clever people," said Pendergast. "And now I have one for *you*. Bet you never saw *this* antenna!" He dropped a magazine in my lap. It was the April, 1974 issue of *Amateur Radio*, of the Wireless Institute of Australia.

"The antenna was described at the August, 1973 Convention of the Institute of Radio and Electrical Engineers in Melbourne, and the article in *Amateur Radio* is a summary of the IREE paper given by Dr. R. Guertler and G. Collyer of the Antenna Engineering Company of Australia."

I looked at the drawing (fig. 4). "I'll be damned," I said. "This is a broad band dipole that covers 3 to 30 mHz! Fantastic!"

I read from the article:

"The dipole was designed for short-haul h.f. communication systems and is supported in a horizontal position between two masts. The feed point impedance provides a good match to a 300 ohm balanced line, or may be matched to a 70 ohm coaxial line by means of a balun."

"Go on," said Pendergast. "What does it say about the networks?" I continued:

"Firstly, there is a 12.1 meter (39.7 feet) length of two-wire line spaced 1.8 meter (5.9 feet) by means of two 25 mm. (1") diameter aluminum tubes. The wire is 7 strands of 1.2 mm. diameter copper. A tapering section of 1.25 meters (4.1 feet) brings the wires together at the feed point. At the other end of the open wire section there is a network which connects to another section of open wire line 6.4 meters (21 feet) long. The network consists of a 16 μH inductor in parallel with a 330 ohm resistor and takes up a length of 0.45 meter (1.4 feet, including connections). Overall the antenna is 40.6 meters (133.25 feet) long."

"What about the network?," asked Pendergast, nervously chewing on a pencil.

I continued:

"It was found that neither the value of the 330 ohm resistors nor that of the shunt inductors was very critical. The shunt inductor has a small effect on s.w.r. at the lower frequency end. However, reduction of the resistance to 150 ohms caused the s.w.r. to fluctuate considerably with frequency. The taper sections were required to reduce shunt capacity between spreaders M and P. Reducing the length of this section produced an increase in s.w.r."

"Wow!," said Pendergast. This looks like the long-missing all-band antenna. Imagine, this antenna can work on all ham bands between 80 and 10 meters, and all frequencies in between! Feed it with a 70 ohm line and a 4 to 1 balun! You've got it made!"

He gathered up his belongings and made a rush for the garage workshop. ■

* * *

W6SAI note to readers: I would be interested in hearing from any experimenters who try out this unique antenna design. No additional information, other than that in this column, is available at the present time.

MATH'S NOTES

BY IRWIN MATH,* WA2NDM

LAST month we learned a little about field effect transistors (FET's) and this month, as promised, we will look at some applications of these devices.

The most unique parameter of these devices that first comes to mind is high input impedance. This allows a host of circuitry formally reserved for vacuum tubes to be designed.

Fig. 1 is a 22 megohm FET version of the old reliable v.t.v.m. which is small enough to build into many types of equipment for local measurement purposes. The divider chain is quite similar to the vacuum tube version and the FET (a junction type) is used as a source follower. The 1 megohm series gate resistor and .02 mf capacitor keep input transients from damaging the FET. The output voltage from the source is fed to a 50 μa meter which is connected in a bridge circuit balanced by means of a 1K "zero adjust" pot. Note that by proper selection of R the 1K pot can also be used to set the zero point of the circuit to half scale.

*5 Melville Lane, Great Neck, N.Y. 10023.

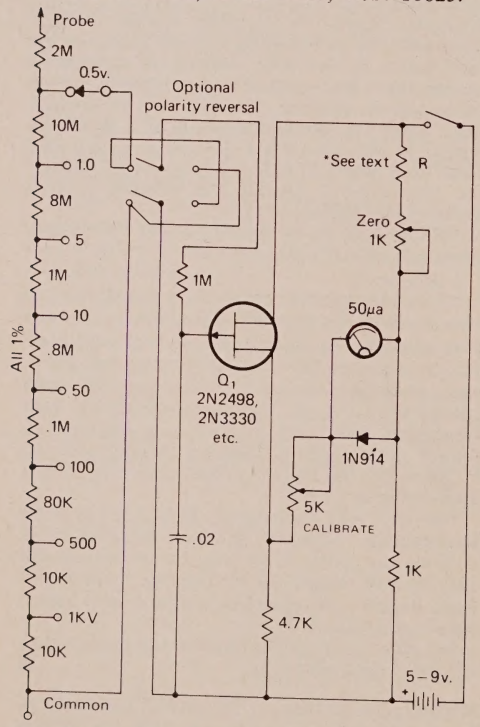


Fig. 1—Basic 22 megohm/volt FET voltmeter. Q^1 can also be an N-channel JFET by reversing the battery, meter, 1N914 and 5 v. Zener diode.

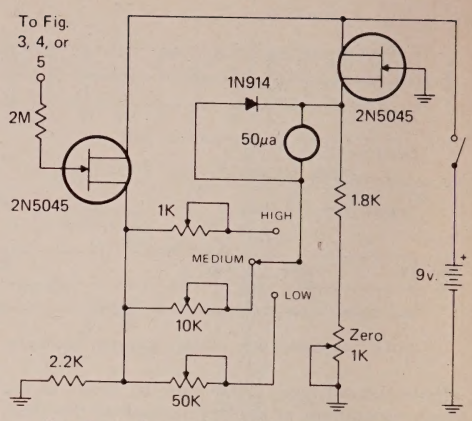


Fig. 2—Bridge circuit discussed in the text.

Accuracy of this circuit is limited only by the tolerance of the divider chain and the care taken to calibrate the unit. Since total current drain rarely exceeds a milliampere, battery life is quite long and almost any type of battery may be used.

Another measuring circuit that is a variation of the "v.t.v.m." just mentioned is the electrometer shown in fig. 2. This circuit employs a dual FET for stability and can be used for such application as picoampere leakage measurements, ultra-high resistance measurements, or non-loading voltage measurements.

From the input FET back, the circuit is also a bridge type arrangement with three series adjustable meter resistors for three ranges of sensitivity. These may be set for a full scale sensitivity of .5, 1.5, and 5 volts by adjusting each individual pot with the appropriate input voltage.

Where the circuit becomes unique however, is in the way that the input is used. In fig. 3, a series of very high value resistors switched by a good quality ceramic rotary switch, turn the basic circuit into a picoammeter. Since it takes a very small current to develop .5 volts across the high value resistors we can easily calculate the current by ohms law.

$I = E \div R$ or $I = .5 \div R$ where R is the value of the resistor being used. Notice that when a 1000 megohm resistor is used, 500 picoamperes (500×10^{-12} Amperes) will cause the meter to read full scale and on a 100 division scale, 5 picoamperes will be readable. Naturally, great care in insulation and layout is necessary to properly build such a circuit but it can and absolutely will work.

In fig. 4, the input has been connected to

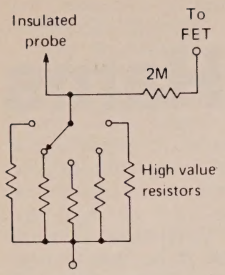


Fig. 3—Picoammeter input circuit for FET voltmeter.

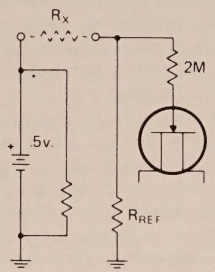


Fig. 4—High resistance ohmmeter.

measure very high resistances. The value of R_{REF} is chosen so that it is equal to the ½ scale reading desired. Let us choose 100 megohms for R_{REF} as an example. If we now connect another 100 megohm resistor to the *R*x terminals, the voltage from the battery (.5 volts) will divide by 2 and the meter will read half scale. A 1000 meg resistor will give a half scale reading with a R_{REF} of 1000 megohms and so on. Also, by properly varying the battery voltage other ratios can be achieved.

Construction of the *R*x binding posts and wiring should of course be proper for the resistances to be measured.

Finally, in fig. 5, we have the same basic circuit as in fig. 3, but without the switch. Now, only .5 volts across 1000 megohms is necessary for a full scale reading while on a 100 division scale, 5 millivolts (across 1000 megohms) can be resolved.

When building any of these circuits, especially at higher sensitivities or resistances, use extreme care in mounting components as it is quite easy to introduce leakage paths that will limit the usefulness of the circuitry.

Another interesting application for FET's is as replacements for vacuum tubes when "modernizing" old equipment. Fig. 6 is a schematic of a typical r.f. (or i.f.) amplifier stage such as might be found in a non-transistorized short wave receiver. The FET version of this circuit is shown next to it and, by simply changing a few of the original values, can be easily implemented. Using the values shown in the schematic will usually result in a working circuit immediately and "playing" with the starred values will generally enable the stage to be optimized without much difficulty. Naturally a realignment of the stage will be necessary but the final result will be less heat due to reduced power requirements of the FET, lower noise and, of course the life associated with solid state devices.

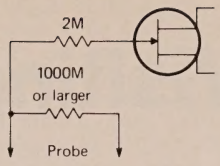


Fig. 5—Non-loading voltmeter.

Next month we will look at other r.f. circuitry using FET's that can be used to improve almost any h.f. and v.h.f. circuitry. Before concluding, however, I would like to mention the introduction of the Teledyne Semiconductor "FETRONS" again. We told you about earlier versions of these solid-state direct plug-in vacuum tube replacement devices in previous columns but somehow our readers could never get any from Teledyne at that time. Well, they are here again . . . this time as a set to convert Hewlett Packard HP400 Voltmeters or Tektronix CA plug-in oscilloscope modules to solid state.

If you are interested, write for details, prices, etc., to Teledyne Semiconductor, 1300 Terra Bella Avenue, Mountainview, California 94043 and tell them the exact type of circuit that the 6AK5 or 12AT7 you wish to convert is used in.

See you next month, Irv, WA2NDM

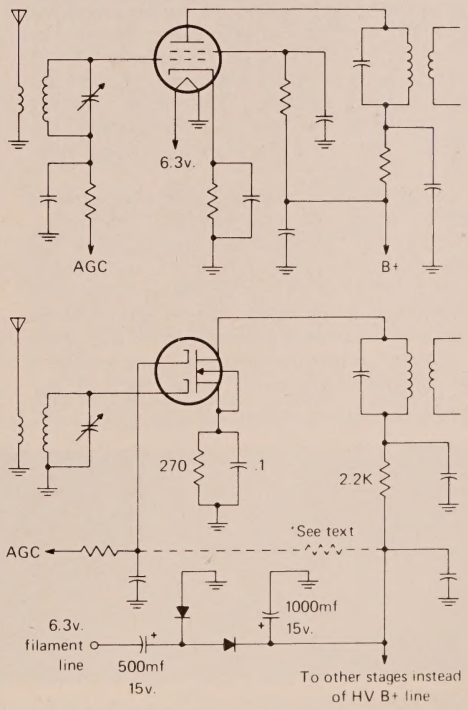


Fig. 6—FET conversion of a typical r.f. or i.f. amplifier stage.

Visiting the Balkan Hams

BY GEORGE PATAKI,* WB2AQC

THIS year we had to go to Europe. I wanted a nice DXpedition to far away places, but with our one-year-old Diane, this would have been quite difficult. I apologize to all those who hoped we would show up from Sikkim, from Iraq, from South Yemen, or from what ever they still need to get on the Honor Roll.

So we let KLM take us comfortably to the Balkans where we left Diane in Romania with my wife Eva's family, toured a few countries, visiting amateurs and operating where possible.

I'll describe our journey to Romania, Bulgaria, Turkey, Greece, Yugoslavia and to Hungary, which isn't in the Balkans but was on our way back to New York.

Romania: An Improved Situation

We usually go to our native city of Timisoara via Belgrade, instead of Bucharest, because it's easier and cheaper. Bucharest is farther East, so the airline tickets would be more expensive. From Belgrade we can take either the train or a bus and in 4-5 hours we are home.

Three years after our latest trip, here we are again entering Romania. The officer checking the passports and the customs officials are friendly and polite. We got the visas right there, at no cost.

In our compartment the customs inspector is amazed seeing so much baggage. Confirming Murphy's Law, he points to a large piece of luggage asking me to open it. Now, I know how difficult it would be to explain the presence of a microphone to somebody whose profession is suspicion. In his mind a microphone is connected to a secret transmitter which is connected to a spy network. And even if he searched all our packages he wouldn't find a transmitter. This will only increase his suspicion. If he finds that we carry 5 microphones, we are finished. Who will believe us that we are just taking gifts to amateur radio friends?

I try to lift the luggage out from the rack. It's very heavy, and I'm getting weak. I cannot do it. The inspector helps. I wish he wouldn't. When he pulls, I push. When he pushes, I pull. The luggage doesn't move. Finally he points to another bag. It's a pleasure; it's full of clothing.

Then he had three questions for me:

"Do you have guns?"

"Do I look like a cowboy?" I answered.

"Do you have pornographic books?"

"Would you like to learn something new?" I continued the tactics.

"Do you have religious books?"

"God forbid," I said, and I crossed myself three times.

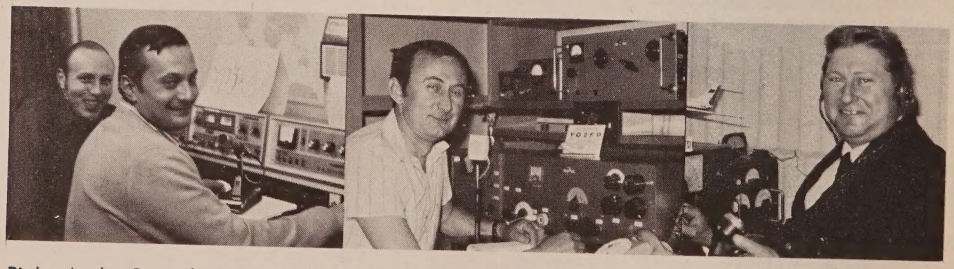
Soon we got to Timisoara; Eva's family was waiting at the railroad station. They grabbed our one-year-old Diane and ran to a taxi leaving me with 9 pieces of luggage. I had to disappoint them and call them back, loading them with our bags. If you think I gave the heaviest to my mother-in-law, you are so right.

Later we heard the good news; Eva's father Stefan, who passed his amateur radio test and applied for a license more than a year ago, finally got it. He is now the happiest YO2BGP I ever met.

I meant good news for *him* because now I have to send him a transceiver. "So what," said Eva, "it's only money." True, but it's *my* money!

Three years ago, on a previous trip, we had unpleasant experiences in Romania. Most of the local hams were afraid to meet us—the foreign-

*34-24 76th Street, Jackson Heights, NY 11372.



Right: At the Central Radio Club in Bucharest, Paul, WA3OAS is the guest and Andy, YO3AC is the host. Center: Fred, YO2FP has his station under his bed or his bed above his station. Left: Dima, LZ2FD is a radio technician at the Varna airport.

ers. Those who did meet us, later had to do a lot of official explaining.

This time we found a much improved atmosphere. We were invited to the radio club and many hams took us to their homes. Well-known DXer George, YO2BB, for his special achievements in amateur radio, was awarded with the "Master of Sports" title. Fred, YO2FP, with whom we had many QSOs from New York and from our West African DXpedition, has a most practical set-up: a special piece of furniture; below, a desk for the rig and above, a full bed for the tired operator. And his excellent rig is all home brew. Also home brew is the rig of Oscar, YO2BF, a much better ham than I because he put into his station a lot more work, knowledge and creativity than myself. When I installed my station, all I had to know was how to write my name on a check.

I was invited to see the shack of Anton, YO-2BL. He is a professional broadcaster and a skilled technician but he also has a "rich uncle" in America, so he's using Heathkit equipment. Panti, YO2BN, a veteran in amateur radio, doesn't have a rich uncle in America, not even a poor one, but he has a friend who has a rich uncle so . . . he's also using Heathkit. Costi, YO2BU, an old timer, brought a Japanese transceiver from West Germany, and now is installing a quad antenna.

The radio club has a full time manager, Florin, YO2IX, a station, YO2KAB, a QSL bureau (P.O. Box 100, Timisoara), a classroom for courses, etc., and it is in the center of the city, just across the street from the new and modern Continental hotel.

We met many friends at the club; old and new. Poly, YO2BX is an enthusiastic 2 meter fan. Aurel YO2BS is the chief engineer of the Romanian Broadcasting company, (also using Heathkit). We met Puiu, YO2ALS, Victor, YO-2BCO, Rudi, YO2BW, Traian, YO2BEO, Costi, YO2BC and many others.

Later, in Bucharest we were invited by the Romanian Television company to see their ultra-modern facilities; they have much better equipment than we have here in New York. There are many American made movies and serials on Romanian TV to the delight of the public.

We were made welcome at the Central Radio Club by Josef, YO3JP, the General Secretary of the Romanian Amateur Radio Federation and by a large group of YO3s: personal friends like Ghitza, YO3FU, Dan, YO3ZA, Dorn, YO3GM, and on-the-air friends like Andy, YO3AC, Bebe, YO3RG, Tavi, YO3JU. Although everybody was cordial, when I said I would like to photograph some of them at their home stations, they declined for various unconvincing reasons. I had a feeling they were following instructions.

We also visited the club station of the Pioneers' Palace located in one of the former royal palaces. This station is mostly operated by children under the supervision of two instructors: Nicu, YO3CB and Sandy, YO3AWC.

I recommend a visit to the YO land, meeting the local hams but it is advisable to write in advance to the Central Radio Club. In Bucharest, the Village Museum is a rare beauty, worth visiting.

I don't recommend any dealings whatsoever with the local Gypsies who are constantly approaching foreigners, offering to buy hard currencies, clothing, etc. These dealings, besides being illegal, usually end up with the Gypsy getting everything and paying for nothing.

Bulgaria and Its Friendly Hams

From Bucharest we took a train South, and crossing the Danube river, entered Bulgaria. But before that, we had problems with Romanian customs. The inspector wanted to confiscate 3 balun transformers I was taking as gifts to Bulgarian amateurs. I brought them all the way from New York, I entered with them in Romania, now I could not take them out.

I tried to convince him that they were innocent parts of an antenna. He thought they belonged to a bomb. If he takes them away, they may go off in the customs house, I said—trying to scare him off. This made sense, he returned them promptly and left the train as fast as he could.

The Bulgarian customs inspection was easy; they couldn't care less about my "bombs."

In Russe we changed trains and we boarded



Right: At the shipyard's club station LZ2KKZ in Varna with Hristo, LZ2HK, the chief operator and Belcio, LZ2BN. Center: Engin, TA2QR and George, TA1OM/2 (WB2AQC), on the Asiatic side of Istanbul. Left: TA1YL (WA2BAV) and Bedi, TA1BE, always happy to give a new country.

the slowest train we ever used. That train was so slow, once I saw a cow passing us, and I don't think she was in as much of a hurry to get to Varna as we were.

We chose to visit Varna, located on the Black Sea, because I know Hristo, LZ2HK, lives there and he speaks perfect Romanian. Besides, Varna is about mid-way from Bucharest to Istanbul, the highlights of our trip.

We finally arrived in Varna and settled in the hotel, as usual, we tried to locate local hams. With the help of a *Callbook* and a phone directory, we found Totu, LZ2FM, a professor of electronics who came to our hotel. To our surprise Totu also spoke Romanian. It was already late in the evening and we agreed to meet next day, Totu promising to bring Hristo.

Bulgaria is the only country I know where the head movements for Yes and No are not like in the rest of the world. For example nodding up and down means No. Inclining the head left and right means Yes. Isn't that confusing?

The next day, around noon time, we met Totu, LZ2FM, who brought Hristo, LZ2HK, and a third Romanian speaking amateur, Belcio, LZ-2BN, who is the chief operator of LZ2KST club station.

We began our visiting at LZ2KKZ, a club station where Hristo is in charge. Everything is home made and this is quite a miracle because there are very few radio parts you can buy here. Eva guest-operated LZ2KKZ, indicating in every QSO that she was WA2BAV. Then I made a few QSOs using the stations callsign but saying that the operator was WB2AQC.

Letting us operate was a nice gesture. There was no need for bureaucratic forms, approvals, licenses, etc. Many other coutries and many people could learn from these friendly Bulgarian hams. We filled out the QSL cards for the contacts we just made, took some photos and left for more sightseeing. This time they took us to their seashore, the famous Golden Sands. Compared with Miami Beach, Golden Sands isn't too much, but for Eastern Europe it is quite a place.

Later in that afternoon we all went to see Dima, LZ2FD, a radio technician for the airport. Part of his station is home made; the other part could win first prize at an antique show. Amazingly enough, everything was working fine.

Looking for a way to continue our trip, we learned that there was neither a direct flight to Istanbul, nor a direct train or bus. Fortunately we heard of a Russian liner, *Bashkiria,* and we bought two tourist tickets for it.

On board the Russian ship we met two Polish tourists and decided to dine together. We entered the restaurant and sat down at one of the many empty tables, but a waitress quickly came over and said we could not sit down, that we'd have to wait because no decision had yet been made where we should sit. I asked if that table was available. She said it was, but we still had to wait for a decision. I said, OK, make a decision. She declined saying that its not under her jurisdiction. We waited about 15 minutes. Finally the waitress returned taking us to the same table we sat at before.

I understand the Big Brother has to make all the important decisions, but why can't the little sisters take some initiative?

I recommend visiting Bulgaria but Sofia, being a larger city with more interesting sights, would be a better choice.

If a pretty Bulgarian girl invites you for dinner, or for anything for that matter, don't nod frantically; you may never get a second chance.

Turkey Where No Ham Has a License

Istanbul is an amazing place even for an experienced traveler. There are so many things different from the rest of the world, we had to stay a little bit longer.

In Turkey, amateur radio has never been recognized by the authorities and they have never issued a license. More than that, from time to time the officials cracked down on hams, confiscating their gear and even jailing some of them.

Before our trip I wrote many letters and collected a lot of information about the TA amateur radio situation. I contacted Turkish amateurs, QSL managers of Turkish hams, Americans who operated in Turkey, and Turkish officials working in New York City. The conclusion was that it would be impossible to get TA licenses.

When our ship docked in Istanbul, the seven passengers who got off were taken to the customs house. There we had to put our bags on the tables. A customs inspector came and with a frightening face ordered: "Open the luggage." They mean business—was my thought—and I opened everything wide. For about half an hour, the seven passengers and 5 customs inspectors waited, but nothing happened. Finally a chief-inspector walked into the room and quickly, without looking in the luggage, marked everything with a piece of chalk and said, "Finished."

Then I understood why five inspectors could not inspect our luggage; they knew only the "opening" words in English, but the chief-inspector, more educated, knew also the "finish" word.

We exchanged some dollars and tried to get to the Hotel Gezi, closed to TA1BE's residence. As we stepped out of the customs house we were confronted by a dozen aggressive taxi drivers.

"How much to Hotel Gezi in Taksim?"

"Fifty Turkish liras," answered three of them. I didn't know how far the hotel was but I knew I was in Istanbul and I was supposed to bargain.

"That's too much and Allah will get you for this," I said.

[*continued on page 62*]

COP's COLUMN

BY COPTHORNE MACDONALD,*
WØORX

ONE facet of equipment design which most hams put into the "black magic" category and avoid whenever possible is the design of lowpass, highpass, and bandpass *L-C* filters. Part of the problem is the relative lack of information on the subject in the amateur literature. *The Radio Amateur's Handbook* gives schematics and equations for Constant-K and M-derived filters, but no attenuation curves. Thus, one must build and try. One exception to this dearth of data is Donald Lancaster's excellent two part article on the design of Butterworth filters which appeared in *CQ* in November and December, 1966. I'm sure there are other exceptions, but for the most part we must turn outside of ham radio to the engineering literature to find what we need. This month I'd like to point out some of those sources, and talk about some filter basics. These are simple things I learned years later than I might have wished, but which swept away a lot of the mystique when I finally got the message.

The names of the various filter families—Constant-K, M-derived, Butterworth, Tchebycheff, Elliptic-function, etc.—come from the mathematics on which the particular design is based. Each type has its own particular advantages and disadvantages, and we'll start with a look at the basic characteristics of the more useful ones.

The Constant-K and M-derived designs were used for most of the filter design work done during the 20's, 30's and 40's. The design was first outlined by Otto Zobel of Bell Labs about fifty years ago. The mathematics is very simple, and if attenuation curves are used to aid the design process, quite satisfactory filters can be designed. The primary disadvantages are a degree of unpredictability when designing multistage sharp-cutoff filters, and the fact that a specific Zobel filter often contains more components than are really needed to achieve a given level of performance. A good book containing attenuation curves, and telling how to design filters of this type is *The Electronic Designer's Handbook*, by Landee et. al., McGraw-Hill, 1957.

In the 50's, designers started hearing about "modern filter design." Some very clever mathematician/engineers came up with new families of filters based on esoteric mathematical functions such as Butterworth and Tchebycheff polynomials. By using complex mathematical procedures, they came up with families of filters that optimized specific characteristics. Fortunately, the digital computer was also coming into its own at this time, and computers were used to generate filter design *tables*. These tables made it possible for ordinary folks to design these exotic new filters with even less mathematical effort than had been required to design traditional Zobel filters. Furthermore, with these new designs the filter performance matches the design predictions very closely.

Of these "modern designs" the Butterworth and Elliptic-function filters are probably the most widely used. The Butterworth filter has a smooth predictable response, and does not exhibit any passband "ripple." Its "stop-band" contains no infinite rejection frequencies except at infinite frequency. The steepness of the cutoff slope depends on the number of poles used in the filter, but is not as steep as the Elliptic-function type for the same number of poles. Because there are no infinite rejection frequencies that must be accurately located, component tolerances of 10% or so are normally good enough. An additional advantage of Butterworth filters is that design tables exist which permit ideal Butterworth performance with low-Q inductors.

Elliptic-function filters have steeper cutoff slopes than Butterworth filters having the same number of poles. In exchange for introducing some known amount of passband ripple, and by adding some resonances in the stop-band, the cutoff slope is steepened. Elliptic-function disadvantages are that high Q inductors must be used, and component tolerances must be more tightly held.

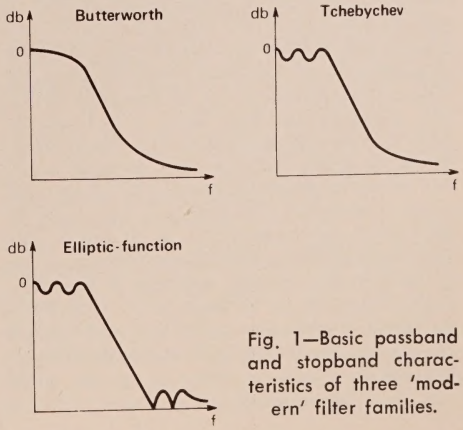


Fig. 1—Basic passband and stopband characteristics of three 'modern' filter families.

*P.O. Box 483, Rochester, MN 55901.

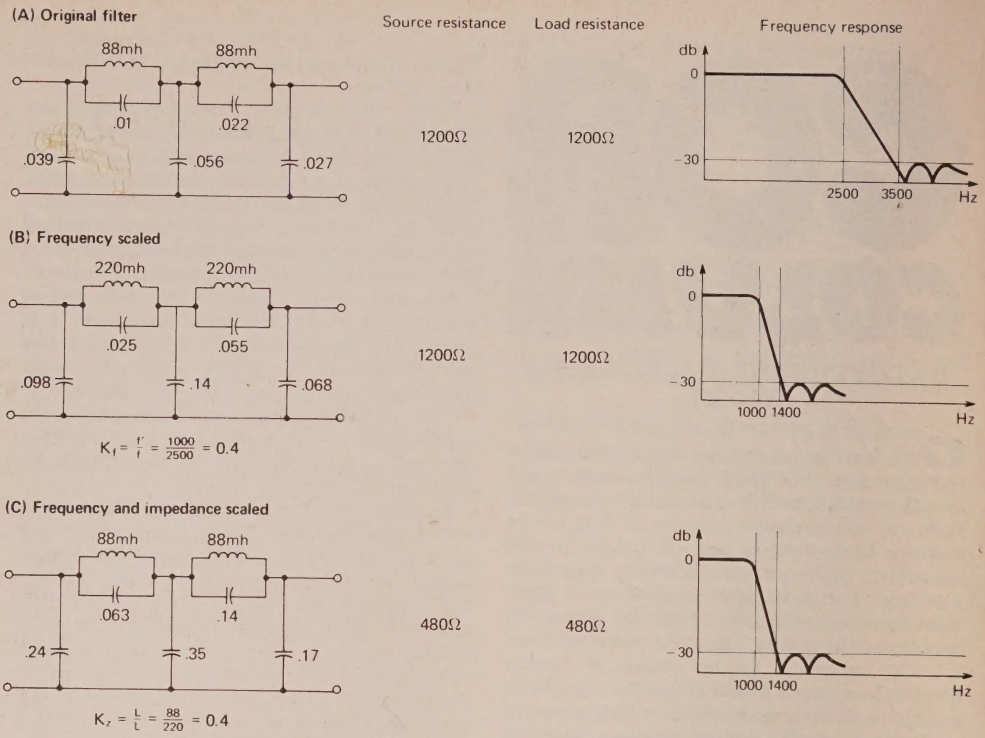


Fig. 2—A practical example of frequency scaling using the procedures in Tables I and II. All C in mf rounded off to 2 places.

The general shape of the Tchebycheff filter response is shown along with the other two curves in fig. 1. This type of filter has passband ripple, but no infinite rejection frequencies in the stop-band. Its performance falls somewhere between the other two types, and shares the disadvantages of Elliptic-function filters in requiring high Q inductors and closer tolerances.

There are a number of sources of filter design tables. *Simplified Modern Filter Design* by Philip Geffe (1963, Rider) is an excellent book containing 60 pages of tables; including 2 to 10 pole Butterworth, 3 to 7 pole Tchebycheff, and 3 to 11 pole Elliptic-function filters. This book also goes into the practical details of using the tables, and contains a lot of generally useful info about filters. Both Geffe and Lancaster refer to *Network Analysis and Synthesis* by L. Weinberg (1962, McGraw-Hill) as being a useful book containing Butterworth and Tchebycheff tables. Lancaster's *CQ* article is very easy to understand and covers 1, 2, 3, 5, and 7 pole Butterworth filters. (The Elliptic-function tables in Geff's book originally appeared in an article in the December, 1958 issue of the *IRE Transactions on Circuit Theory* by Saal and Ulbrich entitled "On the Design of Filters by Synthesis".) Engineering books are expensive, so you might

[*continued on page 62*]

Table I—Scaling Filter Impedance

[Values without a prime mark indicate original values before scaling. Values with a prime (′) indicate the value of the parameter after scaling.]

1. Find the impedance scaling factor, k_z.
   a) If a new filter termination impedance (Z') is desired instead of the original termination impedance (Z), then: $k_z = \frac{Z'}{Z}$
   b) If a new inductance value (L') is desired instead of an original inductance (L), then: $k_z = \frac{L'}{L}$
2. Once k_z has been determined, multiply each inductance value by k_z to determine the inductance value after scaling:
   $L_1' = k_z L_1$, $L_2' = k_z L_2$, etc.
3. Divide each capacitance value by k_z to determine the proper termination resistances after scaling:
   $C_1' = \frac{C_1}{k_z}$, $C_2' = \frac{C_2}{k_z}$, etc.
4. Multiply the value of the source and load termination resistors by k_z to determine the proper termination resistances after scaling:
   $R_s' = k_z R_s$, $R_L' = k_z R_L$
5. The filter frequency response remains the same after impedance scaling as it was before.

Results of the 15th Annual CQ 160 Meter DX Contest

BY CHARLES M. O'BRIEN,* W9NFC/W2EQS/9

The night has a thousand eyes,
And the day but one;
Yet, the light of the bright world dies
With the dying sun.
. . . Francis William Bourdillon

A bit of poetry so apropos in the context of the 160 meter band. The thousand eyes of the night are the myriad signals heard while, during the day, there seems to be but one.

Did you ever hear such great conditions as on the contest weekend of January 25-26, 1974? Hardly a European signal was heard in the mid-west for weeks prior to the Contest with DHJ missing most of the time. Some of the boys wondered if that commercial station had gone QRT. QRN very bad for weeks before our affair and right up to that Thursday night. Then came our weekend and no QRN whatsoever except for a period from 0700-1000Z when bad QRN set in, but as quickly as it set in, it disappeared. Many asked, "How do you do it in hitting good conditions for the Contest?"

The band was slow in opening up the first night. Then, DX was fantastic for hours—G, GM, GW, GC, DL, HB, OK, LU, PY, VP8, YV, KP4, KV4, VP5. OK1ATP and LU5HFI both had strong signals and QRMd each other badly. Was this actually 160 meters? Yes, it was.

On the second night from here to Europe the conditions weren't nearly like the first but the East Coast boys were working them left and right. Conditions to South America not as good either but what signals from KH6IJ and KH6CHC! Even VK6HD had an astounding signal. Sunrise here was at 1300 Z but the 6s and 7s were still heard up to 1430Z working the JA's.

Did any of you tune the band that Sunday night? Wow! What horrible QRN. And, QRN the following Friday/Saturday/Sunday peaked 30 db over S9. Two nights during week after the contest DHJ hit 589 out here but no European ham signals heard. Never heard DHI that loud even in N.J.

Now I know what the fellows out here in the mid-west are up against in hearing or working the Europeans. Sure is a helluva lot different from you fellows on the east coast where it is comparatively "easy" to work many of them. The boys on the west coast must have the same frustrated feeling but they do get Asiatic openings. On the whole the 1973/74 season was a very frustrating one. Less DX openings and horrible QRN. Many a night the QRN would remind you of mid-summer conditions.

Last year's Contest saw all previous existing records broken. Well, practically all of those records were surpassed this year by a good margin—proof that on the whole conditions were excellent. 46 countries from all continents except Africa were active, though we did have activity from there last year. Logs were received from 26 countries including W and VE.

All 50 states were on, compared to 49 last year. Other statistics: Previously the highest multiplier ever made in this Contest was 69 last year. This year 5 exceeded that mark . . . K1PBW (75), W4YWX (75), W3IN (74), WA2SPL (73) and KV4FZ (73). Last year only two stations exceeded 350 QSO's. This year it was three with W3IN leading the pack with 383 followed by WA2SPL with 371 and K1PBW with 352. Ten

Top Ten USA Stations

K1PBW	97,200	W5RTQ	46,322
W3IN	91,020	W4WSF	43,940
WA2SPL	75,774	W1HGT	43,440
W4YWX	62,850	WB4URW	41,472
K8CCV	52,140	W2EQS/9	39,528

*56085 Harman Drive, Mishawaka, IN 46544.



The GW3UCB/P team in the CQ 160 Contest. L. to r.: GD4BEG, G4BRK, G3WXS, G3XZK, G3WKH, s.w.l. John.

The first column indicates the number of contacts, second is the multiplier, third is the number of different countries worked and the last column is final score.

Connecticut

K1PBW 352 75 25 97,200
W1WY 174 45 15 28,072

Massachusetts

W1HGT 162 64 25 43,440
W1BB/1 ..... 103 57 24 34,542
W1PL 161 51 17 24,174

Maine

WB4HQE/1 .. 167 52 13 23,192
W1VF 78 45 8 13,905

New Hampshire

W1GBP 183 46 6 18,308
W6MZW/1 . 176 42 7 16,800
W1GJE 132 37 4 10,360
W2MNK/1 .. 20 11 2 440

Rhode Island

K1ZFN 145 39 4 11,934

Vermont

WB2CKS/1 ..100 45 8 11,250

New Jersey

W2AZQ 157 50 7 18,100
W2KHT 149 43 7 14,878
W2BP 55 41 17 10,086
W2HUG 108 46 8 9,920
W2GBY 104 39 5 9,048
W2NYU 41 25 7 3,050
W2CVW 63 19 3 2,546
W2BAY 20 14 2 672
WA2CCF 9 7 1 126

New York

WA2SPL 371 73 22 75,774
K2BQO 155 46 12 17,940
W2QIP 126 40 7 11,680
W2FHU 115 40 6 10,480
K2VGR 73 32 3 4,928
WB2EOO 49 21 5 2,562

Delaware

W3GL 183 53 12 19,080
WA5KUD/3 95 31 2 5,890

Maryland

W3IN 383 74 25 91,020
W3GN 263 56 11 34,832
W3AXW 104 44 10 11,968
WA3AFQ 43 26 4 2,860

Pennsylvania

W3QOR 210 58 14 31,320
W3BUR 197 54 13 26,892
W3JSX 176 51 14 23,664
W3CNS 156 50 7 15,845
W3AJS 56 21 2 2,352

Alabama

W8FAW/4 ... 113 42 9 11,844

Florida

K4IRQ 191 60 20 36,240
W4GGU 104 53 8 11,286
WA4DRU 84 40 10 9,600

Georgia

W4YWX 263 75 23 62,850
WB4RUA 135 49 7 15,190
WA4APG 119 49 6 13,230

Kentucky

W4YOK 105 41 4 9,266

North Carolina

W4TMR 241 56 10 30,800

South Carolina

WA4LDM 208 64 14 34,304

Tennessee

K4PJ 204 49 6 21,560
W4UD 66 38 5 5,928

Virginia

W4WSF 254 65 17 43,940
WB4URW 264 64 13 41,472
W4ZM 160 50 8 18,400
W4YHD 127 43 11 14,018
W4YZC 126 45 7 13,500
W4KFC 82 35 5 6,580
W4KMS 38 17 2 1,292

Arkansas

WA5RTG 259 62 13 39,060
W5KL 217 39 2 16,926

Louisiana

K5TFG 166 57 15 25,764

Mississippi

K5RFJ 58 32 6 4,736
W5AO 40 27 8 3,456

New Mexico

W5DO 152 51 7 17,544
K5AM 27 14 2 756

Oklahoma

K5JVF 113 54 8 14,796
WA5VAP 92 40 4 8,000

Texas

W5RTQ 251 66 19 46,322
WA5ZNY 195 60 14 30,600
W5SBX 161 48 10 18,912
W5FIX 93 41 6 8,856
W5QF 89 38 2 6,764
WA5LTQ 73 30 2 4,380
K5PFL 26 20 15 3,600

California

K6UA 237 59 14 38,350
W6RW 202 58 14 35,032
W6PLH 213 58 14 34,916
W6DGH 121 48 10 16,224
WA6PGB 126 43 7 13,588
W6PAA 118 42 7 12,600
WA6VNR 95 30 5 6,420
WB6VZI 72 29 6 5,336
K6NY 70 31 2 4,588
W6GWQ 64 23 5 3,680
W6MAR 48 22 3 2,288
W6DQX 24 15 6 1,320
WA6TLV 21 4 1 168

Arizona

W7NQ 256 61 13 38,552

Idaho

W7DY 53 34 5 4,420
W7HZL 62 30 3 3,810

Montana

W7CBY 9 7 2 126

Nevada

W7ABX 67 28 2 3,752

Oregon

W7IXZ 123 44 7 12,672

Utah

WA7OAU 114 43 2 10,836
W7ZC 52 24 3 2,688

Washington

WA7ILC 135 44 7 15,808
K7IDX 72 33 14 10,296
W7FIM 21 9 2 378

Michigan

K8LJQ 170 57 8 19.386
K8VQP 165 48 9 18,720
WA8MOA 117 49 7 13,818
W8WVU 62 13 3 806

Ohio

K8CCV 307 66 18 52,140
W8PCS 90 42 5 8,568

West Virginia

WB8APH 389 70 23 88,620
K8OQL 199 50 7 21,900
W8HZA 42 28 2 1,176

Illinois

W9MTT 246 62 11 37,324
W9PNE 139 50 8 16,300
W9BMY 132 42 4 11,760
K9KEP 70 31 2 4,340
W9UDK 52 29 3 3,248

Indiana

W2EQS/9 .. 272 61 12 39,528
K9YWO 230 62 11 33,976
WB9BUV 151 63 13 19,864
W9SFR 152 50 9 18,000
W9STW 119 48 3 11,808
WA9BWY 54 27 3 3,132

Wisconsin

K9DAF/9 .... 174 51 8 21,308
WA9HEU 72 37 7 6,179
WB9AVN 34 18 3 1,512

Colorado

WØLJF 23 13 1 598

Iowa

WØNFL 202 60 13 29,028
WØBQ 24 14 1 672

Kansas

WØIUB 113 43 6 10,492

Minnesota

WØAIH 247 64 12 37,248
W2TA/Ø 225 59 9 30,326
WØRHI 34 27 4 1,700

Missouri

KØJPL 146 52 6 16,952
WØBV 44 25 1 2,200

South Dakota

K8EEG/Ø 23 13 1 338

CANADA

Newfoundland

VX1KE 40 21 11 4,872

New Brunswick

VE1AXT 54 23 3 2,668

Nova Scotia

VE1CD 161 52 12 22,568
VE1AVQ 64 28 6 4,480

Ontario

VE3BMV 262 58 11 35,960
VE3BFK 112 39 5 9,672
VE3BBH 51 25 5 3,150

Saskatchewan

VE5XU 77 35 2 5,390

British Columbia

VE7UZ 145 53 13 24,274
VE7HQ 79 29 5 5,742

Argentina

LU5HFI 122 50 19 54,850

Australia

VK6HD 22 15 6 2,535
VK3QI/3 ..... 15 6 6 438
VK3XB 11 6 6 396

Caicos

VP5GS 247 63 20 143,840

Austria

OE1KU 115 9 9 3,231

Bolivia

CP1EU 2 2 2 20

Ceylon

4S7GV 1 1 1 5

Costa Rica

TI2CF 69 32 5 20,960

Czechoslovakia

OK1KRS 209 24 15 21,912
OK1ATP 175 26 16 20,448
OK1FCW 151 25 15 16,925
OK1MMW 165 16 15 9,984
OK2BEN 140 18 14 8,388
OK1AXD ..... — 14 14 6,412
OK1DWA 127 13 13 5,668
OK1FRF 119 13 13 5,434
OK1KPU 104 14 12 5,180
OL6AQJ 121 13 13 5,161
OL5AQC 123 12 12 5,136
OK1MIW 122 12 12 5,052
OL1API 118 11 11 4,411
OK1KNH 117 11 11 4,378
OK2SLS 116 11 11 4,213
OL6ARH 112 11 11 3,916
OK2BKT 100 11 11 3,685
OL4APS 110 10 10 3,550
OL6AQP 102 11 11 3,465
OK2PCW 98 11 11 3,344
OK2PDN 97 11 11 3,300
OK3KAP 87 11 11 3,003
OL9CBM 86 10 10 2,710
OK2PEG 76 10 10 2,480
OK2HI 74 11 11 2,464
OK2PAW 77 10 10 2,350
OK3TFA 79 10 10 2,270
OK1FON 70 10 10 2,270
OL6AQH 67 10 10 2,240
OK1FAR 56 11 11 1,859
OL8CCP 70 8 8 1,624
OK1KIX 62 8 8 1,496
OL5AQU 59 8 8 1,400
OK1KRY 59 8 8 1,320
OK1OFD 81 5 5 1,170
OK1XC/P 47 8 8 1,136
OK3TEG 49 7 7 917
OL6ARB 55 6 6 888
OL1AQO 47 6 6 726
OK2PFV 56 5 5 710
OL8CCH 51 5 5 675
OK3YCV 42 6 6 666
OK1YR 50 5 5 660
OL1ARA 47 4 4 456
OL8CCJ 49 4 4 420
OK1AAZ 21 6 6 360
OK2BCI 25 4 4 268
OK1KZ 19 4 4 224
OL8CBU 28 3 3 168
OK1ZW 12 1 1 24

Eire

EI9J 39 18 10 5,040

England

G4BUE 156 17 13 10,353
G3VDW 85 9 9 2,502
G4BXN 51 9 9 1,801

Falkland Islands

VP8KF 80 41 14 29,110

Finland

OH2BH 106 15 14 7,845
OH3XZ 107 13 13 6,591
OH2BO 65 11 11 3,366

Germany

DL7HA 153 30 19 23,700
DL1FF 134 29 16 21,431
DK3PO 132 22 15 14,938
DL1YA 24 6 6 630
DLØKF 138 15 13 9,660

Guernsey

GC3SVK 202 28 16 31,556

Hawaii

KH6CHC 114 42 10 41,454
KH6IJ 49 20 5 8,180
KH6RS 40 17 4 6,664

Hong Kong

VS6GM 32 5 5 875

Iran

EP2BQ 76 13 13 4,966

Japan

JA3AA 88 13 8 3,744
JA7NI 93 10 7 2,760
JA3ONB 57 10 5 1,810
JA2UEO 63 6 5 1,176
JA6LCJ 42 3 3 252
JA3JM 35 3 3 228
JA2KZ 37 1 1 74
JF1RPZ/4 .. 25 1 1 50

Marcus Island

JD1AGZ 18 2 2 190

Netherlands

PAØHIP 178 28 16 27,188

Paraguay

ZP9AY 30 22 7 6,050

Puerto Rico

KP4AST 242 61 18 142,252

Scotland

GM3UPK 143 14 13 8,988

Switzerland

HB9NL 79 24 9 10,920

Venezuela

DL2GG/YV5 144 52 15 70,044

Virgin Islands

KV4FZ 293 73 27 185,055

MULTI OPERATED STATIONS

Maine

K1RQE 195 53 13 26,606

Florida

W4OZF 144 47 11 17,672

Virginia

W4UPJ 214 48 8 23,616

Texas

W5YG 219 56 10 28,560

California

W6YRA 164 48 8 23,040

Ohio

K8KAS 256 48 9 27,264

Michigan

W8KAZ 190 44 6 16,368

Scotland

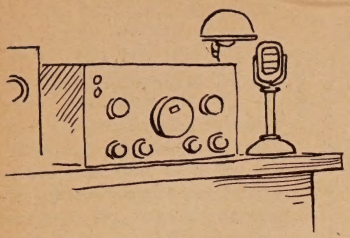
GM3IGW/A 219 33 20 38,412
GM3YOR 123 13 13 7,371

England

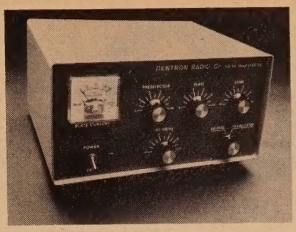
G3XEP 119 21 15 11,970
G3KMI 150 20 14 11,400
G4BUX 142 16 16 8,160
G3GJL 118 12 12 4,764
G3YDD/A 87 9 9 2,943
G3IRS 51 7 7 1,414

Wales

GW3UCB/P 214 33 20 37,422



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= 160 Meters

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PPD U.S.A.

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Cypress, Cal. 90630

master charge THE INTERBANK CARD

Top Ten DX Stations

KH6CHC	41,454	KV4FZ	185,055
GC3SVK	31,556	VP5GS	143,840
VP8KF	29,110	KP4AST	142,252
PAØHIP	27,188	DL2GG/YV5	70,044
OK1KRS	21,912	LU5HFI	54,850

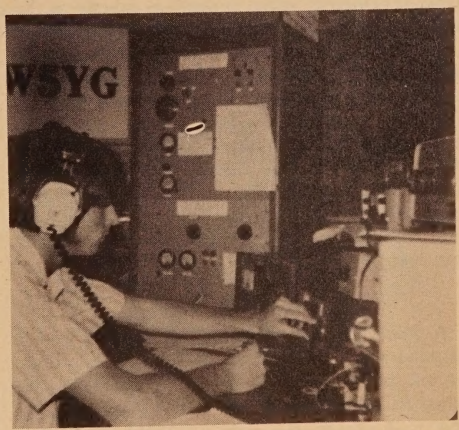
stations worked 20 or more countries: KV4FZ (27), K1PBW (25), W1HGT (25), W3IN (25), W1BB/1 (24), W4YWX (23), WA2SPL (22), K4IRQ (20), VP5GS (20) and GM3IGW/A (20).

I can't vouch for this for the rest of the country but out this way not a single phone station was in the DX Window. Thanks a meg fellows.

As usual, there were many complaints about W/VE working and/or calling in the DX window. This is unsportsmanlike conduct. Complaints were received on the operations of: W1DDC, K1CPF, WA2SPL, W3MAR, WA8KAZ, WA9HEU, WØAIH, W4GSH, W6PLH, W7GZL, WA7NBW. This is the first time such a list has appeared in this story but it is only a reminder to them and any others that they should be more careful and check their operating frequency during the Contest. Most of the violators of the "Window" were those who operated too close or worked right smack on the edge. Others were newcomers who weren't aware of the "Window." Most of those who were reminded moved immediately. We don't want to disqualify anyone but we may have to in the future.

A most attractive certificate shall be sent the winners in each State, Province and DX country and, in cases where scores are close, one shall also be sent to 2nd and 3rd place contestants. Winner of the *CQ* plaque for the highest scoring single operator station goes to Herb, KV4FZ.

73, Charlie, W2EQS/9



This young fella is WA5RXT, one of the ops of W5YG, Rice Univ. ARC. Other ops: WB5IOG and WB5JJE.

QRP$_p$

LOW-LOW POWER OPERATING

BY ADRIAN WEISS,* K8EEG

ONE essential requirement of any receiver to be used in QRP$_p$ operation is a high degree of selectivity. One must be able to eliminate strong interfering signals in order to be able to copy a weak QRP$_p$ signal. With a direct conversion receiver this selectivity must be achieved in the audio section unless some form of r.f. *Q*-multiplier with steep slopes is included in the front-end. Various methods of achieving that important selectivity will be discussed this month.

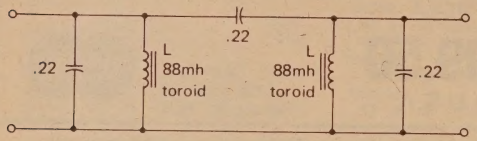


Fig. 1—Typical passive L-C audio filter.

Passive Audio Filters

Two types of passive filters have found wide application in amateur circles—the *LC* and *RC* filters. These filters are relatively simple to construct, but exhibit an insertion loss. Further, they have the nasty and sometimes self-defeating habit of "ringing" when a signal is exactly at the resonant frequency. The *LC* filter shown in fig. 1 uses 88mh toroids which are quite bulky. To achieve worthwhile skirt selectivity it is necessary to use several toroids (a minimum of four to get below 1000 Hz bandwidth), which increases bulk and insertion loss. See the ARRL *Handbook* (1973), p. 272, for details of such a filter. Note that, in addition to the space requirements, several active stages of audio amplification are necessary to overcome the insertion losses.

Active Audio Filters

A much more effective filter can be realized if amplifiers are made an integral part of the filter circuit. In the filter of fig. 2, for example, the tuned *RC* filter legs consist of C_1,C_2, C_3, R_1, R_2 and C_4,C_5,C_6,R_3,R_4. The resonant frequency of these networks is determined by the values of

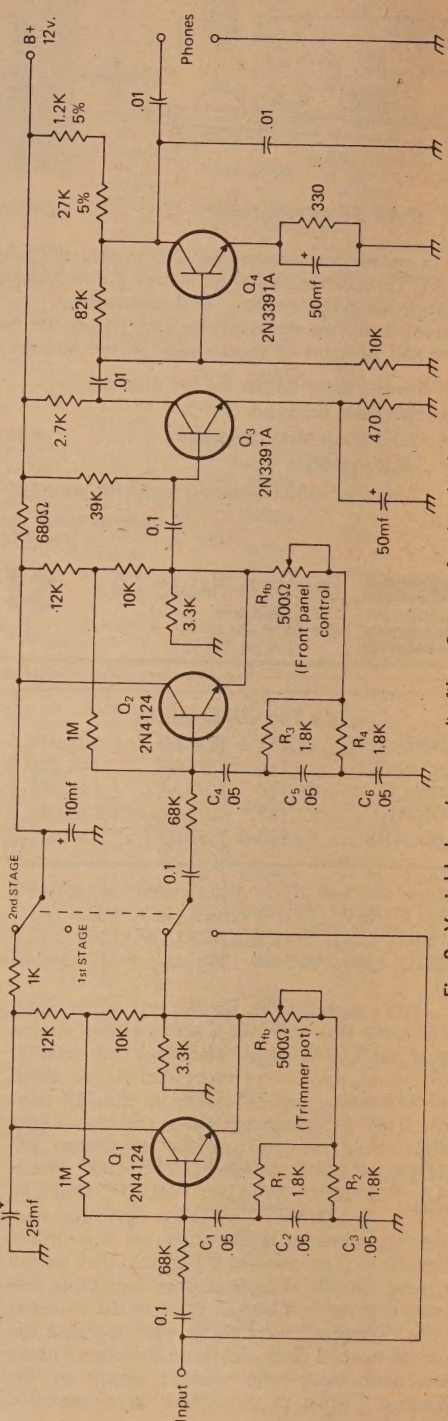


Fig. 2—Variable bandpass audio filter. See text for details of operation.

*213 Forest Ave., Vermillion SD 57069

the components: with the values indicated, the center frequency of the filter is about 450 Hz, and can be changed by changing the values of resistors R_1, R_4, Q_1 and Q_2 are emitter follower amplifiers which exhibit near-unity gain. The filter leg becomes a feedback loop through R_{fb}, which controls the gain of the amplifier. When R_{fb} raises the gain of Q_1 to unity, oscillation occurs. However, as the gain approaches unity and the stage becomes regenerative, but before breaking into oscillation, the circuit exhibits an extremely high Q at the resonant frequency of the network leg. Because of the extremely high Q, only audio signals at the resonant frequency of the filter pass through the circuit, and all others are attenuated. In addition, some gain is realized.

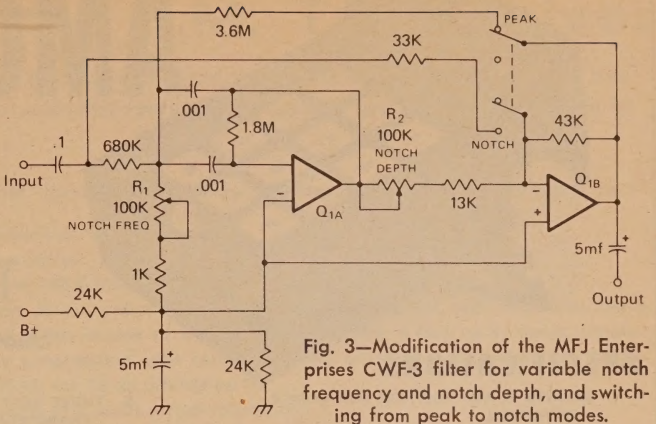


Fig. 3—Modification of the MFJ Enterprises CWF-3 filter for variable notch frequency and notch depth, and switching from peak to notch modes.

While I haven't observed the skirt selectivity on a scope, I'd venture that a single stage at peak provides about a 150 Hz bandwidth at 6 db down, with the skirts flaring out at that point. Cascading two stages, as in fig. 2, greatly increases the skirt selectivity. With both stages peaked, an S4 signal comes out equal to an S9+ signal only a 100 Hz or so removed from the filter center frequency. Some slight "ringing" occurs at the peak. An important feature of this filter is that R_{fb} constitutes a variable bandwidth control. The further R_{fb} is backed away from the point of regeneration, the less selective the filter becomes, until it exhibits little selectivity at all, with a slight loss of gain. This is an especially useful feature. In normal QRM situations, one stage is all that is needed to make weak signals readable, and so a d.p.d.t. switch is included to cut-out the first stage. It is usually switched in only during fierce contest QRM.

A third stage would result in the band sounding dead unless a signal is right in the passband. The two stages of audio amplification following the filter stages bring the audio level from a typical direct conversion receiver up to very loud headphone level.

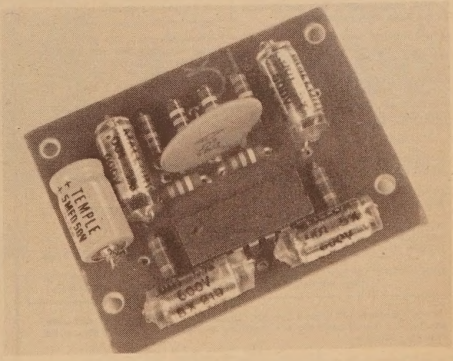
Construction is non-critical. The circuit can be laid out linearly along a piece of p.c. board with the same parts placement shown in the schematic. Adjustment is simple. With both stages switched in, advance R_{fb} of stage 2 into regeneration, and then back off R_{fb} of stage one until oscillation stops. In this way, ultimate selectivity with both stages switched in will be controlled by R_{fb} of the second stage, which is mounted on the front panel. In my version, an RCA CA 3020A 500 mw audio amp is also on the p.c. board and drives a small speaker.

MFJ CWF-2 and CWF-3

Two superb, ready-to-use, and *cheap* IC audio active filters are currently available from MFJ Enterprises.[1] The CWF-3 utilizes a dual ua 741 IC for two active stages and can fit anywhere—it measures 1.5" × 2"! Two selectivity positions of 110 Hz and 180 Hz are provided. It is a superb filter, equivalent or slightly superior to the filter of fig. 2. The CWF-2 uses a pair of dual ua741 IC's to provide four active stages, with selection of bandwidths of 80 Hz, 110 Hz, and 180 Hz. In the 80 Hz position, selectivity is about 750 Hz at *60db* down! This filter probables represents the limits of current technology. No "ringing" is exhibited by these filters.

Installation of either filter is simple. Provide

[1]P.O. Box 494, Mississippi State, MS 39762. CWF-2—$12.95, $14.95 wired/tested; CWF-3—$7.95 kit, $8.95 wired/tested. The CWF-2 available in cabinet for $19.95. (See ad elsewhere in this issue for further details.)



The MJF Enterprises CWF-3 c.w. audio filter with two active stages in a dual ua741 IC.



AMCOMM 1200

TONE ENCODER

*COMPATIBLE WITH BELL SYSTEM DIALING TONES

SPECIFICATIONS

1. MOUNTS IN ANY POSITION FOR MOBILE OPERATION.
2. LIGHTED DIAL FOR EASY NIGHT TIME VIEWING.
3. THE BLACK PLEXIGLASS ENCLOSURE IS INTERNALLY SHIELDED FROM R.F. INTERFERENCE.
4. EXTERNAL AUDIO LEVEL CONTROL.
5. THREE EASY CONNECTIONS TO YOUR TRANSCEIVER:
   A. 12 VDC
   B. AUDIO OUT
   C. EXTERNAL PUSH TO TALK (P.T.T. SWITCH)
6. THE PUSH TO TALK MAY BE VARIED. FOR EITHER MANUAL OR AUTOMATIC KEY UP ON YOUR TRANSCEIVER.

WIRE AND TESTED: $69.95

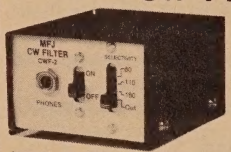
F.O.B. POMPANO BEACH, FLORIDA; ADD $1.00 FOR SHIPPING; FLORIDA RESIDENTS ADD 4% SALES TAX.

AMCOMM CORPORATION

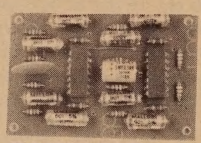
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TELEPHONE (305) 781-0161

CW FILTERS



New Model CWF-2BX - $22.95
Ready to use. Please include $1.50 postage



Model CWF-2 - $13.95
$15.95 Wired, tested, guaranteed. Please include 75 cents postage

- Get Razor Sharp selectivity from any receiver or transceiver.
- Extremely high skirt rejection.
- Drastically reduces all background noise.
- No audible ringing.
- No impedance matching.
- Ultra modern active filter design uses IC's for super high performance.

CWF-3....$9.95 wired; $7.95 kit. 75cents postage. Economy version of CWF-2 is ideal for easy installation inside battery operated QRP rigs. Compact size. No audible ringing. 110 Hz or 180 Hz B/W with 1.5 and 1.2 db gain.

We have what we think is the finest CW filter available anywhere. The 80 Hz selectivity with its steep sided skirts will allow you to pick out one signal and eliminate all other QRM and QRN. Simply plug it into the phone jack or connect it to the speaker terminals of any receiver or transceiver and use headphones, small speaker, or speaker amplifier. Better yet, connect it between any audio stages to take advantage of the built in receiver audio amplifier.

Build the 2"x3" CWF-2 PC card into your receivor or get the self contained and ready to use CWF-2BX and plug in!

SPECIFICATIONS

BANDWIDTH: 80 Hz, 110 Hz, 180 Hz (Switch selectable)
SKIRT REJECTION: At least 60 db down 1 octave from center frequency for 80 Hz bandwidth
CENTER FREQUENCY: 750 Hz
INSERTION LOSS: None. Typical gain 1.2 at 180 Hz BW, 1.5 at 110 Hz BW, 2.4 at 80 Hz BW
INDIVIDUAL STAGE Q: 4 (minimizes ringing)
IMPEDANCE LEVELS: No impedance matching required
POWER REQUIRED: CWF-2 . . . 6 volts (2 ma.) to 30 volts (8 ma.); CWF-2BX . . .standard 9 volt transistor radio battery
DIMENSIONS: CWF-2 . . . 2"x3" PC board; CWF-2BX . . . 4"x3 1/4"x2 3/16" (black winkle steel top, white aluminum bottom, rubber feet)

TRY this fantastic CW filter. If you don't think it is the best you have ever used, ask for your money back. We will cheerfully refund it. These filters carry a full one year warranty.

Write for FREE brochure and magazine test reports. Other IC active filters available. CW mini filter (1½" x 2"), low pass, high pass, and wide bandpass filters. Audio amplifiers: ½, 1, 2 watts. Crystal calibrator.

MFJ ENTERPRISES P.O. Box 494-J, Mississippi State, MS 39762

a mounting bracket or holes in a transceiver, bolt on, hook up a few leads, mount the selectivity switch if desired, and it is ready to go. At these prices, it is inconceivable that there is an HW-7 around without one in it.

Some interesting modifications can be performed on these filters to make them more flexible. First, the addition of two pots can convert the CWF-3 (or first IC of the CWF-2) into a notch filter which will attenuate any signal in the 300 Hz-3 kHz range. See fig. 3 for details. R_1 is the notch frequency control—it is varied until the unwanted signal is attenuated. R_2 is the notch-depth or Q-control. It is adjusted for the degree of attenuation desired to eliminate the unwanted signal. R_1 should be a log-taper pot.

The addition of a d.p.d.t. switch and an extra resistor will result in a notch/peak filter. In one switch position the filter functions as a notch filter as described, while in the other position it functions as a peak filter with variable bandpass controlled by R_2.

If a four section CWF-2 is used, the first IC may be modified as above, which the second IC will continue to function as a bandpass filter. MFJ indicates that these modifications work out all right.

That's it for this month. Summer is over (thank God!) and things should pick up again in the months ahead. Good QRPp'ing.

73, Ade, K8EEG

The Ultimate F.M. Transceiver

Here it is, the FMer's dream, a fully synthesized transceiver that'll cover the entire two meter band, PLUS a built-in scanning receiver that'll locate any repeater frequency in your area that's in use.

And get a load of these other features that make the "Dream Machine" the ultimate rig:

- Operates on FM, AM or Modulated CW
- Built-in DC and AC power supplies
- Frequency Range of 143.5 to 148.5 MHz in 5 KHz increments
- Autoscan in 5 KHz steps across entire band, with adjustable speed and frequency limits.
- Synthesizer flexibility that offers choice of 600 KHz up or down, 1 Meg up or down, simplex, frequency split, or any nonstandard split (programmable) all from a single function switch.
- Receiver Sensitivity of 0.35 Mv for 12 db SINAD on FM
- Dual power output of 20 watts or 5 watts across entire band
- Adjacent channel rejection (30 KHz) 100 db minimum
- Image spurious and intermodulation (EIA) 80 db minimum
- 10 pole, 13 KHz crystal filter
- Receiver Superhet, single conversion
- Frequency stability of 0.0005%
- Built-in tone burst and PL encoders and decoders
- Built-in touch tone pad
- Full LED Digital readout
- Built-in S Meter also serves as VSWR bridge, power output meter, battery indicator, deviation indicator and discriminator meter.
- Audio output 4 watts @ 10% THD
- Speaker built-in to left side of cabinet for maximum mobile reception
- Headphone jack for noise-free mobile operation
- Independent selectable priority channel
- Built-in Auto CQ
- Temperature range from -20^{o} to 170^{o} Fahrenheit
- Size: 4" H x 8" W x 10" D Weight: 10 pounds
- One million channels (1000 Rec. x 1000 Trans.)

The EBC-144 "DREAM MACHINE"



$1495.00

A $150 deposit will insure early delivery and guarantee price

AMATEUR PRODUCTS DIVISION

emergency beacon corp.

15-RR River Street
New Rochelle, N.Y. 10801
(914) 235-9400

NOVICE SHACK

BY HERBERT S. BRIER,* W9EGQ

Hobby For The Handicapped

Charles Bral, 214 S. State St., Elgin, Ill., tells his story very eloquently: "I'm studying for my Novice license now and getting my code speed up. I can recognize the letters by their sounds fairly well. I have some difficulty in hearing, partly because of a childhood illness which caused me to end up as a mental patient in the state mental hospital here. I believe that ham radio has great potential in hastening the cure of persons with mental or emotional problems. I find, however, that it takes me about two or three times longer to master the code than it does for other people. I took the National Radio Institute, Washington, D.C. 20016, correspondence course in amateur radio and have successfully constructed the Conar transmitter and receiver.

My grades were above average. I intend to study for higher-grade licenses.

"The Conar rig puts out about 25 watts. I intend using 300-ohm TV lead-in wire for the antenna. I guess it's known as a folded dipole. I have a crystal calibrator that I purchased from Palomar Industries. But now I'd like to find a source of supply for the E. F. Johnson, 50-pf, ceramic variable capacitor for the grid-dip oscillator I am building from Charles Caringella's book, *Practical Ham Radio Projects* (Sams). I'm also having trouble locating a 1N38 diode. I understand that they are fairly common, but I've tried one or two stores (we have only about that number in Elgin) and they don't even have substitutes. (Any general-purpose, germanium signal diode, such as a 1N34 or 1N60, should be satisfactory: Herb.)

"I have a question to ask. Is it true that a transmitter and receiver should be allowed to be on for an hour or so before use, when they are new in order to stabilize the 'system of units?'

"I enjoy *CQ* very much, especially the articles on SSTV and the NOVICE SHACK. Charles."

The answer to Charles's question is that it is an excellent idea to "warm up" transmitters and receivers in their "standby" positions for an hour or two when they are new or have not been operated for some time. In addition, to reduce the annoyance of warm-up frequency drift that virtually all amateur transmitters and receivers have, a 15 to 30-minute warm-up at the start of each operating session is recommended.

Getting the Message Across

Charles's letter illustrates again the universal appeal of amateur radio and emphasizes the immense value that it can be to handicapped individuals. Imagine, if you can, the boon of having his own amateur station is to a house-bound invalid with speech difficulties. His radiotelegraph key and transmitter and receiver expands his world from the confines of his bed or wheel chair to the wide world. Licensed handicapped amateurs have shown that nearly any physical handicap need not prevent anyone from becoming a radio amateur. But, considering what the hobby could mean to them, too few physically-handicapped people become amateurs. One reason is that many do not know what they are missing; another is that they have heard it is extremely difficult and expensive to become an amateur. I cannot think of any better activity for any amateur than to change the picture.

Do not put on a hard-sell publicity campaign. Rather, if you know or hear of a handicapped person that might be a suitable candidate for an amateur ticket, talk to members of his or her family first. Find out whether they think that their brother, sister, son or daughter might be interested in obtaining an amateur license and whether they would have any objection to you seeing him or her. Sometimes they have very valid reasons to veto the idea, but they will usually be all for the idea as soon as they have assured themselves that your ideas will not harm the individual.

When you are introduced to the prospective candidate for a ticket, be friendly and accept things as you find them *without comment* or expressions of sympathy. Explain what amateur

*385 Johnson St., Gary, Ind. 46402.



Eric Esteran, WN6WNK, Arcadia, Calif., operating his Heathkit HW-101 transceiver. Look for him on 40 meters or 15 meters.

radio is, display a couple of QSL cards and pictures of simple amateur stations, answer questions about licensing procedures, and send a couple of code characters on a code-practice set. Stop immediately if your host or hostess starts to seem bored. And even if he or she does not get bored, do not make your first visit too long. Instead, make arrangements for another visit and depart. The second or third visit is plenty of time to introduce license manuals and code courses.

Amateur Radio Course For The Blind

The Hadley School For the Blind, 700 Elm St., Evanston, Ill., offers excellent amateur radio correspondence courses for the blind. Also, the Library of Congress, Division for the Blind and Physically Handicapped, Washington, D.C., can supply a list of other radio amateur publications in *Braille* or "talking books," which can be procured through most public libraries.

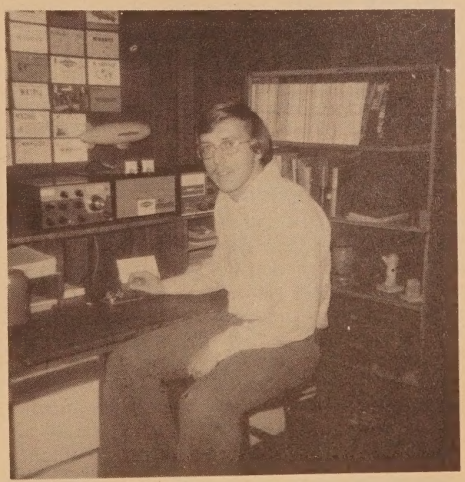
Novice News

We ran out of room for these items in a previous issue. **Ted, KH6GI,** Hawaii, says that I omitted one item that should be included on a QSL card in the March, 1974, NOVICE SHACK. Include the actual location of operation, if it is different than the mailing address. He has cards from a couple of "rare" Pacific islands which he cannot submit for operating awards, because they list only the operators' stateside addresses . . . **Gerry Swetsky, WB9EBO** manager of the ARRL W9 QSL Bureau, reminds us that some QSL bureaus prefer 5" × 7" return envelopes to eliminate the necessity of bending oversize foreign cards to get them in the envelopes. He also suggests that you tailor the amount of postage that you put on the return envelopes to the amount of DX you work. Otherwise, you might wait a long time before your envelope is stuffed with the maximum number of cards that the postage will carry . . . **Dave Earl Clark, WN2TLQ,** Stone Orchard R.D. #2, Gouverneur, N.Y. 13642, operates a modified HW-7 transceiver on the Novice bands and has worked 22 states with a power of less than three watts.

Eric Esteran, WN6WNK 360 Sharon Rd., Arcadia, Calif. 91006, got started in amateur radio in the Electronics course at the First Ave. Jr. High School, Arcadia, and the school amateur radio club. At first, he had no idea of becoming a Novice, but other students and the Science instructor, Bill Manley, W6LDT, told him how much fun amateur radio is. As a result, he now operates a Heathkit HW-101 CW/SSB transceiver on c.w. at home in conjunction with a 3-element tri-band beam and a Hy-Gain 14-AVQ vertical antenna, which he uses on 40 meters. He has worked 31 states and seven countries. By the time you read this, Eric hopes to have passed his General test, which he is studying for with fellow club members, Paul, WN6VWJ, and Jon, WN6CPQ. He proudly tells us that the First Ave. Jr. H.S. Amateur Radio Club has turned out 40 amateurs in its 4-year existence. The club has a Swan-500-CX transceiver for the higher-class members and a Heathkit HW-16 for the Novice members . . . **Dave Cook,** 38612 Wade, Romulus, Mich. 48174, is studying for his Novice license with Greg Dahlstrom, WB8IYA, who operates six meters. Dave's one piece of shortwave equipment to date is an old Hallicrafters S-120, general-coverage receiver, which he uses to practice code on and to eavesdrop on the phone bands. A Heathkit HW-16 or a Heathkit DX-60B transmitter and the matching receiver are in his plans when he gets his license.

The past summer, K4TPA, Lake Worth, Fla., and K7HOZ, Seattle, Wash., had their licenses revoked for failing to reply to their official FCC mail, which is apparently one of the most frequent reasons of revoking licenses—and not only of amateur stations, either! So it behooves any FCC licensee to have his current mailing address always on file with the Commission. W8JWN, Iron Mountain, Mich., was luckier. The FCC dismissed charges against him.

Once again, we are approaching the bottom of the page. Will we be reading about your activities or seeing your picture in the next edition of your column? The first step is for you to write to me, and I will do the rest. Send your letters to the address on the first page of the column. 73, Herb, W9EGQ.



Jeff Popa, WN8QYT, Akron, Ohio, was the Senior Technician on the Goodyear blimp *Europa* in Europe before returning to the states to qualify for his Novice license.



DX

BY JOHN A. ATTAWAY,* K4IIF

THE Northern California DX Foundation is to be congratulated on the fine effort from KP6-PA, Palmyra, and KP6KR, Kingman Reef. The DXpedition was well planned, well publicized and was carried off in fine style. The only negative was poor propagation from the Reef and that's something we haven't learned to control yet.

Pileups during the Kingman Reef operation were far and away the heaviest we have heard in quite a while. Interest in DX is far from dead. In looking for a comparative basis we would have to go back to the "good ole days" of the major worldwide DXpeditions of Danny Weil, Gus Browning, Loyd and Iris Colvin and Don Miller, particularly those operations which took place during the sunspot minimum of the mid-1960's. Poor propagation limits high frequency activities, especially 10 and 15 meters, and sharpens the competition.

Again, congratulations to the California crew. What do you have for an encore guys?

W8WZ—Silent Key

The DX World is saddened by the loss of Dr. H. E. Stricker, W8WZ, who died of a heart attack on June 23, 1974. "Doc" was the very first winner of a Single Band WAZ plaque, 20 meter c.w. awarded at the 1974 Dayton Hamvention, and was working on the award for 15 meters at the time of his passing.

De Extra

DXCC—Rule 9: As the ARRL DX Advisory Committee considers changes in DXCC rules, considerable discussion has developed regarding rule 9. This is the rule which defines the limits within which a station may be moved before the country total reverts to zero. It reads as follows:

(9) All stations must be contacted from the same call area, where such areas exist, or from the same country in cases where there are no call areas. One exception is allowed to this rule: where a station is moved from one call area to another, all contacts must be made from within a radius of 150 miles of the initial location.

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

The WPX Program

445 JA3AAW	447 K9UQN	449 WB2VWW
446 DJ8CR	448 F6AUS	450 DL3BC

SSB

810 JA2LA	811 GW4BLE	812 DJ9RB

C. W.

1335 G3HB	1338 WA5EEM	1340 DJ1NG
1336 K9UQN	1339 DM2ARD	1341 WA2AUB
1337 F6BPP		

Endorsements

Mixed: W4BQY, W6TCQ-1000, WB4KZG-900, SM7TV, W9IRH-800, WA6HRS, W2OVC, WA5VDH-700, WA5ZWC, WA6TAX, K9YXA-650, W5QBM, JA2LA-600, WA2AUB, WØYVA/4-500
SSB: W6TCQ, W4IC-800, WA6AHF, WB6DXU-700, WA2EAH-650, W6TTS-550, WA5VDH-500, LU1BAR/W3-450, WA2AUB-350
CW: WB2FMK-950, W3ARK-750, WA6JVD-700, W4KFB-550, WA5VDH, WA3GNW-500, KH6HC-450
Europe: OK1DVK, OK2DB, SM5-2735
North America: WDX5FEB, WB2FMK

Complete rules for WPX may be found on pg. 67 of the February, 1972 issue of *CQ*. Application forms and reprints of the rules may be obtained by sending a business size, self-addressed stamped envelope to WPX Award Manager, P.O. Box 1271, Covina, Ca 91722.

The July 2, 1974 issue of the West Coast DX Bulletin printed a well-written letter from DeWitt Jones, W4BAA, pointing out some of the inequities resulting from this rule where membership on the DXCC Honor Roll is concerned. As a result of rule 9 and the listing of inactive (but not deleted) countries for Honor Roll credit, it is a necessity to remain near or within the same call area if one wishes to maintain a high spot in the Honor Roll.

This is not to say that a person cannot move. He can move a considerable distance as long as he remains in the same call area. For example, OM DeWitt points out that a W7 can move from Bellingham, Washington to Douglas, Arizona, a distance greater than from Chicago to Cuba, without restarting his DX score, while a W2 or W3 would be limited to a rather modest 375 miles. Anyone crossing the boundary of a call area is limited to only 150 miles.

W4BAA himself has started DXCC over 3 times. Initially he worked 174 countries and earned WAZ #16 as W6WKU during the period 1945-50. From 1951-72 he worked 315 countries as W9WKU and during 1973 and 1974 he has worked about 200 countries as W4BAA.

In checking 1974 Callbook listings for the W4 and W9 areas and extrapolating to all 10 call areas, DeWitt estimates that over 3000 U.S. amateurs move to a different call area each year, an indication that the ham population is significantly mobile. Since rule 9 does not recognize the vast distances one can move in his own district, and since it was developed over 25 years ago when the U.S. population was less mobile, W4BAA feels that rule 9 should be modernized. He offers the following alternative recommendations:

(1) Rule 9 be relaxed to match the greatest distance a U.S. amateur can move within any district. This would be about 1500 miles for a W7.

or (2) Rule 9 be eliminated entirely, letting all contacts count no matter from where they might be made within the continental U.S.

or (3) All countries which are not active during a 10 year period be temporarily deleted until they are activated again, i.e. Clipperton, giving the amateur who moves a reasonable chance to make the Honor Roll.

If you have thoughts about this and related matters I am sure that they would be appreciated by the ARRL DX Advisory Committee.

From the Postoffice

The U.S. Postal Service advises "Watch for Changes in Countries' Names." DXers in a rush for a much coveted QSL best heed this advice, because a country's proper name can be very important if national pride is involved.

An example cited by the postal authorities is *Belize*, the country we used to call British Honduras. Citizens of this Central American country could feel slighted if we display our ignorance by omitting their new name on the address label.

Other examples of particular concern to DXers include *Sri Lanka*, which we knew in the past as Ceylon, and the *Khmer Republic*, proper name for the land referred to as Cambodia on the evening news.

In an address, Germany could represent either of two countries. Therefore, the label should read *West Germany* if the card is for the Federal Republic of Germany and *East Germany* if it is designated for the German Democratic Republic. Failure to indicate the correct Germany can generate missent mail, costly handlings between the two countries and substantial delays for you.

The problem is more difficult in the case of the two Chinas. If you use the improper name and your card or letter goes to the wrong country it will probably be returned to you. Mail to the island of Taiwan should be addressed *Republic of China*, while mail to the mainland must be addressed *Peoples Republic of China*. The Chinese also insist that their capital city be spelled Peking, rather than Peiping.

A list of countries by geographic areas is available through customer service representatives or postmasters.

The WAZ Program

S.S.B. WAZ

1212 UO5BZ	1215 JA2KLT	1218 DK6QA
1213 WA2FCA	1216 K3SXQ	1219 WA3MBQ
1214 K4RA	1217 JA7TI	

C.W.—Phone WAZ

3726 UT5EW	3732 WA5OCN	3737 JA3BN
3727 UK1AAG	3733 W4UPJ	3738 W5HCJ
3728 UA1DX	3734 W4KFB	3739 JA1JKG
3729 UW1YY	3735 YU2CDS	3740 DL6ZB
3730 UA6NX	3736 K6UJS	3741 WA3MBQ
3731 WØHBH		

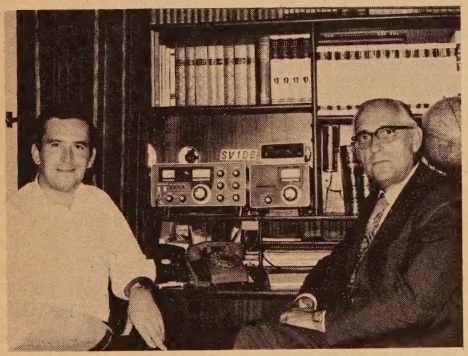
Complete rules for the Single Band WAZ program are shown on pgs. 57-58 of the December, 1972 issue. Complete rules for regular WAZ may be found on pgs. 64-66 of the June, 1970 issue. Application blanks and reprints of the rules for WAZ awards may be obtained by sending a business size, self-addressed, stamped envelope to the Assistant DX Editor, P.O. Box 205, Winter Haven, FL 33880.

Rare or Special Prefixes for WPX

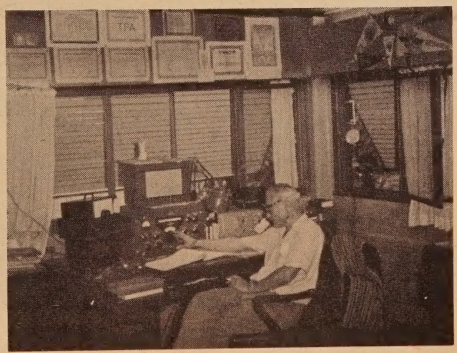
CY2—The CY2 prefix was used during August and September by VE2 stations in connection with the Festival International de la Geunesse.

FR0—Our good friend and *CQ* DX checkpoint, Claude, F9MS, is operating FR0BCS on Reunion Island. QSL to Claude's home QTH, 63, rue Voltaire, Suresnes (Seine), France.

H3—H3A—H3Z has been allocated by ITU to the Republic of Panama.



On the left is Norman, G3FNJ, visiting SV1DB at the latter's home QTH in downtown Athens. *(Photo via SV1EN.)*



C. L. Hardy, LU1DJU, has been award manager for the Radio Club of Argentina for 12 years. He is a very active 77 years old.

The CQ DX Award Program

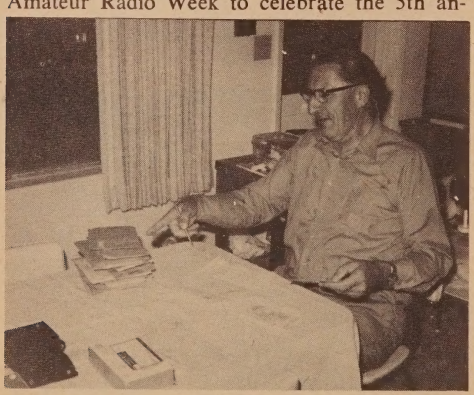
C.W. DX		2XSSB DX	
159	W6PT	359	ZL3UC
160	DJ1NG	360	K2ANT

Endorsements

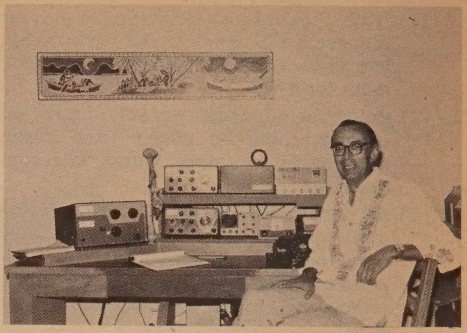
CW: W6PT-310 Countries

Complete rules and application forms for the *CQ* DX Award Program may be obtained by sending a business size, self-addressed, stamped envelope to DX Editor, P.O. Box 1271, Covina, Ca 91722.

IB0—IB0JN was operating from Ventolene Island. His QSL Manager is I8KDB.
IF0—IF0XRR was operated by I5XRR as a QRP Mobile Propagation Research Study.
KF0—KF0UMD operated Aug. 15-18, 1974 from the Carlton Co. Fair, Barnum, Minnesota to celebrate the 2nd Anniversary of Teaching Amateur radio at the University of Minnesota, Duluth. QSL to WA0QIT, 123 South 65th Ave., Duluth, MN 55807.
KL2—KL2ARW commemorated Amateur Radio Week in New York. QSL to WA2UWA.
KS9—KS9EAA operated from the 22nd Annual Experimental Aircraft Association Convention in Oshkosh, Wisconsin. QSL to WA9GJU.
LH0—VK2BKE/LH on Lord Howe Island counts as LH0 for WPX. Mail to Dr. Ken Hicks, Lord Howe Island, 2898, Australia.
S2—SM2DWH/S2 in Bangladesh frequently operates near 14225 kHz at 1400 GMT.
SQ0—SQ0ITU was one of many Polish stations using the special prefix. QSLs for this station should be routed to SP5WC.
SU0—Portable SU stations are SU0 for WPX. VE6CBJ/SU has been quite active 1900-2100 GMT on 20 meter s.s.b. QSL to VE1AL.
WF6—Cards for the WF6OCF operation from the Orange County Fair should be sent to K6VDP.
WH4—QSL WH4FLA to W4OZF.
WM2—WM2OON operated during New Jersey's Amateur Radio Week to celebrate the 5th anniversary of the Apollo-11 moon landing, QSL to W2KF. Another active WM2 was WM2ARS who has WA2CCF as his QSL manager.
WS1—The America's Cup Race was celebrated by WS1ACR issued to the Newport, Rhode Island Amateur Radio Club. QSL to W1SYE.
WW3—WW3FAF commemorated the Festival of American Folklore. Confirmations are being handled by W3DOS.
WY6—The WY6FDA operation was in honor of Flag Day America. QSL to WA6WMT.
5J—Special prefix used by Columbian stations in contest. 5J3 = HK3, etc.



Jock White, ZL2GX, CQ Award checkpoint for New Zealand, pitches in to cut down the stack of cards for WAZ checking at the K4IIF QTH. Jock and his delightful XYL Beattie visited John and Olga Attaway for several days last year.



This fine shack belongs to Len, KG6SW and is complemented by a Triband Yagi and fixed delta loop beam on the US for 7 mHz. *(Tnx W7YBX)*

QSL Information

A6XS—Via G3SUW
A6XT—To G4CHP
A9XK—c/o WB2FVO
A35FX—Via ZL2AFZ
A51PN—To W1JFL
C21NP—c/o P.O. Box 225, Republic of Nauru (Pacific)
CR9AK—Via CT1BH
DU1JMG—To P.O. Box 1381, Manila, Philippines
EP2VJ—c/o P.O. Box 12-1135, Tehran, Iran
F2JD/5U7—Via F2MO
FØBCL/3A2—To DK4YM
FC2CH—c/o WA8TDY
FR7ZU/J—Via P.O. Box 4, St. Clotilde, Reunion Island (Via France)
HBØXJJ—To DL7HZ
JA8IRV/JD—c/o JA8JL
JY9GR—Via P.O. Box 565, Amman, Jordan
KA8AA—To W7PHO
KG4FX—c/o George Salinas, USNAS, Box 41, FPO Norfolk, VA 23593
KG6SW—Via W7YBX
KM6DF—c/o KASKP, Kenneth Phillips, NASU, FPO Seattle, WA 98764
SVØWGG—To K4EKJ
TU2DV—c/o WA6NFC
TU2EF—Via WA6CEB
VE3NEB/HH—To VE1AYE
VP2DM—c/o WA1ABV
VP2GFA—Via KL7FA
VP2LAO—To W3HNK
VP2SV—c/o K3GYD
VR1AM—Via P.O. Box 419, Betio, Tarawa, Gilbert Islands (Pacific)
VS5MC—To DK5JA
YB3AP—c/o P.O. Box 59, Surabaya, Java, Indonesia
ZD3G—Via P.O. Box 165, Banjul, The Gambia
ZD3O—To OZ1OO
ZK1CL—c/o The Radio Station, Atutaki, Cook Islands (Pacific)
ZK1CY—Via W6KNH
3A2GX—To I1SCL
5R8SD—c/o F8US
5T5CJ—To W4BAA, P.O. Box 1, Captiva Island, Fla. 33924
5T5LO—Via K9KXA
5V7AR—To P.O. Box 123, Lome, Togo, West Africa
5X5NK—c/o DL1YW
5Z4PD—Via P.O. Box 14829, Nairobi, Kenya, East Africa
7Q7DW—To G3AWY
9G1GG/TY—c/o WA2NVQ
9K2DC—Via W3HNK
9V1RR—To P.O. Box 2728, Sinapore
9V1RW—c/o SM5CAK



Propagation

BY GEORGE JACOBS,* W3ASK

THE 1974 *CQ* World Wide DX Contest will be held on the following dates:

Phone Section: 0000
GMT October 26—2400 GMT October 27
C.W. Section: 0000
GMT November 23—2400 GMT November 24

For the 24th successive year, this month's *Propagation* column contains a special forecast for use during the Contest sections, both phone and c.w.

Sunspot Activity

Strange things happened on the sun's surface this past July. Here it is the "low" part of the present solar cycle, and the Swiss Solar Observatory announces that the monthly mean sunspot number for July was 61.5. This is a much higher level than would ordinarily be expected. This pushes the 12-month running smoothed sunspot number, upon which the sunspot cycle is based, up to 36, centered on January, 1974. At this point, the present cycle seems to be rising a bit, rather than declining! While this is probably only a very short term increase in solar activity, it does slow down the cycle's decline. It also means that we can expect somewhat better DX conditions this fall than would have been possible if this increase had not taken place. It looks pretty certain now that solar activity will be in the upper 20's during October and November, maybe even as high as 30.

Solar activity during last year's Contest period was on the order of 33.

Storm Warning

Conditions during last year's Contest were pretty much as predicted. They were rated ABOVE NORMAL during the Phone section, and generally were good-to-excellent. Conditions during the c.w. section began NORMAL, but slid to BELOW NORMAL by the second day, and averaged only fair, but with periods that were poor.

In early September, as this is being written, a long-range forecast indicates that there is, unfortunately, a 75% chance that a radio storm will develop during both the Phone and c.w. sections of this year's Contest period. It's too early to estimate what the intensity of the storm might be, but it will probably drop conditions to BELOW NORMAL for at least part of the time. Check the "Last Minute Forecast" at the beginning of this column for updated information, and be sure to check either MAIL-A-PROP or DIAL-A-PROP for the latest propagation forecast just prior to the Contest.

*11307 Clara St., Silver Spring, MD 20902

LAST MINUTE FORECAST

Day-to-Day Conditions Expected For October, 1974

	Rating & Forecast Quality			
Propagation Index .....(4)	(3)	(2)	(1)	
Date *October*				
Above Normal: 6, 8-9, 11, 30	A	A-B	B-C	C
Normal: 2-5, 7, 10, 12, 17, 19-22, 24, 27-29, 31	A-B	B-C	C-D	D-E
Below Normal: 1, 13, 15-16, 18, 23, 25-26	B-C	C-D	D-E	E
Disturbed: 14	C-D	D	E	E

Where *expected signal quality is:*

A—Excellent opening, exceptionally strong, steady signals.

B—Good opening, moderately strong signals with little fading or noise.

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

D—Poor opening, signals weak 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 particular opening for any day of the month. For example, all openings shown in the Charts with a *propagation index* of (3) will be fair to poor (C-D) on Oct. 26, fair to good on Oct. 27, (B-C). Below normal conditions are expected on Oct. 26, the first day of the *CQ* World Wide DX Contest. Conditions should improve to just about normal on the 27th.

For updated information dial Area Code 516-883-6223 for DIAL-A-PROP, or subscribe to weekly MAIL-A-PROP, P.O. Box 86, Northport, NY 11768.

Band-by-Band Conditions

The following is a band-by-band summary of general DX propagation conditions that can be expected during the 1974 Contest.

10 Meters—Solar activity should be high enough to permit some 10 meter openings, as long as conditions remain NORMAL. If a storm should develop during the Contest period, there could be very little DX on this band. Fairly good openings should normally be possible to South America during much of the daylight hours. Other openings may also occur to Africa, the Pacific Islands, Australasia and New Zealand. Conditions should peak towards the east and southeast before noon, and towards the west and south during the afternoon. If conditions should stay NORMAL, the band may also open towards Europe from the eastern and central areas of the USA, and to Asia and the Far East from western states.

15 Meters—A significant seasonal improvement is expected in DX conditions on this band during October and November. When conditions are NORMAL good openings should be possible to

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How To Use The DX Propagation Charts

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

2. The predicted times of openings are found under the appropriate meter band column (10 through 80 Meters) for a particular DX region, as shown in the left hand column of the Charts. An * indicates 80 Meter openings. Openings on 160 meters are likely to occur during those times when 80 meter openings are shown with a *propagation index* of (2), or higher.

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

(4) Opening should occur on more than 22 days
(3) " " " 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 Propagation 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.

4. 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. Appropriate *standard* time is used, *not* GMT. To convert to GMT, add to the times shown in the appropriate Chart 8 hours in the PST Zone, 7 in the MST Zone, 6 in the CST Zone and 5 in the EST Zone. For example 14 in Washington, D.C. is 19 GMT and 20 in Los Angeles is 04 GMT, etc.

5. The charts are based upon a transmitter power of 250 watts c.w., or 1 kw, p.e.p. on sideband, into a dipole antenna a quarter-wavelength above ground on 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 10 db loss, it will lower by one level.

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

one area of the world or another from an hour or so after sunrise to almost sunset. The band should peak to Europe before noon; to Africa at about noontime; to South America during the afternoon, and to the Pacific, Australia, New Zealand, the Far East and other Asiatic areas during the late afternoon, and possibly into the early evening.

20 Meters—The band should close earlier in the day than it did during the summer months, but between fair and excellent DX openings should be possible to all areas of the world, sometime between the sunrise period and the early evening hours. Openings to many southern and tropical areas may be possible to as late as Midnight, if conditions are NORMAL. Signals should peak to all areas of the world for two or more hours after sunrise, and again during the late afternoon. All-in-all, this is still likely to be the best band for DX during the Contest.

40 Meters—DX openings towards Europe and in an easterly direction should begin during the late afternoon hours and improve with darkness. Good openings towards the south should be possible throughout most of the hours of darkness. Openings in a westerly direction should peak at about sunrise in the USA, just before the band closes for DX propagation. If conditions are NORMAL, signal levels on this band can be expected to be strong.

80 Meters—Some fairly good DX openings should be possible to several areas of the world during the hours of darkness and the sunrise period. Conditions should peak around midnight on paths to the east, shortly before sunrise on paths to the north or south, and just after sunrise on openings in a westerly direction from the USA.

160 Meters—DX possibilities are improving on this band. While not as good as 40 or 80 meters, DX openings should be possible to many areas of the world during the hours of darkness and the sunrise period. Because of power limitations imposed in this band in many areas of the world, signals at best are likely to be noisy, especially on phone. The best time for 160 meter DX is when a path is in *complete* darkness. Within this period, conditions often peak just as the sun begins to rise at the *easterly* point on the path. The best forecaster for 160 meter DX is a set of sunset and sunrise tables. For example, if the sun is expected to rise at 0600 GMT in western Europe, then this is the best time to look for an 160 meter opening between western Europe and the USA, plus or minus 15 minutes, or so. Conditions on 80 meters can often also serve as an indicator for 160 meter openings. The band will often open at times when 80 meters seems to peak on a particular path. With these tips and some patience, it should be possible to work several DX areas of the world on 160 meters during the Contest.

Radio Storm

The propagation data appearing in the Charts in this column are based on *normal* conditions for a sunspot level in the upper 20's. If a radio storm should develop during the Contest, conditions may drop to BELOW NORMAL or DISTURBED, depending upon its severity. Under such conditions, expect considerably fewer openings on 10, 15 and 20 meters. During storms, propagation conditions on 40, 80 and 160 meters generally become erratic, with poorer openings during certain phases and improved openings at other times.

If a storm should develop, circuits passing through or near polar regions will probably become weak, fade considerably, or may even black out entirely. While east-west propagation may become poorer, north-south paths may improve. Concentrate on working the higher frequency bands and paths to the northeast, north and northwest during the daylight hours, and the lower bands and paths to the east, south and west during the evening and early morning hours.

Up-Dated Contest Info

In order to meet printing and publication deadlines, the forecasts appearing in this column

have to be made more than two months before the Contest dates, and are subject to change. For up-dated propagation data, specially tailored for the radio amateur and available at the beginning of the Contest, try MAIL-A-PROP and DIAL-A-PROP.

A *special* MAIL-A-PROP forecast will be issued for both the Phone and c.w. sections of the Contest. MAIL-A-PROP forecasts, issued in weekly newsletter format, contain day-to-day descriptions of expected conditions on each h.f. amateur band. Written in simple language, they describe conditions as ABOVE NORMAL, NORMAL, BELOW NORMAL or DISTURBED, based on the latest analyses of magnetic, ionospheric and radio data. Band openings are rated as *excellent, good, fair* or *poor*. There are special sections for DX tips continent-by-continent, band-by-band and for time periods throughout a day.

All regular subscribers will receive automatically the special Contest forecasts. The annual subscription rate, for 52 issues, is $30, postpaid. A special five-issue introductory subscription, covering both sections of the Contest, is available for $5, postpaid. Checks should be sent to MAIL-A-PROP, P.O. Box 86, Northport, N.Y. 11768 *before* October 15 to receive this special subscription.

MAIL-A-PROP and DIAL-A-PROP forecasts are tailored for the radio amateur and apply specifically to the amateur bands. Updated propagation data of a more general nature is available from the hourly transmissions of WWV, Fort Collins, Colorado.

C.W. Contest Forecast

This month's Charts are valid for *both* the Phone and C.w. sections of the 1974 Contest. *Be sure to keep them for use during next month's C.w. section as well.* Next month's column will contain Short-Skip Charts for November and December, 1974. Short-Skip propagation forecasts for October appeared in last month's column.

Good luck in the 1974 Contest

73, George, W3ASK

October 15—December 15, 1974

Time Zone: EST (24-Hour Time)

EASTERN USA TO:

	10 Meters	*15 Meters*	*20 Meters*	*40/80 Meters*
Western & Central Europe & North Arica	09-11 (1)	08-09 (1) 09-11 (3) 11-12 (2) 12-13 (1)	06-07 (1) 07-08 (2) 08-09 (4) 09-11 (3) 11-13 (4) 13-14 (3) 14-15 (2) 15-17 (1)	16-17 (1) 17-18 (2) 18-23 (3) 23-02 (2) 02-03 (3) 03-04 (1) 19-21 (1)* 21-23 (2)* 23-01 (3)* 01-02 (2)* 02-03 (1)*
Northern Europe & European USSR	09-11 (1)	08-09 (1) 09-10 (2) 10-11 (1)	06-07 (1) 07-10 (3) 10-13 (2) 13-15 (1)	17-19 (1) 19-23 (2) 23-02 (1) 02-03 (2) 03-04 (1) 20-23 (1)* 23-01 (2)* 01-03 (1)*
Eastern Mediterranean & Middle East	08-10 (1)	08-09 (1) 09-11 (2) 11-12 (1)	06-10 (1) 10-12 (2) 12-15 (3) 15-17 (2) 17-18 (1)	18-20 (1) 20-00 (2) 00-02 (1) 20-00 (1)*
West Africa	10-12 (1) 12-13 (2) 13-14 (1)	08-10 (1) 10-12 (2) 12-13 (3) 13-15 (4) 15-16 (2) 16-17 (1)	06-07 (1) 07-09 (2) 09-13 (1) 13-15 (2) 15-16 (3) 16-17 (4) 17-18 (3) 18-19 (2) 19-20 (1)	18-22 (1) 22-01 (2) 01-03 (1) 00-03 (1)*
East & Central Africa	10-13 (1)	08-12 (1) 12-14 (2) 14-15 (1)	07-13 (1) 13-15 (2) 15-17 (3) 17-18 (2) 18-19 (1)	20-01 (1) 22-00 (1)*
South Africa	09-10 (1) 10-12 (2) 12-12 (1)	08-10 (1) 10-11 (2) 11-13 (3) 13-14 (2) 14-15 (1)	07-13 (1) 13-15 (2) 15-17 (3) 17-18 (2) 18-19 (1)	18-19 (1) 19-22 (2) 22-23 (1) 19-21 (1)*
Central & South Asia	*Nil*	17-19 (1)	07-08 (1) 08-10 (2) 10-12 (1) 19-21 (1)	18-21 (1) 05-07 (1)
Southeast Asia	*Nil*	17-19 (1)	07-08 (1) 08-10 (2) 10-13 (1) 18-21 (1)	18-20 (1) 05-07 (1)
Far East	*Nil*	16-17 (1) 17-18 (2) 18-19 (1)	07-08 (1) 08-10 (2) 10-11 (1) 16-19 (1) 19-21 (2) 21-22 (1)	04-08 (1) 05-07 (1)*
South Pacific & New Zealand	10-13 (1) 13-15 (2) 15-17 (1)	12-14 (1) 14-15 (2) 15-16 (3) 16-18 (2) 18-19 (1)	06-07 (1) 07-08 (2) 08-09 (3) 09-11 (2) 11-17 (1) 17-18 (2) 18-20 (3) 20-22 (2) 22-01 (1)	00-03 (1) 03-05 (3) 05-07 (2) 07-09 (1) 03-04 (1)* 04-06 (2)* 06-07 (1)*
Australasia	14-16 (1)	10-15 (1) 15-16 (2) 16-17 (3) 17-18 (2) 18-19 (1)	06-07 (1) 07-09 (2) 09-15 (1) 15-17 (2) 17-20 (1) 20-23 (2) 23-01 (1)	03-05 (1) 05-07 (2) 07-08 (1) 05-07 (1)*
Central America & Northern Countries of South America	08-09 (1) 09-10 (2) 10-12 (3) 12-13 (2) 13-15 (1)	07-08 (1) 08-09 (2) 09-14 (3) 14-15 (4) 15-16 (3) 16-17 (2) 17-18 (1)	02-06 (1) 06-07 (2) 07-09 (4) 09-11 (3) 11-15 (2) 15-16 (3) 16-18 (4) 18-18 (3) 19-20 (2) 20-00 (1) 00-02 (2)	18-19 (1) 19-21 (3) 21-03 (4) 03-05 (2) 05-06 (1) 19-21 (1)* 21-03 (2)* 03-05 (1)*
Peru, Paraguay, Bolivia, Brazil, Chile, Argentina, & Uruguay	09-11 (1) 11-15 (2) 15-16 (1)	07-08 (1) 08-10 (2) 10-13 (1) 13-14 (2) 14-16 (4) 16-17 (2) 17-18 (1)	14-16 (1) 16-17 (2) 17-19 (3) 19-20 (2) 20-22 (1) 22-02 (2) 02-06 (1) 06-08 (2) 08-11 (1)	20-23 (1) 23-04 (2) 04-06 (1) 23-04 (1)*
McMurdo Sound, Antarctica	*Nil*	13-15 (1) 15-16 (2) 16-17 (1)	16-18 (1) 18-19 (2) 19-21 (3) 21-23 (2) 23-00 (1) 06-08 (1)	00-06 (1)

*Indicates best time to listen for 80 Meter openings. Openings on 160 Meters are also likely to occur during those times when 80 Meter openings are shown with a forecast rating of (2), or higher.

Time Zones: CST & MST (24-Hour Time)
CENTRAL USA TO:

	10 Meters	*15 Meters*	*20 Meters*	*40/80 Meters*
Western & Southern Europe & North Africa	08-10 (1)	08-09 (1) 09-12 (2) 12-13-(1)	06-07 (1) 07-09 (2) 09-11 (1) 11-12 (2) 12-14 (3) 14-16 (2) 16-17 (1)	17-18 (1) 18-20 (2) 20-21 (3) 21-23 (2) 23-01 (1) 01-02 (2) 02-03 (1) 19-20 (1)* 20-22 (2)* 22-00 (1)*
Northern & Central Europe & Eur. USSR	08-10 (1)	08-11 (1)	06-07 (1) 07-12 (2) 12-14 (1)	18-20 (1) 20-22 (2) 22-01 (1) 20-23 (1)*
Eastern Mediterranean & Middle East	08-10 (1)	09-11 (1)	06-10 (1) 10-12 (2) 12-14 (3) 14-15 (2) 15-17 (1)	19-23 (1) 20-22 (1)*
West Africa	09-10 (1) 10-12 (2) 12-13 (1)	07-10 (1) 10-11 (2) 11-13 (3) 13-14 (2) 14-15 (1)	06-12 (1) 12-14 (2) 14-15 (3) 15-16 (4) 16-17 (3) 17-18 (2) 18-19 (1)	17-19 (1) 19-21 (2) 21-22 (1) 19-21 (1)*
East & Central Africa	09-12 (1)	08-11 (1) 11-13 (2) 13-14 (1)	07-14 (1) 14-15 (2) 15-17 (3) 17-18 (2) 18-19 (1)	20-00 (1) 21-23 (1)*
South Africa	09-10 (1) 10-12 (2) 12-13 (1)	07-10 (1) 10-11 (2) 11-12 (3) 12-13 (2) 13-14 (1)	07-13 (1) 13-15 (2) 15-17 (3) 17-18 (2) 18-19 (1)	18-19 (1) 19-21 (2) 21-23 (1) 19-21 (1)*
Central & South Asia	*Nil*	17-20 (1)	07-08 (1) 08-10 (2) 10-12 (1) 17-18 (1) 18-20 (2) 20-21 (1)	06-08 (1) 18-20 (1)
Southeast Asia	*Nil*	14-16 (1) 16-18 (2) 18-19 (1)	07-08 (1) 08-10 (2) 10-14 (1) 18-19 (1) 19-21 (2) 21-22 (1)	04-07 (1)
Far East	16-18 (1)	15-16 (1) 16-18 (2) 18-19 (1)	07-08 (1) 08-10 (3) 10-11 (2) 11-12 (1) 16-18 (1) 18-20 (2) 20-22 (1)	01-02 (1) 02-04 (2) 04-06 (1) 06-08 (2) 08-09 (1) 02-04 (1)*
South Pacific & New Zealand	11-13 (1) 13-16 (2) 16-18 (1)	10-14 (1) 14-16 (2) 16-18 (3) 18-19 (2) 19-20 (1)	06-07 (1) 07-09 (3) 09-11 (2) 11-17 (1) 17-18 (2) 18-20 (3) 20-22 (2) 22-00 (1)	23-01 (1) 01-06 (3) 06-07 (2) 07-08 (1) 00-02 (1)* 02-06 (2)* 06-07 (1)*
Australasia	14-16 (1) 16-17 (2) 17-18 (1)	10-13 (1) 13-15 (2) 15-17 (3) 17-18 (2) 18-19 (1)	16-18 (1) 18-20 (2) 20-22 (3) 22-00 (2) 00-02 (1) 05-07 (1) 07-08 (2) 08-10 (3) 10-11 (2) 11-14 (1)	02-04 (1) 04-07 (2) 07-08 (1) 03-04 (1)* 04-06 (2)* 06-07 (1)*
Central America & Northern Countries of South America	08-09 (1) 09-11 (2) 11-13 (3) 13-14 (2) 14-15 (1)	07-08 (1) 08-09 (2) 09-14 (3) 14-15 (4) 15-16 (3) 16-17 (2) 17-18 (1)	02-06 (1) 06-07 (2) 07-09 (4) 09-11 (3) 11-13 (2) 13-15 (3) 15-18 (4) 18-19 (3) 19-20 (2) 20-00 (1) 00-02 (2)	18-19 (1) 19-21 (2) 21-02 (3) 02-04 (1) 04-05 (2) 05-06 (1) 19-21 (1)* 21-02 (2)* 02-05 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina, & Uruguay	09-11 (1) 11-15 (2) 15-16 (1)	07-08 (1) 08-10 (2) 10-12 (1) 12-14 (2) 14-15 (3) 15-16 (4) 16-17 (2) 17-18 (1)	01-06 (1) 06-08 (2) 08-14 (1) 14-16 (2) 16-17 (3) 17-19 (4) 19-20 (3) 20-21 (2) 21-23 (1) 23-01 (2)	19-21 (1) 21-01 (2) 01-03 (1) 03-04 (2) 04-05 (1) 21-04 (1)
McMurdo Sound, Antarctica	*Nil*	13-15 (1) 15-17 (2) 17-18 (1)	15-17 (1) 17-19 (2) 19-22 (3) 22-00 (2) 00-01 (1) 06-08 (1)	23-05 (1)

Time Zone: PST (24-Hour Time)
WESTERN USA TO:

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

[*continued on page 64*]



Contest Calendar

BY FRANK ANZALONE,* W1WY

Calendar of Events

Oct.	5-6	VHF Space Net Contest
*Oct.	5-6	VK/ZL/Oceania Phone
*Oct.	5-6	California QSO Party
*Oct.	5-6	Missouri QSO Party
Oct.	5-7	W.E. Phone/C.W. Party
*Oct.	12-13	VK/ZL/Oceania C.W.
*Oct.	12-13	RSGB 21/28 mHz Phone
Oct.	16-17	YLRL Anniv. C.W. Party
Oct.	19-20	RSGB 7 mHz C.W. Contest
Oct.	19-20	WADM C.W. Contest
Oct.	19-20	Boy Scouts Jamboree
Oct.	19-21	Manitoba QSO Party
Oct.	**26-27**	**CQ WW DX Phone Contest**
Nov.	1-4	CHC/FHC/HTH Party
Nov.	2-3	ARRL C.W. Sweepstakes
Nov.	2-3	RSGB 7 mHz Phone Contest
Nov.	7-8	YLRL Anniv. Phone Party
Nov.	9-10	North Carolina QSO Party
Nov.	9-10	Rocky Mountain QSO Party
No.	10	Czechoslovakian Contest
Nov.	16-17	ARRL Phone Sweepstakes
Nov.	**23-24**	**CQ WW DX C.W. Contest**
Nov.	30	10 Meter Ground Wave Test
Dec.	7-8	Tops C.W. Contest
Dec.	7-8	ARRL 160 Meter Contest
Dec.	14-15	ARRL 10 Meter Contest

*Covered in last month's Calendar

YLRL Anniversary Party

C.W.: Oct. 16-17 Phone: Nov. 7-8
Starts: 1800 GMT Wed. (C.W.) Thurs. (Ph.)
Ends: 1800 GMT Thurs. (C.W.) Fri. (Ph.)

This is the 35th annual YLRL contest open to all YLs around the world. OMs keep out.

All bands may be used but avoid contacts on net frequencies. Phone and c.w. are separate with separate scoring and awards.

Exchange: QSO no., RS(T) and ARRL section or country.

Scoring: One point per QSO between stations within a ARRL section or between DX stations. Contacts between DX stations and ARRL section stations count 2 points. Same station may be worked only once.

Your multiplier is derived from the number of ARRL sections and countries worked. There is a low power multiplier of 1.25 if input is 150 watts or less, 300 p.e.p. on s.s.b.

Final Score: Total QSO points × ARRL sections and countries × power multiplier.

Awards: 1st, 2nd and 3rd place certificates to winners in each call district and DX country. And two Gold Cups, phone and c.w., to the top YLRL member in the world. There are also 3 special awards for YLRL members. The Corcoran for the highest combined c.w./phone score in a ARRL area, the Hager to the highest combined score for North and Central America, including Caribbean areas, and one for the rest of the world.

Compute your score, sign your log and mail no later than November 22nd to: Christine Haycock, WB2YBA, 361 Roseville Ave., Newark, N.J. 07107

RSGB 7 mHz Contest

C.W.-Oct. 19-20 Phone-Nov. 2-3
Starts: 1800 GMT Saturday
Ends: 1800 GMT Sunday

Like the 21/28 mHz phone contest this one is also based on contacts between the British Isles and the rest of the world. QSO point value is figured differently however but the bonus points are the same. Only single operator entries are acceptable. Phone and c.w. are separate contests.

Exchange: RS/RST report plus a progressive QSO number starting with 001.

Scoring: Contacts with British Isles stations vary in point value according to the location of the DX station. If in Europe, 5 points; North America, 15 points; Africa, Asia, South America, 25 points; Oceania 50 points.

In addition a bonus of 50 points may be claimed for the first contact with each B.I. country/number prefix. (G2, GC3, GD4 and etc. a max. of 36 possible.) No bonus for GB stations. Just add your total QSO points and bonus points for your final score.

Awards: Certificates to top station in each country and VE, VK, W/K, ZL and ZS call area. (A definite improvement.)

There is a s.w.l. section with scoring same as above. Overseas stations log British Isles stations only.

The c.w. entries must be received no later than Dec. 16th and the phone Dec. 30th. They go to: RSGB HF Contests Committee, c/o John Bazley, G3HCT, Brooklands, Ullenhall, Solihull, Warwickshire, England.

WADM C.W. Contest

Starts: 1500 GMT Saturday, October 19
Ends: 1500 GMT Sunday, October 20

Here is a good opportunity to add to your country total now that DM/DT has been given separate country status. Use all bands 3.5 thru 28 mHz on c.w. only. There are 3 classifications, single operator, multi-operator and s.w.l.

Exchange: RST plus QSO no. starting 001.

*14 Sherwood Road, Stamford, Conn. 06905.

Scoring: Three points for each DM/DT contact. Multiply total by sum of DM districts worked on each band. A district is identified by the last letter in the call, *not* by the number in the prefix. (A thru O, a maximum of 15 possible on each band.)

Awards: Will be in the form of certificates. Contest QSO's may also be applied for the many DM awards. WADM, DMCA, DMDXC and DMKK. More information available from the GDR.

Logs go to: Radio Club of the GDR, Att: DM2ATL, DDR 1055 Berlin, P.O. Box 30, German Democratic Republic.

Scouting's Jamboree-on-the-Air

Starts: 6:00 P.M. Friday, October 18
Ends: 12:00 P.M. Sunday, October 20
(Local Time)

This is the 17th annual Jamboree-on-the-Air (JOTA) in which amateurs may assist in promoting Scouting fellowship on the air. It is also a fine opportunity to introduce amateur radio to newcomers. Individual amateurs and club stations may invite scouting groups to their station to contact similar groups at other stations. Interested amateurs should contact their local scout council and give them details of availability for the JOTA. Scouts should contact their Council for assignments.

Frequencies: Phone — 3740, 3940, 7090, 7290, 14290, 21360, 28990. C.W. —3590, 7060, 14070, 21140. 28190. Also 2 and 6 meters. (Above are calling frequencies).

Logging Info: List all stations worked or heard in JOTA activity, time in GMT. Indicate if other station operator is a Scout, Scouter, or has been either one. And how many Scouts or Scouters were present at other station. Tally up the number of JOTA contacts, stations with Scouts or Scouters operators, and number who participated from your station.

Awards: The JOTA Certificate will be awarded to all participants, amateurs, Scout groups and s.w.l.s who submit a report.

Logs and reports go to your National Organizer. In the USA it is Walter Maxwell, W2DU, Care of National Headquarters, Boy Scouts of America, North Brunswick, N.J. 08902.

Manitoba QSO Party

Starts: 0001 GMT Saturday, October 19
Ends: 0400 GMT Monday, October 21

This is the first QSO party sponsored by the Amateur Radio Clubs of Manitoba. This being the Centennial year for the city of Winnipeg the special VA4 prefix has been issued for the occasion. Should be interesting for WPX buffs.

The same station may be worked on each band and mode, VE4 to VE4 contacts permitted.

Exchange: QSO no., RS(T), name and QTH. City or town for Manitoba; state, province or country for others.

Scoring: Each contact 1 point. VE4's multiply total by number of US states, VE provinces and DX countries worked. All others use number of Manitoba cities and towns worked.

Frequencies: Phone—3770, 3900, 7145, 7230, 14190, 14280, 21250, 21355, 28600. C.W.—3750, 7150, 14090, 21200, 28200.

Awards: Certificates to top scorers in each province, state and DX country. Plaques to the highest scoring base and mobile station outside Manitoba, and base and mobile within the province of Manitoba.

Mailing deadline for logs is November 8th to: Doug Bowles, VE4QZ, 1104 First Street, Brandon, Manitoba, Canada R7A 2Y4.

IARS CHC/FHC/HTH QSO Party

Starts: 2300 GMT Friday, November 1
Ends: 0600 GMT Monday, November 4

The International ARS is going to find it rough going for their Fall QSO Party. With the ARRL C.W. Sweepstakes now on the same week-end, things are bound to get a bit sticky.

Exchange: QSO no., RS(T), name, CHC/FHC no., state, county or similar subdivision. Non-members send HTH in place of number.

Scoring: For CHCers: 1 point per QSO with other CHCers, 2 points if it's a HTHer, and 1 additional point if it's a YL, B/P, FHC, Novice, CHC200, Merit or Club station. Double above points if QSO is out of own country.

For HTHers: Contacts with other HTHers 1 point, with CHCers 3 points, otherwise same as above. Scoring for s.w.l. same as HTH.

Multiplier: Each continent, country, ITU zone and US state. (counted once only)

Final Score: Total QSO points from all bands multiplied by the sum of the multiplier. Multi-operator stations divide score by number of operators. (The same stations may be worked on each band and mode for QSO points.)

Frequencies: C.W.—3575, 3710, 7160, 14075, 21075, 21090, 21140, 28090. Phone—3770, 3790, 3943, 3960, 7070. 7090, 7210, 7260, 7275, 14320, 14340, 21360, 21440, 28620, 28690. Both for US and DX as allowed.

Awards: Hundreds of certificates and trophies for CHC, FHC, SWL-CHC, HTH, VHF, Novice and B/P (blind/paralyzed)

As you can see the rules are rather detailed. Would suggest you send a large s.a.s.e. (20¢ or 2 IRC) to K6BX for a contest package.

Send logs and all requests to: I.A.R.S., K6BX, P.O. Box 385, Bonita, Calif. 92002

CQ World Wide DX Contest

Phone: Oct. 26-27 C.W.: Nov. 23-24
Starts: 0000 GMT Saturday
Ends: 2400 GMT Sunday

Not much object in repeating the rules which are now well established and appeared in details in last month's issue.

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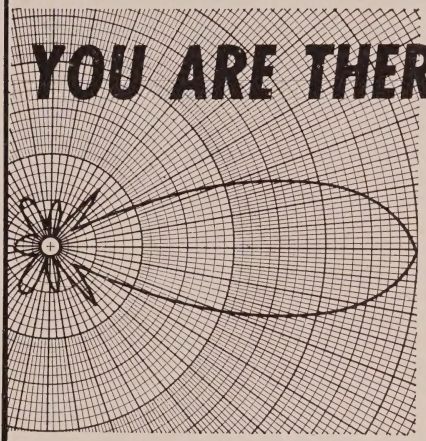
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As a reminder however, the ARRL and DARC WAE country lists are used to determine the Country multiplier. The latest WAE list will be found on page 64 of the July issue.

In the multi-operator, single transmitter category you are limited to *one* band change for the purpose of picking up a new multiplier within the 10 minute time period. Abuse of this exception will land your score in the multi-multi division.

If you copy your log it must remain in its original form, showing duplicate contacts if any, and of course no credit taken.

And for pity sakes, make sure your name and complete mailing address appears on your summary sheet. In BLOCK LETTERS please.

Mailing deadline for Phone entries is Dec. 1st, and Jan. 15th for the c.w. section. To: CQ World Wide DX Contest. 14 Vanderventer Ave., Port Washington, L.I., N.Y. USA 11050. Indicate Phone or C.W. on envelope.

Editor's Notes

The VHF Space Net announcement was not received in time to give full details in last month's CALENDAR. However rules are the same as previous Space Net contests. The last one appeared in the June CALENDAR. Logs as usual go to: Space Net VHF Contest, Box 909, Sicklerville, N.J. 08081

Except for the date change that disrupted some of the activities that had already made plans for the first week-end in November, I believe there has been no other major change in the ARRL Sweepstakes. The current issue of *QST* will give you all the information.

Following are a few errors and omissions in the Phone Contest results.

We neglected to indicate that VE3HUM was the winner of the Calgary A.R.A. Trophy for the highest Multi-operator, Single Transmitter score for Canada.

The Multi Single score of 1,541,706 for PY1EMM was left out.

CP3BY/1 listed as a U.S. entry was actually operating portable in Bolivia.

G3ESF listed as a 3.5 mHz Phone log was a c.w. entry.

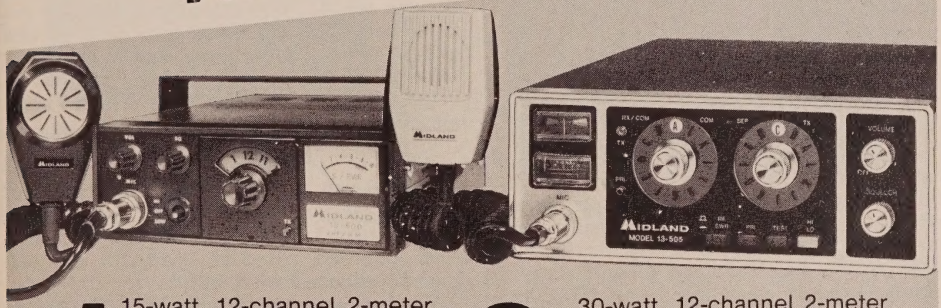
All certificates for the 1973 Contest have been mailed out at this writing. (late August) That is all except those that neglected to indicate their mailing address. And would you believe a few even neglected to sign their name? That's a fact.

You can thank W1MDO's XYL Michelle for the excellent job of processing almost 800 certificates months earlier than in past years. You can blame our good old Postal Service if you have not received yours. But let us know and we will make out a duplicate.

Sure glad that one's over. Man! you have no idea of the work involved.

73 for now, Frank, W1WY

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THE awards PROGRAM

BY ED HOPPER,* W2GT

Special Honor Roll
All Counties

#117—Alfred L. Pedneau, K5HKG, 6-29-74.

THE "Story of The Month" for October as told by Bob is:

Robert L. Dyson, KØAYO

(All Counties #106, 7-26-73)

"In May of 1969, I finally decided to go in earnest for the 3079 Award (Only 3075 now). I had previously worked on the All Kansas Award and various other awards, but the challenge of trying for the *Big One* got to me. After a year, the figure 2500 had been reached, mainly due to the fact that I was working midnight to eight and had about 4 hours a day to devote to the 20 meter mobile net. Two years later the number had only risen to 2980, but the working hours were better. I also took time out from the County Hunting to work 5 Band WAS. Guess where the 20 and 80 meter contacts came from.

"Finally, on July 22, 1973, K9KKX drove to Noxubee County Mississippi for number 3078 and at 2145, the same day, K9KKX crossed over to Humphreys County Mississippi for the *Big One*. Many thanks to Ray for all the effort and driving to get these for me.

"During the last two years, the XYL and I have been busy having a new home built and moving. We are now in (new QTH Rt. 1, Box 230M, DeSoto, Kansas 66018) but still not settled but I hope to have the rig on the Nets long before you read this. I sure miss the gang, besides, WBØDPD (MARAC) still has about 1000 to go.

*P.O. Box 73, Rochelle Park, N.J. 07662.

USA-CA HONOR ROLL

3000	1500	500
K5HKG 140	K5HKG 249	WAØBMO ...1004
G4JZ 141	G4JZ 250	OK2BOB 1005
2500	**1000**	JA1OMH 1006
K5HKG 175	K5HKG 333	K5HKG 1007
G4JZ 176	WBØFRM 334	G4JZ 1008
2000	G4JZ 335	CT1UA 1009
K5HKG 205		
G4JZ 206		

"I've been on the air since September 1955, starting out with an S38C, an 807 and an 80 meter dipole. Since then, I've worked up to a 75S1, HT-37-HA-10 and a TA33-40 with a 65 foot tower. At the old QTH I was unable to put up the beam and tower, so I used inverted Vees on 80-40-20 to get them all. The mobile presently is a Swan 350, with Hustlers with an HW100 as backup.

"I want to take this opportunity to thank everyone, past and present, on the nets who helped with net control, the relays and phone calls when I got near the end. I won't attempt to name the calls, because I would be sure to miss someone and that's the last thing I want to do.

"Just a word to the newcomers, don't be discouraged when you look at all the time it will take to work them all, there is nothing to compare to the feeling you get when you get that final report to finish up. The guys and gals on the nets are the best bunch of hams in the world and they will go out of their way to help each other. It's been a real pleasure to be associated with the County Hunters."

Awards Issued

Al Pedneau, K5HKG, who has given out many rare Counties, waited until he had them *All* and won USA-CA-500 through USA-CA-3000 endorsed All S.S.B., All 20; and *All Counties* endorsed All S.S.B.

Frank Coursey, G4JZ was issued USA-CA-500 through USA-CA-2500 endorsed All 14, All S.S.B.; and USA-CA-3000 endorsed Mixed. Although Frank was #15 to a G station, he is the first to go beyond the basic 500 Award and he needs but 7 to make All Counties. One 500 Award went to GD3GMH, one to GI6TK, and GW3NWV also has USA-CA-3000.

Will Weisert, WBØFRM applied for USA-CA-1000 endorsed All 2 × S.S.B., All Mobiles and upped his USA-CA-500 endorsement to include All 2 × S.S.B., All 14, and All Mobiles.

Arthur Nelsen, WAØBMO was granted USA-CA-500 endorsed All 80, All S.S.B.

Bob Krenek, OK2BOB was sent USA-CA-500 endorsed All 2 × C.W.—this is the 10th Award to an OK station.

Kunimitsu Takahashi, JA1OMH acquired USA-CA-500 endorsed All A-1. This is the 11th Award to Asia.

Justino Ramiro Santos, CT1UA obtained USA-CA-500 endorsed All S.S.B. This is #3 Award to CT1.

Awards

Connecticut Counties Award (CCA): This Award is sponsored by the Council of Connecticut Amateur Radio Clubs. Required: One two way contact with each of the eight (8) Counties of Conn. There are no limitations as to date, band, mode. Mobile and portable con-

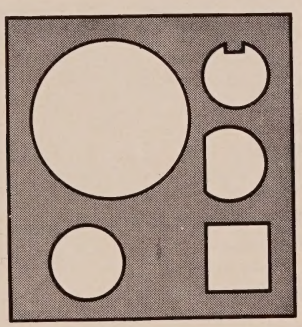


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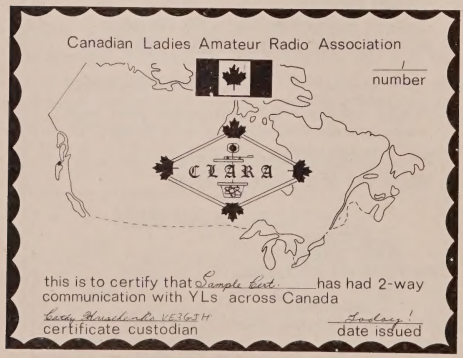
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Connecticut Counties Award.

tacts must show county and/or city on the QSLs. GCR, application certified by two other amateurs will be accepted in lieu of cards. Award manager reserves right to request QSL cards. Submit alphabetical list by county, showing station, band, mode and date of QSO. A donation of fifty cents (50¢) must be included with the application. DX stations ONLY (other than W/K) may send 5 IRCs. Apply to Awards Manager, W. Stanley Lamb, W1WHQ, RFD 2, Ledyard, Conn. 06339. Awards are mailed by first class mail.

CLARA Certificate: Sponsored by the Canadian Ladies' Amateur Radio Association. Rules Revised December 12, 1973. CLARA members must work 12 YLs in 6 call areas (limit 5 VE3s). Other YLs and OMs in Canada must work 10 YLs in 5 call areas (limit 4 VE3s). DX stations, including U.S.A. must work 5 YLs in 3 call areas (limit 2 VE3s). All bands OK, QSOs/QSLs dated September 12, 1972 and later are OK. Send $1.00 and complete QSO/Log data (QSLs must be in your possession) to: Certificate Custodian Cathy Hrischenko, VE3GJH, 30 Lisburn Crescent, Willowdale, Ontario, M2J 2Z5, Canada. Endorsement seals for each additional group of 12, 10 or 5. For these, send log data and self-addressed envelope to VE3GJH.



Canadian Ladies ARS Award.

Editor's Notes

As promised, I will list all Independent Cities and Counties for which they may be used—remember no matter how many times you work a station or stations in such a city, you may use the City only once—so be sure to pick the **One** you need. Since USA-CA started, counties that have been absorbed include Princess Ann, Norfolk and Nansemond of Virginia and Ormsby, Nevada. Also Carson City is now considered an Independent City—Thus we now credit 3075 Counties—latest USA-CA Record Book lists 3077 as Carson City and Nansemond are still listed.

In Virginia:

Alexander—Arlington **or** Fairfax.
Bedford—Bedford.
Bristol—Washington.
Buena Vista—Rock Bridge.
Charlottesville—Albemarle.
Chesapeake—Isle of Wight.
Clifton Forge—Allegheny.
Colonial Heights—Chesterfield **or** Prince George.
Covington—Allegheny.
Danville—Pittsylvania.
Emporia—Greensville.
Fairfax—Fairfax.
Falls Church—Fairfax.
Fort Monroe—York.
Franklin—Southampton.
Fredericksburg—Spotsylvania.
Galax—Carroll **or** Grayson.
Hampton—York.
Harrisonburg—Rockingham.
Hopewell—Prince George
Lexington—Rockbridge.
Lynchburg—Amherst **or** Bedford **or** Campbell.
Martinsville—Henry.
Newport News—York.
Norfolk—Isle of Wight.
Norton—Wise.
Petersburg—Chesterfield **or** Dinwiddie **or** Prince George.
Portsmouth—Isle of **Wight.**
Radford—Montgomery.
Richmond—Chesterfield **or** Henrico.
Roanoke—Roanoke.
Salem—Roanoke.
South Boston—Halifax.
Staunton—Augusta.
Suffolk—Isle of Wight **or** Southampton.
Virginia Beach—Isle of Wright.
Waynesboro—Augusta.
Williamsburg—James City.
Winchester—Frederick.

Carson City, Nevada—Douglas **or Lyon or** Story **or** Washoe.

Washington, D.C.—Montgomery or Prince George, Maryland.

Regarding Alaska and the confusion over Counties/Judicial Divisons/etc. . . . **First** Judicial Division also called—**Southeastern; Sec-**

[*Continued on page 60*]

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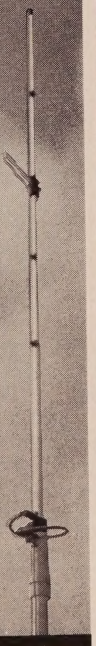
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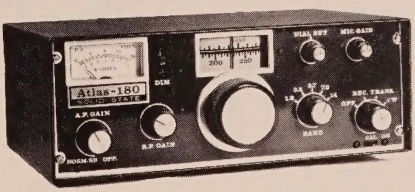


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SURPLUS sidelights

BY GORDON ELIOT WHITE*

My subject this month is the AN/ARR-52 receiver, a late, solid-state item from the U.S. Navy. The units were used in aircraft to pick up sounds from submarines via sonobuoys floating in the sea. While their design may not be state-of-the-art today, they do date from the mid-1960's, so they are a few steps beyond the WW II stuff which has been the mainstay of surplus stores for so many years.

I am happy to say at the outset that the ARR-52 units are available, in quantity, at what appears to be a reasonable price, from several dealers. I can mention two, **Electronic Equipment Bank,** 516 Mill St., NE, Vienna, Virginia, 22180, and **Norman Chipps,** 2509 50th Ave., Hyattsville, Md.

The heart of the AN/ARR-52 set is the R-962 receiver which covers the v.h.f. band 162.25-173.5 mHz in sixteen crystal-controlled channels. The unit is quite compact, measuring 10 inches by seven by two and a quarter.

The receivers are designed to fit into four-unit racks in standard aircraft modules.

The receiver is a double-conversion superhet which can detect a.m., f.m., or video signals, and will put out audio or video. Each receiver is made up of five plug-in modules containing printed circuit assemblies. No tubes are used. The frame of the receiver contains wiring plugs and bandpass filters.

Since the schematic is too large to be reproduced here, I will not attempt to show the circuit. Re-prints are available with the receivers from both EEB and Chipps.

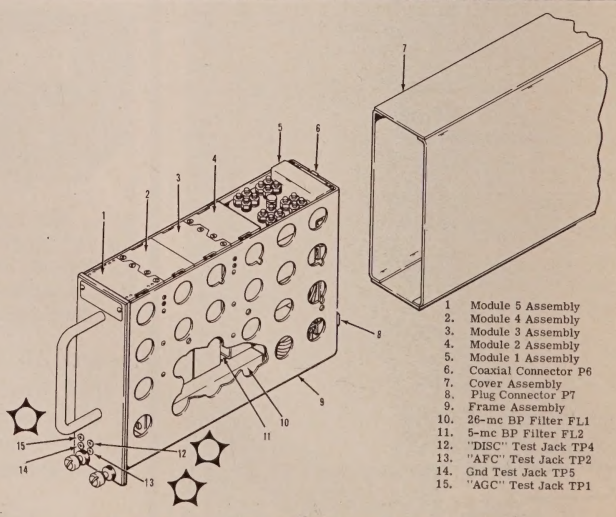
Conversion possibilities include moving the received frequencies down to two meters, using it for business-band work, v.h.f. weather broadcasts, satellite reception or even television. Re-trimming the front end piston capacitors and changing crystals appears to be quite simple and straightforward, particularly since you can play around with one channel without disturbing the others unless you are impossibly ham-handed. This makes for more confidence, I find, when chasing r.f. through v.h.f. equipment.

Module #1 is the r.f. amplifier, first mixer, crystal oscillator, and channel-switching area. The other four modules contain two intermediate frequency amplifiers, second mixer, oscillator, video detector, limiters, audio amplifiers, discriminator, automatic frequency control, automatic gain control, and other components.

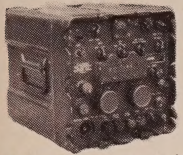
The input to each receiver consists of a subminiature coax jack and a 32 point Cannon plug. Jacks on the front include a.f.c., a.g.c. and discriminator voltage points. Mates to the Cannon plug are hard to find, but for single-channel use you only need ground, audio out, and a source of 18 volts d.c. Most of the rest of the plug is used for control of the 16-position crystal switch. It should be relatively easy to whip up a connection here, probably soldering directly to the male pins and cover-

*1502 Stonewall Rd., Alexandria, Va. 22302.

The heart of the AN/ARR-52 set is the R-962 receiver which covers 162.25 to 173.50 mHz in sixteen crystal controlled channels.



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ing the joint with spaghetti tubing.

Channels in the sets as they come from the Navy are:

1—162.25	9—168.25
2—163.00	10—169.00
3—163.75	11—169.75
4—164.50	12—170.50
5—165.25	13—171.25
6—166.00	14—172.00
7—166.75	15—172.75
8—167.50	16—173.50

Specifications show audio output of 20 volts for an input of 100 microvolts, f.m., deviated at plus or minus 75 kHz at a 1 kHz rate. Since this is designed to pick up a sonobuoy signal that is probably line-of-sight, it won't mean much to most of us. The limiter spec however shows the receiver is expected to be level within plus or minus two DB over a range of 2 to 10,000 microvolts. The two microvolt value is the important one. That's in the ballpark of current VHF gear, and probably indicates that good alignment will produce a little better sensitivity—good enough to be interesting, particularly with a decent antenna.

Noise level is supposed to be below –57 db with a two microvolt input signal. Frequency response is flat within 2 db from 10 to 3,000 Hz.

The receivers were used, in the Navy, with two pre-amps, the AM-2375/ARR-52 and the AM-2376/URR-52, which provided 20 db and 10 db gain plus isolation and suppression of unwanted radiation.

The first i.f. in the receiver is at 26 mHz. The signal is initially passed through a 560 kHz filter and, in the second mixer, converted to the second i.f. at 5 mHz. At that point limiting is applied, and the signal pasesd through a 200 kHz filter. Video and audio detection and amplification follow.

less the 26 kHz i.f., divided by two. The crystal less the 26 mHz i.f., divided y two. The crystal switch operates on 28 volts d.c.

While the ultimate bandpass filter's width of 200 kHz is quite broad, it may be narrowed considerably by removing the loading resistors, it would appear. I haven't tried this yet, but it looks like a reasonable bet. ■

Awards [*from page 56*]

ond called—**Northwestern; Third** called **Southcentral; Fourth—Central.**

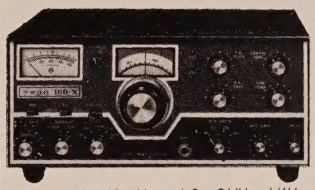
Hope you all had a good summer/vacation/holidays. Sorry for shortages of gas and poor band condx. As for me—anything you can think of, did happen, antenna down, tower needing work and rig needing work. Sorry I have again run out of space, but write and tell me, How was your month? 73, Ed., W2GT

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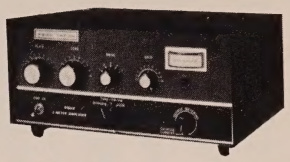
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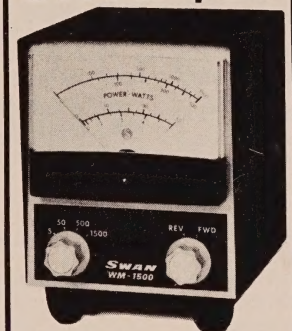
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City & State:

☐ Send used gear list

Balkan Hams [*from page 30*]

"Forty liras," came the answer like from a Wall Street broker.

"You should be ashamed. Don't you think I know how far it is?"

I could see on their faces that they knew very well that I had no idea.

"Thirty liras," said one of them with an honest smile.

Now I'm pretty sure that 30 liras was also too much but I didn't want to lose more time bargaining, so I let him grab one of my bags and followed him. After 10 yards he stopped a passing taxi, told the driver, "30 liras to Hotel Gezi," loaded our luggage in the cab, the taxi driver gave him a tip and we left.

I had bargained with a "free agent" instead of a taxi driver.

That's OK, but let's get there fast. The taxi is very old, the roads up to Taksim are steep. In a busy intersection, the car squeaked in despair and stalled. The driver got out, opened the hood, took out some parts and started off again. The engine worked better with less parts.

I called up Bedi, TA1BE, who lives about 200 yards away and he came to the hotel. Bedi is a D.D.S., and is past president of the Turkish Amateur Radio Association. He agreed to let us use his Hallicrafters with his dipole, but first we had to put the station together because everything was packed and stored separately. Each evening we had to take the rig apart and pack everything in three layers of paper, tie them and store them again. I guess he had his reasons.

So we were ready to go; the power was low, the antenna was quite modest. How about the callsigns? Everybody makes up his call; Bedi for example choose his initials. We took TA1YL for Eva and TA1OM for me. Taksim being on the European side of Istanbul, the district number is 1. We worked for a couple of hours with nice pile-ups, mostly Europeans.

After three days of operation and sightseeings, we were invited to the Asiatic side to operate Engin's station, TA2QR. There we used TA1YL/2 and TA1OM/2. In one afternoon we made about 400 contacts. The pile-ups were heavy; the aggressive Italians did not even understand their own language when I tried to take them by districts. Finally Strulik, 4Z4JT, took lists of 12 (he said is cheaper by the dozen) so we relaxed for a while. An hour later Strulik, overpowered by the Italian offensive, gave up, so we had to fight again.

I recommend visiting Istanbul and operating there, but you'll need the help of some local amateurs.

Don't try to drive a car in Istanbul. In almost every country the police direct traffic. In Italy, nobody does his job, but in Istanbul it's everybody's job. In traffic jams, every driver sticks his head out the window of his car and with wild gestures and loud curses, tells all the others what to do.

Next Month

The next installment of "Travels With George" will take us to Greece, Yugoslavia and Hungary. Tune in next Month. ■

Cop's Column [*from page 32*]

want to *borrow* these books when you need them. If you are near a university, check the engineering department library. In other areas, talk with the librarian at your local public or school library. Librarians are usually very happy to arrange inter-library loans. (If any of you know of low-cost sources of tables, I'd be happy to pass the word along.)

Table II—Scaling Filter Frequency

[Values without a prime mark indicate original values before scaling. Values with a prime (′) indicate the value of the parameter after scaling.]

1. Find the frequency scaling factor, k_f, by letting f be the frequency of any one point on the frequency response curve before scaling, and letting f' be the frequency of that same point after scaling: $k_f = \frac{f'}{f}$

2. Find the new capacitance and inductance values by dividing each of the original capacitance and inductance values by k_f:

$$L_1' = \frac{L_1}{k_f}, \quad C_1' = \frac{C_1}{k_f}, \quad \text{etc.}$$

3. The new frequency response curve can be plotted by taking the frequency of individual points on the original response curve, and multiplying those frequencies by k_f.

4. The proper filter source and load termination resistances remain the same after frequency scaling as they were before.

Frequency and Impedance Scaling

One of the things you find out right away when you go to use the tables is that any particular design can be "scaled" to any desired cutoff frequency and impedance level. Most of the tables are "normalized" to give the values of C and L you'd use with a terminating resistance of one ohm and a cutoff frequency of one radian per second (6.28 Hz). Needless to say, *something* must be done! Even if you never design a filter from scratch, these scaling rules can be very useful from time to time. *Any* L-C filter—not just those in the tables—can be scaled up or down in impedance and/or cutoff frequency. Let's say you see an article describing a narrow band audio filter designed to pull c.w. signals out of the noise. The filter looks great except that the passband is centered at 1000 Hz and you like to copy your c.w. at an audio frequency of about 400 Hz. The original design can easily be scaled to 400 Hz. In another typical situation a



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Frequency Range	: 146-174MHz
Channel	: 2 channels
Power Supply	: Ni-Cd Rechargeable Battery X 10pcs. 12.5V or Dry Cell Battery (Pen-Lite) X 8pcs. 12.0V
Operation System	: Press-talk System
Modulation System	: Phase Modulation
Receiving System	: Crystal Control Double Conversion Super-heterodyne
Temperature Range	: -10°C ..... +50°C
Dimension	:74X47X224m/m
Weight	: 1.2Kgs. 2.5 lbs w/batteries (10)

Transmitting

RF Output	: 3.0 watt
Frequency Tolerance	: ±0.002%
Frequency Deviation	: Maximum +5KHz
Crystal Multiplication	: 24 times
Spurious Radiation	: More than 40 dB below Carrier
FM Noise	: at least 40 dB below 70% system deviation (1KHz)
Audio Low-Passfilter	: 40 log 10 (f/3 dB 70% system deviation (1KHz)

Receiving

Sensitivity	: less than 3dB (20 dB noise quieting)
Frequency Tolerance	: ±0.002% xtal (54.566 x 3)-10.7=f opr.
Bandwidth	: More than 12KHz (6 dB down)
Selectivity	: With 25KHz(80 dB attenuation)
Spurious Rejection	: less than -50 dB
Audio Output Power	: 500 mW (Distortion factor 10%)
Squelch Sensitivity	: -3 dB (less than)
S/N Ratio	: More than 50 dB

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design calls for a certain value of inductance. The junk box yields a perfectly good inductor, but not the correct value. In many cases the design impedance can be scaled to permit the junk box part to be used. Tables I and II show the steps required in the scaling operations. In some cases it is necessary to scale both the impedance and frequency. An example of this is shown in fig. 2. The original low-pass filter (A) has a passband 1 db down at 2500 Hz and is more than 30 db down above 3500 Hz. In (B), the filter cutoff frequency has been scaled from 2500 Hz down to 1000 Hz. In (C), the filter of (B) has been impedance scaled to permit the use of the original 88 mh toroids, but keeping the new 1000 Hz cutoff frequency. If you'd like to try your hand at the scaling process, use the procedure of Table II to go from (A) to (B), and Table I to go from (B) to (C). Use the ratio of inductances to determine k_z.

Some Filter Hints

The less than perfect characteristics of real-world inductors sometimes cause filter problems. The first requirement is that the inductors used must have a satisfactory *Q* at the filter *cutoff* frequency. We know that 88 mh toroids have a high *Q* at 2500 Hz and at 1000 Hz. Mathematically we could scale the filter of fig. 2 down to a frequency of 3 Hz if we wanted to, and even scale its impedance to permit the use of 88 mh toroids. The filter wouldn't work well, however, because an 88 mh toroid has a very low *Q* at 3 Hz! An inductor's stray winding capacitance can also cause problems; in this case at high frequencies and high impedances. Every inductor has some winding capacitance "built in," giving rise to a parallel "self-resonance" at some frequency. If this resonance falls into the filter passband there are obvious problems. If the filter design is such that the inductor is paralleled with a capacitor anyway, this external *C* can often be reduced to compensate for the stray *C*. In a low pass filter, when an inductor is paralleled by a capacitor as in fig. 2, the purpose is to introduce a specific infinite rejection frequency in the stop band. The design tables tell where these frequencies should fall. Not only stray *C* problems, but component tolerance problems as well, can be eased by individually resonating these inductors. This is done using an *L* that is approximately the correct value, and then by trial and error, selecting a *C* that resonates it at the proper infinite rejection frequency. Generally speaking, the more complex the filter the more accurate the individual parts values must be.

Filters are designed not only for a specific *load* impedance, but also for a specific *source* impedance. (This term "source impedance" means the impedance looking from the filter input back into the driving circuitry.) In some designs source and load impedance are equal. In others they are not. Geff's book has tables for both varieties. The important thing is to terminate the filter at each end with the resistance which the design calls for.

L-C filters are bilateral, which means that it doesn't matter which end you feed the signal into as long as both ends are terminated properly.

Choose the capacitors you use in your *L-C* filters with some care. Mylar and other film types are generally satisfactory at audio frequencies, but they should have extended foil construction. (Some bargain capacitors may not. Break one open. If each lead is connected to a great mass of foil, all is ok.) At radio frequencies, mica and polystyrene capacitors are ok. Try to avoid ceramic capacitors in both audio and r.f. filters. They are not very stable.

Perhaps the "best buys" in audio inductors are the 88 and 44 mh telephone toroids available from such RTTY outlets as Van, W2DLT. There are two windings on each core. The 88 and 44 mh figures are with the windings in series. With the windings in parallel the inductance will be 22 and 11 mh, respectively. In-between values can be reached by removing turns. If you can't scale your design to use these inductorss, contact Allen Electronics Division, Allen Organ Co., Macungie, Penna., 18062 for a list of their audio toroids and prices. They offer a wide range of inductance values and much lower prices than most other toroid manufacturers. For r.f. applicators, winding your own toroids is a good route to take. Amidon Associates, 12033 Otsego St., No. Hollywood, Calif., 91607 sells small quantities of powdered iron toroidal cores to hams. Write them for technical data and prices.

Vy 73, Cop, WØORX

Propagation [*from page 49*]

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

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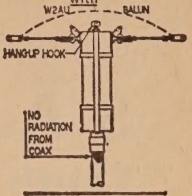


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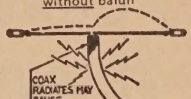
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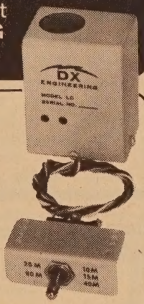
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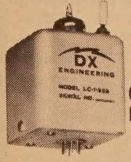
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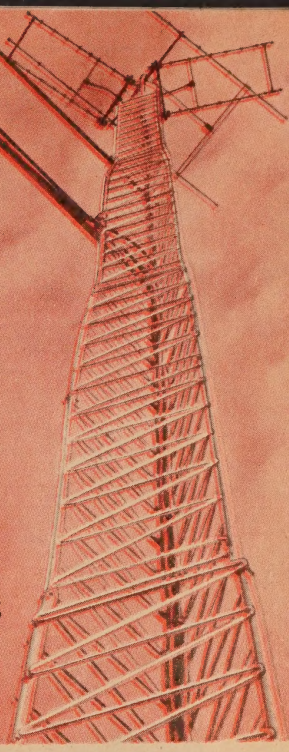


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MANUALS: 75A4; Northern Radio 174 RTTY TU Scope OS 8/U. Each $5 or $6.50 postpaid. Harder, W1GVN, 500 Lexington Rd., Concord, MA 01742.

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WANTED: Phone traffic, weekend phone patches to W 6 land, Pomona area, Daughter starts college at Harvey Mudd in September. K1IQF, Ray Edwards, 83 Lovers Lane, E. Lyme CT 06333.

LIKE NEW: Unique 80-10 Random length wire tuner, $45. Will pay shipping. Dave Lambert, WA1JSD, RFD 3, Derry, NH 03038.

WANTED: SX-111 or HQ110A. WA2PCL, 101-23 Lefferts Blvd. Richmond Hill, NY 11419.

WANTED: BC459 new or fine condition price and details in first letter. Stillwell, P.O. Box, 1773 K.C., MO 64141.

WANTED: Cabinet and base for M28 RO or KSR. Also need intermediate gear assembly. Price, details first letter. Lauber, 3128 Vastamont Dr., San Jose CA 95118.

WANTED: Old Battery operated radios and crystal sets of the early 1920's. Need not be in working condition. Also want old catalogs and wireless equipment, model and price please. Dave McKenzie K0SVJ, 1200 W. Euclid Ave., Indianola, Iowa, 50125.

FOR SALE: Military R-392/URR receiver, Used servicable, $125.00. Plus shipping. K2ZSZ, G. Gleicher, 96-04 57th Ave., Rego Park, NY 11368. (212)271-8438.

FOR SALE: Motorola T - 1200 console, mobile quick call decoder, $20, single tone encoder, $8. G.E. 4EC28 remote console, $40. K6KZT, 2255 Alexander Ave., Los Osos, CA 93402.

FOR SALE: 4CX 1000A with Ceramic sockets & chimneys, $75. Drake TR-4, $375; L-4, $475, mint condition. Both for $750.00. WA2NFK, 314 So. Western Ave., Springfield, OH, 45506.

CANADIANS WANTED: Hallicrafters SX71 or SX100 in good condition, also junk SX71 for parts. Arch Bursey, Middle Arm, Greenbay, NFLD, Canada.

FOR SALE: Viking Challenger transmitter, 80-6, Excellent condition, $40. WA9AXA, Jerry Koudehk 201 E. 59th St., Westmont, IL 60559.

SELL: Hallicrafters SR-500 xcvr, 500w, 80,40,20 meters, AC, DC P.S., spkr, MIC, $360. WANT: A SKED. WB9JHS, 6092 Chase Ave., Downers Grove, IL, 60515.

FOR SALE: Copies of genuine Phillips code. $10 postpaid via insured mail. Dr. Hess, W6CK, P.O. Box 19 M, Pasadena, CA 91102.

DON'T use your watch! Buy a readable 24 hour wall clock from us. Battery or electric. Steve WB5BKM, 1524 N. Oklahoma, Shawnee, OK 74801.

NEED: Beer cans for collection. Will pay 25 cents each. WR9ABH, Box 291 Western Springs, IL 60558.

WANTED: Cryptographic equipment, books, manual, $60. Johnson T-R switch, $15. W0OYW, 3317 Starr St., Lincoln, NE 68503.

WANT: Information on upcoming Hamfests and conventions anywhere. Send information to: Jeff Howell, RFD 6, Box 239, Bedford IN 47421.

WANTED: Instructograph and Electronic Keyer. Tom Dornback, K9MKX, 2515 College Road, Downers Grove IL 60515.

WANT: Copies Radio News before 1928, also parts or complete sets Crosley radio 1 to 3 tube; Robert Ireland, P.V., NY 12569.

FOR SALE: Motorola P33BAM-3101 AM, manual, accessories, spares. Best offer. R. Dewey, 7 Caroline Dr., Bennington, VT 05201.

Want: KWM11 with 516F2. Will pay cash for a bargain. Dr. Leathers, K5LHS, 11 Leathers Lane Muskogee, OK 74401.

WEATHER SATELLITE: Please anyone who is able to copy WS pix please write to me, I need lots of information. John, Ward, 5814 Mavis Lane, Pasadena, TX 77505.

FOR SALE: Kenwood R599 receiver with S599 speaker, excellent condition, $265. T.A. McKee, 1306 Grove Rd., Lynchburg, VA 24502. (804)-239-5002.

WANT: Millrite, Clausing or similar vertical milling machine. Tappehorn, 2536 Kings Highway Louisville KY 40205.

SELL: HQ-1 with AR-22 rotor, $75. NCX-3 with ACPS, $150. WB5HBO, 4033 Dublin, Corpus Christi, TX 78413.



THE SWAN 600T!

There are five transmitters available to amateur radio operators today providing 5-band coverage in SSB, CW and AM modes. Of these five, only SWAN's 600T supplies 600 watts P.E.P. input. Among the others, one has 240 watts P.E.P.; two have 200 watts P.E.P. (one of these requiring an accessory power supply); and one is a kit capable of a mere 180 watts P.E.P. input.

Compare the cost per watt, then judge for yourself as to which is the best value: The kit retails at $1.67 per watt; the 240 watt unit is $1.41 per watt; the 200 watt rig with the power supply built-in runs $2.30 per watt, while the other 200 watt transmitter costs $2.65 per watt by itself or $3.15 per watt if you buy the power supply recommended.

Now consider the economical SWAN 600T — it gives you a full 600 watts P.E.P. input, about three times the power of the others, for **JUST 98¢ PER WATT!**

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WHEREVER THERE'S VALUE IN AMATEUR RADIO, YOU'LL FIND SWAN ELECTRONICS

600T	Transmitter	**$589.95**
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600S	Speaker	**$ 24.95**
600SP	Deluxe Speaker with FP-1 phone patch	**$ 69.96**
510X	Crystal Oscillator	**$ 54.95**
VX-2	Automatic Voice Control	**$ 44.95**
MARK II	Linear Amplifier (2000 watts P.E.P.)	**$749.95**

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THE BEST PRACTICAL DEVELOPMENTS IN AMATEUR RADIO

WANTED: Used Ameco all band converter model CMA 160 mtr to 144 mc no. Billy, Mobray, K5YBQ, Box 1 Keyes, OK 73947.

SELL: 3600-0-3600 1 Amp Xfmr, with 110/primary $35 FOB, W8AIH, Paul Bittner, 304 W. 17th St., Grand Island, Nebr.

FOR SALE: Star 700E rcvr & 300 st PEP xmtr 80-10 mtr, xlnt condition, cost, $950, yours for $395. Silbert, White Sulphur Springs, NY 12787.

FOR SALE: SB-102, Gonset GSB-201 Linear, HP-23B, SB-600, HD-15 Phone P., HM-15 SWR, EV-69 TR. All for $530.00, All excellent condition. WB8GUA, 1730 Erksine Rd., Hemlock, MI 48626.

YAESU TRANSCEIVER OWNERS: Present and prospective. Join the International Fox-Tango Club. Send business-size SASE or two IRCs for complete information and sample of monthly FT Newsletter. Milton Lowens, WA2AOQ, 3977-F Sedgwick Ave., Bronx, NY 10463.

WANTED: National model SRR cabinet. New or used. W9GGP, 2306 N. Moreland, Indianapolis, Indiana, 46222.

WANTED: HQ120X manual or schematic. Will run copies and return plus fee. K2OLG, 303 Old Stage Road, Spotswood, NJ 08884.

WANTED: Advent 201 or Wollensak 4760 tape decks, Heath IM-58 or similar distortion meter, 1945 and 1946 CQ's.

FOR SALE: RCVRS: FM, SCA Multiplex for background music. McMartin & Browning, $25 to $65. SASE for specs. W4JGO, 643 Diamond Rd. Salem, VA 24153.

SELL: Johnson Valiant, $129.00. Heath HG10 ES DX60B, $90.00. Norris McKamey, R.R. 1, Box 185 Bettendorf, IA 52722.

FOR SALE: G50 Gonset 6 meter Mint Low Pass filter, $95.00. WA2CMO, 1830 Serpentine, Dr., Forked River, NJ 08731.

STORE COUPON KLINIC! No dues. Exchange $1.50 value. Unusable store coupons for $1, value usable coupons. Specify. SASE. CQ Stock, 5/111-A Oak, Lex SC 29072.

FOR SALE: Hammarlund HQ-170 Receiver with manual, in excellent condition, $125. You pay shipping. Joe Rogers, WB9ZSI, 9251 North 37th Ave. Phoenix, AZ 85021. (602)973-5053.

FOR SALE: RTTY Western Union Model 100 page printer with keyboard, $40. Massey, WA9NBU Box 4501, Norton AFB, CA 92409.

AWARDS Hunters, buy big 1 lb. Directory of Certificates & Awards book, covers world sponsors. $5 to POB 385, Bonita CA 92002.

WORKED SOUTH AMERICA Certificate. Work all 13 countries. Send list and $1. HCI TH, 4805 Willowbend Blvd., Houston, TX 77035.

QSL CARDS FREE: 100, with an order of 200. Samples, 20 cents. The Print Shop, P.O. Box 353 Lockport, IL 60441.

SELL: Magnum 6 processor for TR4. Never used $110. Will ship. W6TCQ, (213)375-0106.

FOR SALE: RTTY model 19 set $105 and model 15 machine, $70. Ed Bienstock, 3730 Nautilus Ave., Brooklyn, NY 11224.

WORLD'S LARGEST DX-Certificate Hunter's Club CHC, FHC, SWL-CHC, publishes world's Awards Directory. $5.00. Box 385, Bonita, CA 92002.

FOR SALE: Tubes 25L6 pulls but guaranteed OK. 50 each; 5.00/dozen. Plus shipping. A.S. Bielenda, W2IDA, 43 Chestnut Ridge Rd., Saddle River, NJ 07458.

WANTED: Call letter license plates for collection. I'll pay postage. Phillips, WA7NXL, 3401 N. Columbus Blvd., Apt. 5-0, Tucson, AZ 85712.

FOR SALE: Swan 350 with 117XC console, $300. National VX-501 VFO console, $125. Lafayette HA-250 Linear Mobile AMP. for 6, 10, 11, 15, meters 100 watts, $40. Vanguard 2 meter preamp, IF output 23 to 27 MHz, $20. PR 311CT, $10. Colella, WA2HQD, 105-18 131rst St., Richmond Hill, NY 11419. (212)641-2559.

WILL TRADE F'B' US mint plate blocks, can use date nails from railroad ties. L.B. Fuqua, W4WBD, Box 6 Eddyville, KY 42038.

SELL OR TRADE: Heathkit GR-2000 with clock. New in April '74. TR4, NB, RV4, AC4. Clegg 27B, standard SRC-145, KR-20. WANT: CX7. SASE for answers. R. Phoorence, 2334 Regal Court, Lawrenceville, GA 30245.

FOR SALE: G.E. 30-50 mc mobile rec, $15, Lab sweep gen 5-100 mc, $25, daven attenuator $20, WANTED: Heath SB-610 monitor. K6KZT, 2255 Alexander Ave., Los Osos, CA 93401.

WANTED: Taylor Tubes all types; also WE211E & 212D. W7JI-K7WQO, 235 E. 15 Street, Tempe, AZ 85281.

FOTO ENLARGER: 4"X5" with easel, $75. or trade for amateur gear. Many CQ and QST's very cheap. Earl Frentz, Deerwood, MN, Box 12, 56444.

FOR SALE: Little Giant 40 m Antenna, $35.00, FOB. Basham, 735 Caves HWY, Cave JCT, OR 97523.

WANTED: Old receiving and transmitting tubes with brass bases, and some ceramic bases. Need not be operable. W9LHG, 610 Monroe Ave., River Forest, IL 60305.

FOR SALE: 6 element 6 m beam, new, $35.; Allied SWL receiver, $35. Heath SB 310 SWL, $75; WANT 4X5 camera. WA8MLV, 1008 Englewood Dr., Parma, OH 44134.

SELL: 4-400C's Eimacs brand new seald cartons. Prepaid, $40.00 each. Also RCA6146-B New tubes prepaid, $4.50 each. W4AIS, 306 Thornwood Drive, Taylors, SC 29687.

WANTED: Reasonably priced, 1946 Winter Edition of Callbook. Walter O. Carr, W3LDD, R.D. 2, Box 193, Havre de Grace, MD 21078.

MAGAZINES FOR SALE: CQ/73/QST/Ham Radio Send SASE for list. E. Guimares; RFD 2, Box 480 Middleboro, MA 02346.

SALE: Two tube type home brew code oscillators, work fine, $5 each. K8OUQ, 268 Annis Court, Chillicothe, Ohio, 45601.

WANT: Clean MS-4 speaker, also good audio type CW filter. WB9JHS, 6092 Chase Ave., Downers Grove, IL 60515.

COLLECTORS OF QST MAGAZINES: 1920 thru May 1967 inclusive also various months rare editions, 1915, 1916, 1917 and 1919. Will sell total or part for best offer. R. Horan, 2742 Wabash Dr., N.E. Grand Rapids, MI 49505. (616)363-7567.

INVERTER FOR SALE: ATR model RSC, converts 110 v DC to 110 v AC. Capacity 250 watts intermittant, 150 watts continous. In like-new condition. Best offer. Cowan, care of CQ Magazine 14 Vanderventer Ave., Port Washington, NY 11050

Two plastic holders frame and display 40 QSL's for $1.00, or 7 holders enhance 140 cards for $3.00 from your Dealer, or spaad direct: TEPABCO, Box 198Q, Gallatin, TN 37066.

WANTED: Old Radio Show transcription discs Any size or speed. Bill Stricklin, W4GJG, 118 Coburn Drive, Chattanooga, TN 37415.

ROCHESTER, NY: Hamfest date for 1975, May 31st. Marriott Inn, Rochester, NY 14603. Harold C. Smith, WA2KND, General Chairman.

NOW PAYING $2000.00 and up for ARC-94/618T ARC-102/618T. $1200.00 and up for ARC-51BX, $1500.00 and up for 490T-1 antenna couplers. We also need these control boxes-C-6287/ARC-51BX C-6476/ARC-BX, C-741E-2. We also need R-1051 receivers RT-662/GRC-106 transceivers.We buy all late aircraft and ground radio equipment. Also pack radios. We are buyers not takers. Bring your equipment in, you are paid on the spot. Ship it in; you are paid within 24 hours. We pay all shipping charges. If you want the best price for your equipment, call us. Call collect if you have and want to sell or trade. We also sell. What do you need? Dale Electronics, R.D. no. 1 Box 56, Milton PA 17847. (717)742-4604.

SELL: Heathkit HW-202 with mod. kit tone encoder, a.c. P/S, xtals for 14/94, 25/85, 49/09, 52/52, 94/94, 81/21. Perfect, unused condition, $250. Ross, 95 Norwood Ave., Northport, NY 11768.

FOR SALE: Collins KWM2 with 516 AC and MPI DC supplies with new type sealed relays recently installed. Original cartons. $750.00, FOB, Hayward CA. Kenwood T599, 80 thru 10, & R599, 160 thru 10 complete with speaker. Original cartons, $600., FOB, San Diego, CA. All complete with manuals. Also other equipment from estate of K6KI. Send SASE for complete list to K6QI, E. Jackson, 10250 Prospect Ave., Santee, CA.

FOR SALE: For international Morse CW operation, converter with power supply. Authentic Western Union 400 ohm sounder with 24 v power supply and swivel type resonator. Complete, $100. FOB, Hayward, CA. Send SASE to E. Jackson, K6QI, 10250 Prospect Ave., Santee, CA 92071.

LOOKING FOR old Lionel trains. Interested only in "O" gauge, excellent to like-new condition. Primary interest is locomotives prior to 1952, but will consider complete sets or more recent models. Am willing to buy outright for cash or swap radio gear to meet your needs. Write Dick Cowan, WA2LRO, c/o CQ Magazine, or call 516/883-6200.

RECEIVERS: HQ170OA, $150; RCH, $100; BC 342Q, $50. SAIC Hallicrafters, $15. J. Wasiewicz, W2DQC, 229 Sarles Lane, Pleasantville, NY 10570.

WANTED: Scott Philharmonic console cabinet. 75 AM Senier Dial, Millen, 92200 Transmatch, N. McNeill, Box 472, Yorkton, SASK, Canada, S3N 2W4.

WANTED: GR1601A/1602B complete; also, HP-477B. Have GR 1932A; HP 330C/330D; Sierra 126B; T-3/NF-105A; JA xcvrs. Houston/UR2YIE, Box 73, APO 96525.

WANTED: Collins 75S-3C, KWM-2A, S-Line, HV oil capacitors., Sell, 74A-4, complete Drake line 8 mints. Sell 4-1000A linear. Tom Neill, 1321. Merimac Cove, Memphis, TN 38134.

80/40 Novice Transmitter 6AG7/2E21 New parts $30./pair new 811 tubes, $4.00. All plus postage W6BLZ, 528 Colima, LA Jolla, CA 92037.

FOR SALE: Sonar Model, FR-2513 24 ch. 145-175 MHZ. VHF rcvr, with 33 different xtals, and roof ground plane ant. $250.00 For additional information, contact Fred J. Gaisser, 60-45 60th Dr. Maspeth, Queens, NY 11378.

FOR SALE: Collins 75A4, original owner, like new condition. 2 F Filters, $325.00. Mace, 8600 Skyline Dr., Los Angeles, CA 90046.

FOR SALE: Heath Counter-Scaler combo. to 175 MHz. $299.95 FOB, WA9CMC, 2309 Bullington St. Wichita, Fazlis, TX 76301.

FOR SALE: Starr 700E rcvr & 300 wt PEP xmtr, 80-10 mtrs, excellent condition, cost over $900, yours for $395. Silbert, P.O. Box 77, White Sulphur Springs, NY 12787.

WANT: Swan Phone Patch, Excellent condition, Best Price. W2ASI, 7010 S.W. 16th St., Plantation FL 33317. (305)792-4600.

NEED: Elements for Bird no. 43 Thruline Wattmeter. 100 watt-100MHz to 250MHz, 200 watt 25MHz to 30MHz. Marty, (215)384-6010, 1138 Box wood Rd., Jenkintown, PA 19046.

FOR SALE: OSCILLOSCOPE, 5 inch triggered sweep by Bell & Howell. Built and calibrated but never used. (This kit is actually by Heathkit). $150. W0YVA/4, P.O. Box 6216, Arlington, VA 22206.

WANTED: Matching cabinet for Collins R388/51J3 receiver. J.H. Gordon, W2HLF, 16 Henry Circle, Rochester, NY 14624.

WANTED: Radio News, Electrical Experimenter, Modern Electrics, Radio Broadcast, Popular Radio, RADIO, Call Books, Handbooks, & Catalogs. Erv Rasmussen, W6YPM, 164 Lowell, Redwood City CA 94062.

WANTED: Fleming Oscillion Valve circa 1905, UV-217 Rectifier, UV-213, W9LGH, 610 Monroe Ave., River Forest, IL 60305.

WANTED: Good copy of book "Phillips Code" R. Sever, K8XD, 147 South Wise St., North Canton OH 44720.

WANTED: Telegraph book for FCC License. Donald Ryan, Star Route Box 301A, So. Plymouth, NY 13844.

WANT: Eimac 68 wps, Johnson Ranger 1, Gonset 77 wps. Write for details. W6ZI, 595 Midway Blvd., Novato, CA 94947.

FOR SALE: SB-200 excellent with 5 hours use. $170, you pay shipping. WA3LPK, Kevin McKeown, 2300 Louise Ave., Baltimore, MD 21214.

FOR SALE: Drake 2-NT & Heath HG-10B VFO, excellent condition, $100. Leon Bennett, WA6SAW Star Route, Frazier Park, CA 93225.

WANTED: 2M transverter, SB-10, sell 5BDQ 10 to 80 trap dipole, Lynmar KW 50 to 75 ohm 1.5-40 MHz transformer. Offers? WA2ECI, A. Eckman, 11 Fort George Hill, New York, NY 10040.

WANTED: Hallicrafters model T-547" television in metal cabinet. Made 1948-1949. Need not be working but must be complete. Wayne Letourneau, WB0CTE, 2338 E. South Ave., N. St. Paul MN, 55109.

SELL: Collins noise blanker for KWM-2. Plugs into most units, no wiring. Like new. Model 136B2 $80. H.G. Veon, RD no. 1, Mercer, PA 16137.

SELL: Heath HW-16 xcvr with HG-10B VFO, $125 You ship. Write Bill Adams, P.O. Box 72 McKee, KY 40447.

FOR SALE: EMC 211 tube tstr (kit), $20.00; Kodak varifax copier W/ACC $50.00; Gonset no. 3098, 12 volt power supply for G66 A&B receiver, $20.00; all FOB. R. Wendel, WB2YYX, 160-20 Grand Central Pkwy, Jamaica, LI, NY 11432.

SELL: SB-303 & SB-610 mint, $295. Also many high power parts, xformers, and vac. relays. Write Rick Scielzo, 19 Longview Drive, Waldwick, NJ, 07463.

WANTED: Linear amplifier 1 KW cw/ssb. Prefer Heath or HB. Consider cw amp only. Have to sell SB 300 mint with filters HM 102. First reasonable offer on either. KIDEK, 20 Brattle St., Brattleboro, VT 05301. (802)254-5840.

FOR SALE: 6 meter 6 element beam. Never used, $15.00. ARC-4 amp. HR2A, $250. T.N. Colbert WA8MLV, 1008 Englewood Dr., Parma, OH, 44134.

SELL OR TRADE: New Kreco 6 mtr coaxial antenna, won at 6 mtr club Hamfest 6/9/74, value, $60 K9WNG, 8321 N. New England Ave., Niles, IL 60648.

SELL: Last 7 years CQ plus last 11 years QST. A few issues missing. Total pkg. $25. plus shipping. W1BKG, M.A. George, 35 Ridgeway Ave., Pittsfield, MA 01201.

VTI & DODGE GRADS: Attend 100th Anniversary of oldest electronic school in Western Hemisphere. 19 October, 1974. L.W. Briggs, W3MSN.

WANTED: Carborundum Crystal Detector Unit complete. Navy style telegraph key knob 2 7F7 tubes. State condition and price. George W. Wickens 297 Nahant Rd., Nahant, MA 01908.

73 MAGAZINE: Complete set, in Binders, 1rst issue (1960), thru 1968. Best Offer, cash or trade. A. Bernard, 300 Lawrence Ave., Oakhurst, NJ 07755.

FOR SALE: Riders Manuals, Volume 1 thru 21, Excellent Condition. Hate to break these up, would like to sell the entire manuals. Best offer takes them, also have old tubes for sale. Vernon Meyer, Box 2 Ottawa, Illinois 61350.

SELL: Balun, Hy-Gain BN86, KW. Excellent condition. $9. ppd. insured. W2ASI/4, 7010 W. 16th St., Plantation FL 33317. 305-792-4600.

FOR SALE: Drake TR-6, NB, AM Filter, AC4, MS4, Mint, $165. Russell, 19680 Mountville Drive, Maple Hts; OH 44137.

WANTED: Fall/Winter 80M CW Skeds for WAS & WAVE. WA9DLT, 1302 S. Prairie, Arlington Hts, IL 60005.

SELL: Ranger I, $90. WA2KWB/3, 131 Thorn Lane 1, Newark, DEL 19711. (302)368-7711.

FOR SALE: 2 meter Swan FM2X, AC supply, 5/8 whip antenna, mag. base, xtls, like new, $195. Ron, 129 Club Dr., San Carlos, CA 94070.

SELL: Swan SSB Cygnet, $250. Heath Signal Monitor. $30. Also Consol, $30, all excellent condition. W. Gorner, P.O. Box Ascadero, CA 93422.

WANTED: Motorola HT-200 Less xtals and battery, 2 freq., any condition. Marvin Moss, W4UXJ, Box 28601, Atlanta, GA 30328.

WANT: National or Heath 2 meter converter for National NC 303 Receiver. E. Musgrove, W6YQM, 44511 N. 91st St., East, Lancaster, CA 93534.

FOR SALE: Hy-Gain DB10-15A, good condition, you pick up, $35. Ehrhorn SK-1400A, new, $70. SASE for list. A. Emerald, 8956 Swallow Ave., Fountain Valley, CA 92708.

WANTED: Advent 201 or Wollensak 4760 tape decks, Heath IM68 or similar distortion meter, 1945 and 1946 CQ's. J. Becker, 201 Marion St., Prospect Heights, IL 60070.

FOR SALE: DX-100 xmtr, $70; Aemco TX-62 xmtr, $60. Both good condition. F. Kurz, W9VTQ P.O. Box 347, Zion, IL 60099.

WANT: Swan accessories, Heath MP-10. T. Codington, WB6AWC, 7825 Scotts Valley Road, Lakeport, CA 95453.

WANTED: Two or three small video monitors in good working order. Jerry Molaver, 1008 Split Rock Road, Cheshire, CT.

WANT: Mini Mitter or Justin 40 mtr xcvr. KIETU, Charles King, 6 Willow Court, Cromwell, CT 06416.

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PLEASE SHIP THE FOLLOWING HIGH QUALITY FIXED ANTENNAS:

QTY.	MODEL #	DESCRIPTION	UNIT PRICE	AMOUNT
	TB-4HA	Heavy Duty 4-element multiband beam for 10, 15 and 20 Meters. 24 foot boom. Average forward gain = 9 dB. Front-to-back ratio = 24–26 dB. Withstands winds up to 100 MPH. Net Weight 54 lbs.	$189.95	
	TB-3HA	Heavy Duty 3-element multiband beam for 10, 15 and 20 Meters. 16 foot boom. Average forward gain = 8 dB. Front-to-back ratio = 20–22 dB. Withstands winds up to 100 MPH. Net Weight 44 lbs.	$159.95	
	TB-2A	Economical 2-element multiband beam for 10, 15 and 20 Meters. 6½ foot boom. Average forward gain = 5 dB. Front-to-back ratio = 16–18 dB. Withstands winds up to 80 MPH. Net weight 18 lbs.	$119.95	
	MB-40H	Heavy Duty 2-element beam for 40 Meters. 16 foot boom. Average forward gain = 4 dB. Front-to-back ratio = 16–18 dB. Withstands winds up to 100 MPH. Net Weight 40 lbs.	$179.95	

NOTE: ALL SWAN BEAM ANTENNAS ARE RATED FOR 2000 WATTS, and require 52 ohm coaxial feedline.

	1040V	"GOLDEN SWAN" Heavy Duty trap-vertical for 10, 15, 20 and 40 Meters. Patented large High-Q coils, precision tuned for maximum radiation efficiency on each band. Low SWR across width of each band. Withstands winds up to 100 MPH. 2000 Watt power rating. 21 foot height. Shipping Weight 19 lbs.	$ 99.95	
	75 Meter Add-on Kit for 1040V	Modifies "GOLDEN SWAN" trap-vertical for full 5-band use. Adds 5 feet to antenna height. Shipping Weight 6 lbs.	$ 38.95	
	80-40	Inexpensive trap-dipole for 40 and 80 Meters.	$ 39.95	

ALL PRICES F.O.B. OCEANSIDE, CALIFORNIA.
Antennas will be shipped best way, collect, unless otherwise specified in writing.

SUB-TOTAL	
SALES TAX (Calif. Only)	
TOTAL	
DOWN PAYMENT	
BALANCE DUE	

Method of payment (Check one):

- ☐ Full amount enclosed
- ☐ 20% deposit enclosed; Balance C.O.D.
- ☐ 20% down payment enclosed; Charge balance to BANKAMERICARD # _____ Exp. Date _____
- ☐ 20% down payment enclosed; Charge balance to MASTERCHARGE # _____ INTERBANK # _____ Exp. Date _____
- ☐ 10% down payment enclosed; Charge balance to SWAN CREDIT ACCOUNT # _____

SIGNATURE: _____ DATE: _____

FOR SALE: QUAD, Ham-m, roof mount tower, pick up only. (212)280-6330, eves or leave message at (212)543-3147 eves. Robert Spitzer, WB2DZL, Columbia University New York, NY.

WANT: A copy of the Candles C.W. System. Andrew J. Shugart, 164 Pickney St., Chester, S.C. 29706.

FOR SALE: Johnson Viking II and Johnson 122 VFO complete with manuals, pick up only, $100, complete. Hal Smith, W2GKE, 26 Linden St., Bayonne, NJ 07002. (201)436-1405.

WANT: HA-2, SB2-LA & inverter, 100 V w. 160 m, small rangefinder camera; SELL Ricoh SLR w. f1.4 & 135 f2.8 lens WA9CYW, Box 247, Cannelton, IN.

SELL: All new and postpaid, Comaire FLM-6 six meter Ant. Tuner, $16.00; Conar 500 rcvr, $22.00; Heath IM-17 VOM, $17.00; K1IIK, Al Johnson, Box 77, W. Dover, VT 05356.

FOR SALE: Ranger 1. $90.00, Frank Rura, 131 Thorn Lane apt. 1, Newark, DEL 19711.

NEED: Elements for Bird no. 43 Thurline Wattmeter. 100 watt-100MHz to 250MHz, 200 watt-3MHz to 30MHz. Marty, (215)844-4010, 1138 Boxwood Rd, Jenkintown PA 19046.

FOR SALE: Johnson Low Pass Filter 250-20, 50 ohms, $11.00. H. Anderson, 639 N. Wahsatch, CO, 80903.

SELL: Milliamper meters, center reading, 0-150. $3.50 ppd. Goodman, 5826 S. Western Ave., Chicago, IL 60636.

BARGAINS: Various Panel meters, Westinghouse Cartoned 0-300 volt A.C. 2 1/2", $3.00, ppd. G. Samkofsky, 4803 Brenda Dr., Orlando FL 32806.

FOR SALE: Johnson Desk KW pick-up only or trade for 75S3B or KWM2A, Frank Miller, 1608 Nippersink Road, Ingleside, IL 60041.

FOR SALE: HT32A, Mint, $185.00, Navy Long Wave Rcvr., $150.00. You pick up. W9MIK, (312)-281-2057.

WANTED: VX-501 VFO Console for National NCX-5. Write stating condition and price to, R.F. Roll, W9LUH, 2208 Linden Ave., Waukegan, IL 60085.

SELL: Drake 2B, 2BQ, 2AC, $170. SX110 rx, $80. Prog Line MT36N w/AC, $120. 75S1, $300. Norm, WB2EHB, Bronx, NY (212)884-9694.

SAROC National Convention Tenth Anniversary January 2-5, 1975. Hotel Sahara Space Center, Las Vegas, NV. QSL to P.O. Box 945, Boulder City, NV 89005.

Coax: 3 100ft Lengths RGS-AU with PL259 and Ug21B/U connectors, $10 each. Norsico TV Projection Unit with CRT. HV. Supply, $60. W2PPT, (212)843-1723.

SELL: Collins CP-1 crystal pack, $150. Jim Fleming, K9FRZ, 6N705 Harvey Rd., Medinah, IL, 60157.

FOR SALE: Heath Kit D.C. supply model HP13A. Also Heath Kit mobile mount. $65.00 takes them both. Larry, Langevin, K1GXU, 42 Prospect St., Ludlow MA 01056.

FOR SALE: OR SWAP QST 1962 thru 1974 National Geographic, 1962 thru 1974. Want mobile gear. J. Kramer, Box 246 Earlville, IL.

WANT: SX11 or SX101 with manual. WA2PCL, 101-23 Lefferts Blvd. Richmond Hill, NY 11419

WANTED: Twelve number touch-tone pads. H. Perozzo, W7UD, 8515-37th West, Tacoma, WA 98466.

SELL: 2 KW Linear amp. 3-500z finals, by Raytrack $350. Ten Tec PM3A QRP rig, $45. WB9NSH, RI, Box 89A Rochester, IN 46975.

SELL: Hallicrafter SX111, good condition. Box 121 Aiplaus, NY 12008. F.M. Spoonogle.

WANTED: 800 cycle machanical filter for Collins 75A3 receiver. Also Collins 310-B exciter at sensible prices. E.F. Henning, W5BMI, 207 South Smalling Rd., North Little Rock, Ark. 72118.

FOR SALE: HW101 with HP23A, $285.00 MP-33 Mosley Beam, $70. HW29A 6 meter transceiver $20.00. Eico 147A Signal Tracer, $15.00. Al Kast, 7806 Washington Park, Dr., Dayton OH 45459.

BRAILLE DIALS: For the blind (at cost) on Drake Transceivers and Drake Twins and VFO's. Remove knob, slip on Braille dial and replace knob, that's all. Please state model type. $2.00 each PPd. Vernon Page, W8EXJ, 1969 Manz St., Muskegon, MI 49442.

WANTED: Tech manuals for CU-351 Antenna coupler, CU-523/ARC-58, Antenna Coupler also 500 kc. mechanical filters. Steve Hose, WA9AXE, RR2, Hope, IN 47246.

WANTED: Dremel Moto-tool kit. Model 271 or 261. Please advise. Jim, K4VBH, Box 268, Americus, GA 31709.

FOR SALE OR TRADE: 75A4 mint condition, 3 filters. WA0GUN. (303) 757-2450.

WANT: F.B. 100KC crystal calibrator for SBE34 transceiver. Trade or buy. L.B. Fuqua, W4WBD, Maple St., Box 6 Eddyville, KY 42038.

WANTED: Scott Philharmonic console cabinet. 75A4 Vernier Dial. Radio News prior to 1923. R. McNeill, Box 472, Yorkton, SASK, Canada, S3N 2W4.

WANTED: Hy-Gain 14AVQ & manual in excellent condition. Write: W3HNK, Box 14 Norwood PA.

WANTED: Drake TC-6 and (ASR-33 or ASR35) TTY. Please send price and condition to WB4BWK, Box 86, Due West, SC 29639.

SELL: Eico 753/751 with manual. Best offer, good condition. Sever, 612 Lindy Lane SW, North Canton, OH 44720.

WANTED: Older model aircraft radios (VHF) such as LEAR, NARCO, BENDIX, etc. WB6NVH, 7208 Valley Greens Cir. Carmen, CA 93921.

SWAP: FPM-300 for Swan 250C w/ACPS. Jack, K3KEK, 323 Second St., New Cumberland, PA 17070.

WANTED: Will trade Clegg 22'er and Heath 2'er for low band SSB xcvr. Carl Steele, 800 Stonegate Manor, Apt. 22, Salem, VA 24153.

WANTED: Vebroplex or similar bug for use without keyer, good condition. State price. Eric Benjaminson, WN6CEK, 71 Linaria Way, Menlo Park, CA 94025.

FOR SALE: Complete write for list. CQ/QST/73, SASE for list. WB0IKN, P.O. Box 432, Evergreen, CO 80439.

FOR SALE: Like new, Black Nikon F, black pouch Auto-Nikkor 135 mm, F? 2.8 & 50 mm, F:1.4 lens-caps. $390. Elmer Grabb, 523 Spencer Rd., Rochester, NY 14609.

FOR SALE: Complete novice station now on the air, Heath V.V.O. mode HG-10B, Heath DX-60A, Lafayette Amateur Communications Receiver, model, HA-350, with all manuals, $90. Charles Kleinz, W3DAJ, 1408 Birchwood Ave., Rosly PA 19001.

FOR SALE: SX40 receiver, $50.00, new 12V-DC-to-120AC 350 watts transistor inverter. $50.00. Want: Keyer, paddle or bug, Kenneth Hand, WB2EUF, Bridgehampton, LI, NY 11932.

FOR SALE: R-390, $350; 32S1/516F2; $375; PL-172; $80; MOD 28 TTY, $200; 4-400A's, $25; 14 Reperf, $30. Others. G.L. Hale, 6334 Edward St., Norfolk, VA. 23513.

SELL: Collins 75S-3B, 32S-3, 516F-2; Telrex 10, 15 & 20 mtr. beams, Telrex rotators, H/B 4-1000A Linear. W6FET, 1475 Santa Margarita Drive, Fallbrook, CA 92028.

WANTED: Heath Digital Thermometer, and clock Tom Dornback, K9MKX, 2515 College Road, Downers Grove, IL 60515.

MAGAZINES WANTED: March 1961 "73"; June November, 1968 and April 1969 "Ham Radio." Will pay top price plus postage. Al Bernard, WA2UFN, 300 Lawrence Ave., Oakhurst, NJ 07755.

WANTED: Poly-Com 6 or Poly-Com 2. Hallicrafters HA-2, or HA-6. State condition and price WA9HEU, Rt. 2, Box 284 Marinette, WI 54143.

FOR SALE: Drake 2C Receiver; 2AC Calibrator; 2-CQ spk./Q-Multiplier; 2NB Noise Blanker, all new $250.00. W9CO, 604 Wyatt, Lincoln, IL 62656.

SELL: Ameco Advanced License guide, Ameco Radio Theory Course, Post check advanced test study guide, $6. All three, $6. ppd. Feely, 15 Locust Hill, Yonkers, NY 10701.

SELL: FTdx401 6 months old, Gonset Linear, Murch Ultimate Transmatch, all excellent. Best offer, Webb, P.O. Box 6, Morganton, NC 28655.

NEED: Copy of parts list or manual for Mot low band 41V (not T41) for two freq. kit. WT Adams 9707 Hanstord, Austin, TX 78753.

LIFETIME Gold Metal Security Platewith a vinyl 2-pocket carry case, ID card: $2.00 ppd. S. Solomos, 2000 N.E. 31 Ave., Ft. Lauderdale, FL 33305.

NOVICES: Elmac AF-67 and PMR-7 station with AC-DC PS, $100 or best offer. Also SCR-522 with AC PS, $40. B. Baker, WA7SBP, 516 Braemere, Boise, ID 83702.

SELL: Telegraph and Stock Ticker equip. Send SASE to C.B. Goodman, 5826 S. Western, Chicago IL 60636.

WANTED: Pierson-Holt Receiver model, KE-93, with or without power supply. All replies answered Will pay shipping. R.L. Collins, W6WBY, P.O. Box 143, Port Hueneme, CA 93041.

FOR SALE: FRDX 400 receiver, all bands, 160 thru 2 meters, with filters. BC221 with original calibook. W1VM, RFD 1, Saunderstown, RI 02874.

FOR SALE: KWM2 mobile ant. 351D2 and DC power supply 516E1, $100. Ed Snow, W2UN, 139 Edgeview Lane, Rochester, NY 14618.

FOR SALE: Galaxy GT-550 with AC supply, $350 local pick up only. K4JRI 633 SW 5th St., Boca Raton, FL 33432. (305) 395-9324.

SELL: Electro-Voice ceramic microphones, in good condition, 729ER, $9.00; 719, $13.00. A.E. Johnson, K1IIK, Box 77, West Dover, VT 05356.

WANTED: Heathkit HW-12 or HW-101 with or without power supply. James N. Glass, W4CDK. P.O. Box 548, Eddyville, KY 42038.

WANTED: Complete Collins S-Line; Ken, WA5JJB P.O. Box 355, Nederland, TX 77627.

SELL: Collins S/Line, 75S3, 32S3, 312B-4, 516F2, DL-1 complete or separate. T. Gosman, P.O. Box 42, Woodbury, NY 11797.

SELL: Clegg 22'r, $125, Gonset 111 6m, $75. Both in perfect operating and very clean condition. Money-Order or certified check. K4HHH6/1930 Felspar St., San Diego, CA 92109.

FOR SALE OR TRADE: 10-15 meter Mosley beam, K0HLA, 338 16th Ave., No. Hopkins, MN 55343.

FOR SALE: ARC tl8 2.1-3MC & T21 5.3-7MC new, $10.00, Heath 3" scope model 10-17 $65.00 never used, Eico ST40 stereo mint, $69.00, Garrard, ST Cover, base auto & cartridge, mint, $95. W5SYB, 5000 Hall, Amarillo, TX 79109.

SELL: DX40 Transmitter with TR Switch, $40. Victor Schorn, RT 5 Box 323-B, Florence, AL 35630.

TRADE: CX7A Maintenance Manual, new, for CX7 Nov. '70 version in mint condition. A. Emerald 8956 Swallow Ave., Fountain Valley, CA 92708.

NEED HELP: On pi-choke for Microwave Devices Mod. 263 di-coupler. K7OLH, 363 S. Bluefield Pl. Tucson, AZ 85710.

SELL: Eico 950 R/C Bridge $18 FOB, Heath IM 18 VTM/RF Probe $25 FOB. Eico 324 Sig Gen $18 FOB List SASE. WB9BXX, Box N, Gridley, IL 61744.

FOR SALE: Collins 32S3 Xmtr w/PWR Sup long emblem. Local only, $550 firm. New tubes. A. J. Anzevino, WB2KDE, 12 Lakeview Rd., Carmel, NY 10512.

FOR SALE: Viking 6N2 transmitter with Viking 6N2 VFO with manual, $75.00. WA9AXA, 201 E. 59th St., Westmont, IL 60559.

FOR SALE: Knight kit Star Roamer 400kc thru 30mc. Excellent, well-built. WN1WXQ, Doug, No. Star Rt., Torrington, WY 82240.

SELL: 2 new Penta PL184A sockets. K2HXN, 283 W. Shore Trail, Sparta, New Jersey 07871. (201) 729-5400, nites only.

FOR SALE: AC Adaptors, 6VDC 150MA, Standard plug, brand new. $3.00. PPD. K2MFY, 2 Nutley Court, Plainview, NY 11803.

WANTED: Hi/Lo band scanner, 2 meter Yagi Antenna, 275 Matchbox. WA0GGU, Rt. 1 Gilbert, MN 55741.

WANT: Gonset gear (xcpt. 2m) good condition, reasonable price; describe. W6ZI, 595 Midway, Midway, Novato. CA 94947.

FOR SALE: Kenwood TS511S xcvr, PS511S supply, VFO. $450. Venus SSTV monitor, $250. WB2FHI, 22 First St., Kings Park, NY 11754. (516)269-9208.

BUY-SELL-TRADE: Write for monthly mailer, give name address, call letters. Complete stock of major brands, new and reconditioned equipment. Call us for best deals. We buy Collins, Drake, Swan, etc. SSB & FM. Associated Radio, 8012 Conser, Overland Park, Kansas, 66204. (913)381-5901.

FOR SALE: TR-4 w/blanker, P.S. and speaker, used 7 times on 20m, $600. Ranger II, F/W-mint, $120.00. HQ 170-C receiver, mint, $160.00, all FOB, here. C.W. Roberson, W5MBP, Box 218, Terrell, TX 75160.

LEARN DESIGN TECHNIQUES: Electronics Monthly Newsletter. Digital, linear construction projects, design theory and procedures. Sample copy $1.00. VALLEY WEST, Box 2119-M, Sunnyvale CA 94087.

SELL: Sams photofact Exc. Six metal cabinets with 51 misc(25 to 510) plus 466(541 thru 1007) FOB, Best offer, over $300. SASE for answer. Gordon B. Short, 7436 E. 29th Tulsa, OK 74129.

COLLINS: 75A4, gear reduction, 3.1 filter, matching speaker, aligned perfect, original immaculate condition, serial 2883, $380. 500 cycle, 1.5, 2.1, 6.0 filters, $160. All for $500. WA6KAC, 240 Graves, San Luis Obispo, CA 93401.

FCC test answers updated any class, $5; Specify. Dixie Tec, Box 8352 Savannah, GA 31402.

CLEGG FM-27Bs at prices I dare not publish. W0NGS, Bob Smith Electronics, 1226 9th Ave., North, Fort Dodge, IA 50501. (515)576-3886.

SURPLUS, Giant bargain-packed catalog, $1. Etco Electronics, Dept. CQ, Box 741, Montreal A, H3C 2V2.

FOR SALE: Spectra Physics 2.0 mw 071-2 HeNe laser tube, brand new with power supply schematic, $110.00. WA2NDM, 5 Melville Rd., Great Neck, NY 11023.

NEED: BC-923 receiver. Part of SCR-808 and SCR-828 Radio Sets. State condition and price. R.A. Gann, Box 40357, Everman, TX 76140.

FOUNDATION FOR AMATEUR RADIO annual Hamfest Sunday 20th October, 1974 at Gaithersburg Maryland Fairgrounds.

FREE: 12 Extra crystals of your choice with the purchase of a new Regency HR-2B at $229. Send cashier's check or money order for same-day shipment. For equally good deals on Collins, Drake, Kenwood, Standard, Clegg, Swan, Icom, Genave, Hallicrafters, Tempo, Midland, Ten-Tec, Venus, HY-Gain, CushCraft, Mosley, and Hustler, write to Hoosier Electronics, your ham headquarters in the heart of the Midwest. Become one of our many happy and satisfied customers. Write or call today for our low quote and try our individual, personal service. Hoosier Electronics, R.R. 25, Box 403, Terre Haute, Indiana 47802. (812)-894-2397.

FOR SALE: Practical 80-40 meter wire beams! Dozens in "wire beams for city lots." $3.50 ppd. Bray Radio, Iron, Minnesota 55751.

CONFIDENTIAL FREQUENCY LIST! Thousands of classified frequencies: spies, aircraft, ships, government, teletype, emergency, many more! $4.00 postpaid. Bob Grove, WA4PVQ, 6601A S.W. 56th St., Davie, FL 33314.

CANADIANS: For all your electronic parts requirements at low prices, send for free flyer; DARTEK ELECTRONICS, Dept. C, Box 2460, Dartmouth, Nova Scotia.

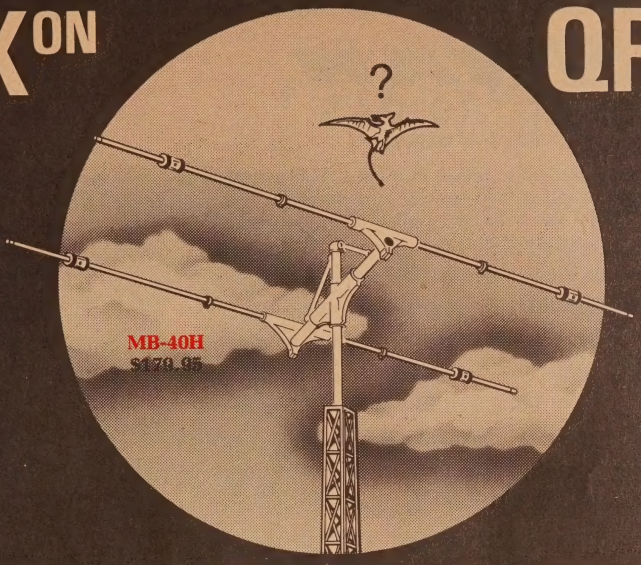
FOR SALE: SBE Sidebaner Six 6m transceiver, $300; Knight TR106 6m transceiver with V-107 VFO; $170; Knight T-150 6m amplifier, $70. Hallicrafters HT-40 80-6m transmitter, $40; Ameco RSA receiver $60; Ron Rech, WB9EPZ, 325 Hickory Dr., Burlington, WI 53105.

Did you know that supplements to the book, "CQ YL," are available? They bring the book up to date with the YLRL Officers thru 1973 and the 6th YLRL Convention, held at Long Beach in May '72. If you have a copy of "CQ YL" and would like to add the new supplements (the pages are "slotted" so they fit directly into the "CQ YL" spiral backbone), drop a note with your request to author/publisher, W5RZJ, Louisa Sando, 4417 - 11th St., NW, Albuquerque, NM 87107. Please enclose two 10 cent stamps to cover cost of mailing. The one and only book about YLs in ham radio, "CQ YL," contains 21 chapters, over 600 photographs. Order your autographed copy, or a gift copy, from W5RZJ, $3.00 postpaid.

MAGAZINES FOR SALE: CQ/73/QST/HAM RADIO issues at 10 cents each (plus shipping) from Lockheed Ham Club, 2814 Empire, Burbank, CA 91504. Send list and check. Available issues and any refund due will be sent promptly.

Rubber address stamps. Free catalog. 45 type styles. Jackson's, Box 443F, Franklin Park, IL 60131.

DX ON QRPp



WITH A SWAN 40-METER BEAM ANTENNA

You, too, can enjoy the same low power DXing success that has pleased George McGinley, W60GM, president of Swan Electronics. George has worked hundreds of contacts with a 3-watt, home-brew, 40-meter transceiver. His MB-40H antenna is the key factor allowing him to reach South America, Japan, the Atlantic coast, the south seas, and Canada from his QTH in Southern California.

Although W60GM has a zest for QRPp, the large precision tuned and weather proofed high Q loading coils of a MB-40H will handle 2,000 watts P.E.P. with ease. While weighing only 40 pounds, this rugged heavy-duty performer is designed to withstand winds up to 100 mph. The antenna surface area, exposed to the wind, is just 2.5 square feet.

MB-40H elements are 30.25 feet long, turning radius is 17.5 feet, and the wind load at the EIA standard of 80 mph is a mere 80 pounds. With a 15.75 foot boom length, two working elements adjust to optimum spacing for maximum forward gain and front-to-back ratio in the CW or phone portion of the band.

For years of reliable service in any kind of weather from the arctic to the tropics . . . whether you go QRO or QRPp . . . you can't buy a better 40-meter beam than this outstanding Swan antenna. Install an easy to assemble MB-40H and communicate with places you've never heard before. See an authorized Swan dealer soon or, if you prefer, use this coupon right now—while you're thinking about it.

To Order Direct, Mail Coupon To:

SWAN ELECTRONICS
A subsidiary of Cubic Corporation

305 Airport Road
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Telephone:
(714) 757-7525

Gentlemen:
Please ship an MB-40H, by motor freight collect, immediately to:

Name _____ Amateur Call _____

Address _____ Telephone _____

City _____ State _____ Zip _____

(California residents, please add sales tax)

☐ $179.95 Full Payment Enclosed. ☐ $36 Enclosed, ship C.O.D.

☐ $18 Enclosed, charge remainder to my Swan Credit # _____

SWAN ELECTRONICS

A subsidiary of Cubic Corporation

Holiday

Now is the best time to invest in a truly ALL American made Swan 300B transceiver, for yourself or, as a gift to that special ham on your Christmas gift list. Besides its well known popularity, here are a bakers dozen of value-packed reasons why you should choose a Cygnet *de novo* amateur station:

1. 300 watts P.E.P. input (200 watts DC on CW).
2. Selectable USB, LSB, AM and CW operating modes.
3. Selectable 10, 15, 20, 40 and 80 meter bands.
4. Self-contained 110V AC power supply and CW monitor.
5. Dial-set calibration control and 100 kHz markers.
6. The most natural sounding voice transmissions — bar none.
7. Excellent suppression of unwanted characteristics.
8. Adjustable output impedance match to antenna.
9. Less than 0.5 microvolt sensitivity for 10 dB S N/N ratio.
10. Internal speaker with exceptional audio response.
11. Swan factory warranty and unsurpassed customer service.
12. Selected "package buys" at reduced prices for a limited time.
13. Convenient financing with NO MONTHLY PAYMENTS UNTIL NEXT YEAR when you use your Swan Revolving Credit Service Plan.

HOLIDAY PACKAGE

BUY #1

"$59.60 OFF"

Swan 300B Cygnet *de novo* transceiver PLUS TD-80/40 trap-dipole antenna for 80 and 40 meters. This regular $595.85 list value is yours during this special season at a low cost of only **$536.25** complete.



Swan 300B Cygnet *de novo* **$519.95**
300B with SS-16B filter **$589.95**

HOLIDAY PACKAGE

BUY #2

"SAVE $67.85"

Swan 300B Cygnet *de novo* transceiver PLUS 14-A 12V DC converter PLUS 404 hand-held microphone PLUS 45 mobile 5-band antenna. Save $67.85 off the regular $679.80 list value. Total package price is just **$611.95** if you buy now.

HOLIDAY PACKAGE **BUY #3** **"FREE MICROPHONE"**

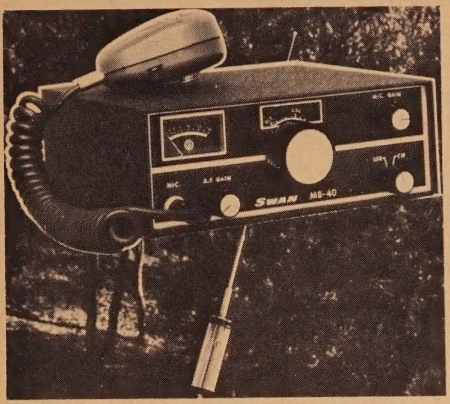
Swan 300B Cygnet *de novo* transceiver plus 444 desk microphone PLUS TB-3HA heavy-duty tri-band beam antenna for 10, 15 and 20 meters. Separately, a regular $715.85 list value. This grouping offered at a net **$679.95** price.

HOLIDAY PACKAGE **BUY #4** **"BEST BUY PER WATT"**

Swan 300B Cygnet *de novo* transceiver PLUS 444 desk microphone PLUS TB-3HA beam antenna PLUS 1200X linear amplifier — a 1200 watt P.E.P. home station. $1015.80 regular list value, now just 80¢ per watt at a **$964.95** sale price.

Specials

ORDER EARLY FOR CHRISTMAS DELIVERY



MOBILER PACKAGE BUY #5 "160 WATT MONOBANDER"

Select a 40 or 80 meter package! Swan MB-40A transceiver PLUS 404 hand-held microphone PLUS 40 meter model 35 mobile antenna . . . *OR* . . . Swan MB-80A transceiver PLUS 404 microphone PLUS 80 meter model 35 mobile antenna. An up to $407.75 list value at only **$385.95** for your choice of frequency band.

ACCESSORIES AVAILABLE
AT REGULAR LIST PRICE:

14-A DC Converter for 300B mobile use	$ 49.95
508 External VFO for extra 300B control	$189.95
VX-2 Plug-in VOX unit for 300B	$ 44.95
FP-1 Telephone Patch	$ 54.95
SS-16B Super-selective I.F. Filter Kit	$ 89.95
GMTK Mobile Gimbal Mounting Kit	$ 5.20
MTK Mobile Custom Mounting Kit	$ 9.95
MARK II 2000 watt P.E.P. Linear Amplifier	$749.95
MBCW CW Sidetone Monitor for Monobander	$ 19.95

Sorry, no substitutions/deletions to special packages. The reduced prices shown are restricted to combinations stated for a limited time only. This offer expires December 25, 1974. Residents of California, please include sales tax when ordering direct from the factory.

You may order through any participating Swan dealer or, if you prefer, complete and mail the coupon with your down payment (certified check or money order) to:

SWAN ELECTRONICS
A subsidiary of Cubic Corporation
305 Airport Road
Oceanside, CA 92054
Phone (714) 757-7525

Gentlemen:
Please ship, best way – collect, the items check to:

NAME: _____ AMATEUR CALL: _____
ADDRESS: _____ PHONE: _____
CITY: _____ STATE: _____ ZIP: _____

☐ **PACKAGE BUY #1** – $536.25 ☐ **PACKAGE BUY #2** – $611.95
☐ **PACKAGE BUY #3** – $679.95 ☐ **PACKAGE BUY #4** – $964.95
☐ **PACKAGE BUY #5** – (Check One: ☐ MB-40A or ☐ MB-80A) – $385.95
☐ 300B – $519.95 ☐ 300B with SS-16B – $589.95 ☐ GMTK Kit – $5.20
☐ 14-A DC Converter – $49.95 ☐ 508 VFO – $189.95 ☐ MTK Kit – $9.95
☐ VX-2 VOX – $44.95 ☐ FP-1 Phone Patch – $54.95 ☐ SS-16B Kit – $89.95
☐ Mark II Linear – $749.95 ☐ MBCW Sidetone Monitor – $19.95

TOTAL AMT. OF ORDER $_____ AMT. ENCLOSED $_____

☐ Full Payment Enclosed. ☐ 20% down payment enclosed, ship C.O.D.
☐ 20% down payment enclosed, charge remainder to BankAmericard
#_____ expires _____; ☐ 20% down payment
enclosed, charge remainder to Mastercharge # _____
expires _____ 4-digit Interbank # _____; ☐ 10% down payment
enclosed, charge remainder to Swan Account # _____
and defer first monthly payment on this charge until January 1975.

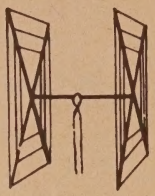
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RUSH

WHICH ANTENNA WINS THE CONTEST ?

In open competition against thousands of commercial and home-brew antennas, WA1JFG won the New England championship with a Gotham beam, by a margin of 5,982 points! WB2JAM won the sectional award for the Sweepstake contest in 1969 and 1970 with a Gotham 4-element 15 meter beam! Hundreds of unsolicited testimonials from grateful hams are our proof that Gotham antennas give you the best design, and the best materials. Forget our low prices - rely on the results of open, competitive contests. Ask yourself: Why do Gotham antennas win?

QUADS Worked 42 countries in two weeks with my Gotham Quad and only 75 watts... W3 CUBICAL QUAD ANTENNAS — these two element beams have a full wavelength driven element and a reflector; the gain is equal to that of a three element beam and the directivity appears to us to be exceptional! ALL METAL (except the insulators) — absolutely no bamboo. Complete with boom, aluminum alloy spreaders; sturdy, universal-type beam mount; uses single 52 ohm coaxial feed; no stubs or matching devices needed; full instruction for the simple one-man assembly and installation are included; this is a fool-proof beam that always works with exceptional results. The cubical quad is the antenna used by the DX champs, and it will do a wonderful job for you!



10/15/20 CUBICAL QUAD SPECIFICATIONS
Shipping Weight: 28 lbs. Net Weight: 25 lbs.
Dimensions: About 16' square.
Power Rating: 5 KW.
Operation Mode: All
SWR: 1.05:1 at resonance
Gain: 8.1 db. over isotropic
F/B Ratio: A minimum of 17 db. F/B
Boom: 10' long x 1¼" O.D.: 18 gauge steel; double plated; gold color
Beam Mount: Square aluminum alloy plate incorporating four steel U-bolt assemblies. Will easily support 100 lbs. Universal polarization.

Radiating Elements: Steel wire, tempered and plated, .064" diameter.

X Frameworks: Each framework consists of two 12' sections of 1" OD aluminum 'hi-strength' (Revere) tubing, with telescoping ⅞" tubing and short section of dowel. Plated hose clamps tighten down on telescoping sections.

Radiator Terminals: Cinch-Jones two-terminal fittings

Feedline (not furnished): 52 ohm coaxial cable

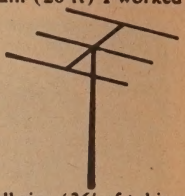
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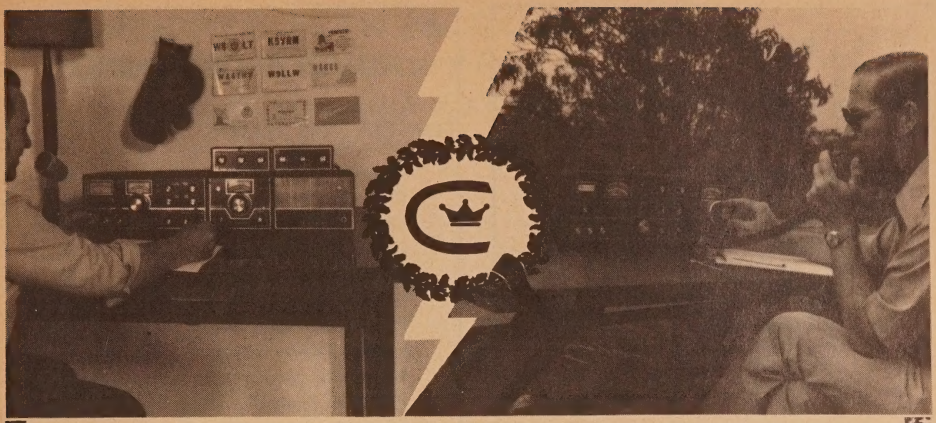
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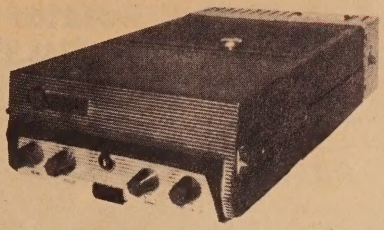
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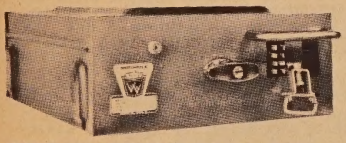


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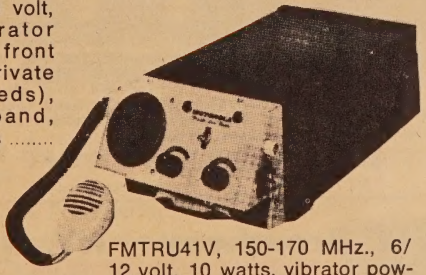
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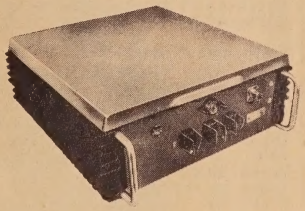
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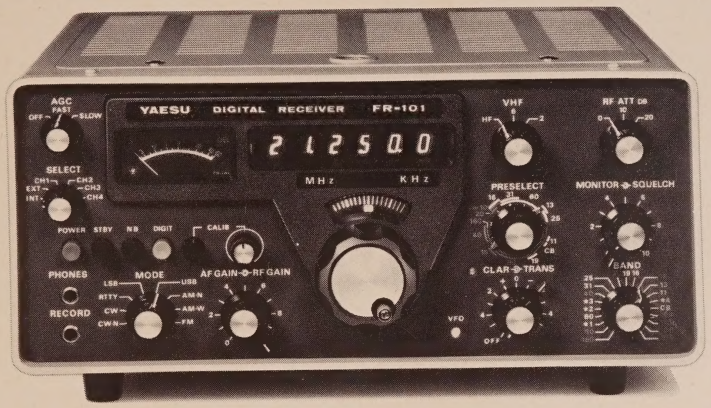
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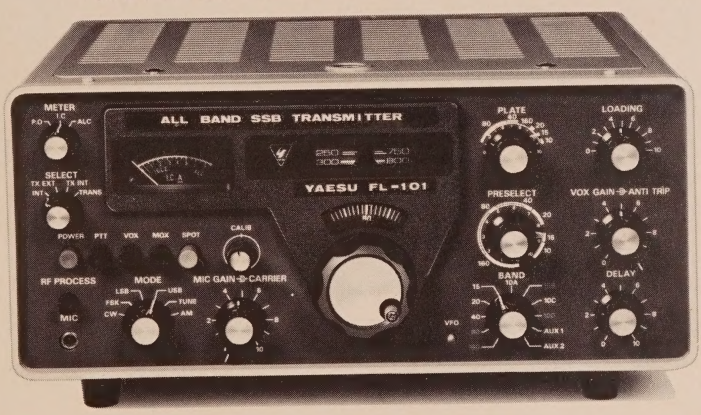
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