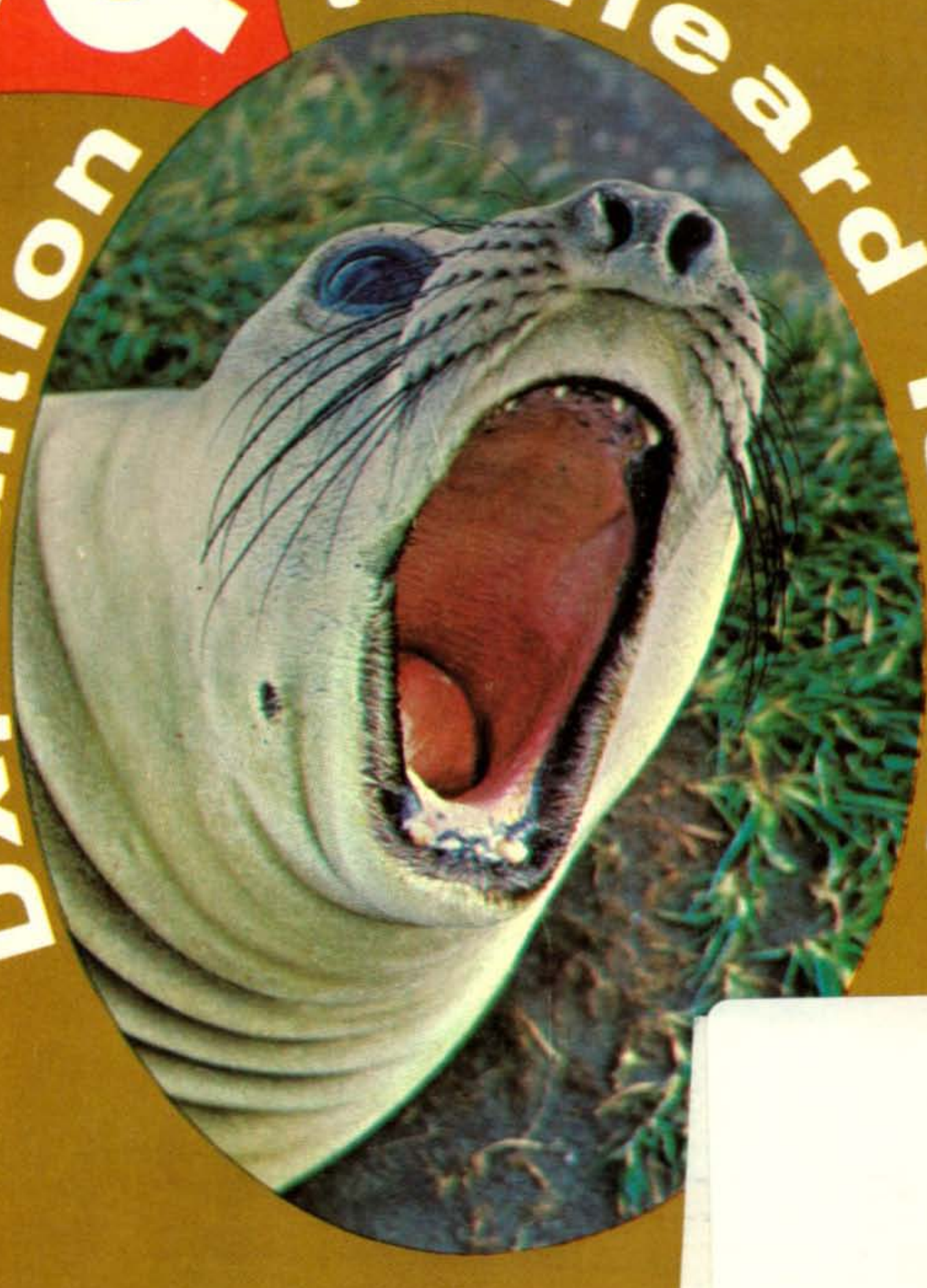
CQ

ICD

September 1970

75¢

DXpedition to Heard Island



C.W. RESU

1969 CQ WORLD WIDE DX

- DIGITAL METEOR SCATTER DATA
- LOW COST LOW LOSS RIGID CO
- MOTORIZE YOUR CRANK-UP TO

The Radio Amateur's nal

Want to start a pile-up?

The New Heathkit® SB-102

Direct descendent of the most popular sideband rigs ever produced — the famous "100" & "101" Series. With an ancestory of top performance, high reliability and unbeatable value, you expect the new "102" to be a better rig . . . and it is.

The frequency stability and linearity of the "101" were second to none. The "102" is even better. An all solid-state Linear Master Oscillator cuts stabilization time in half; offers far greater tracking accuracy.

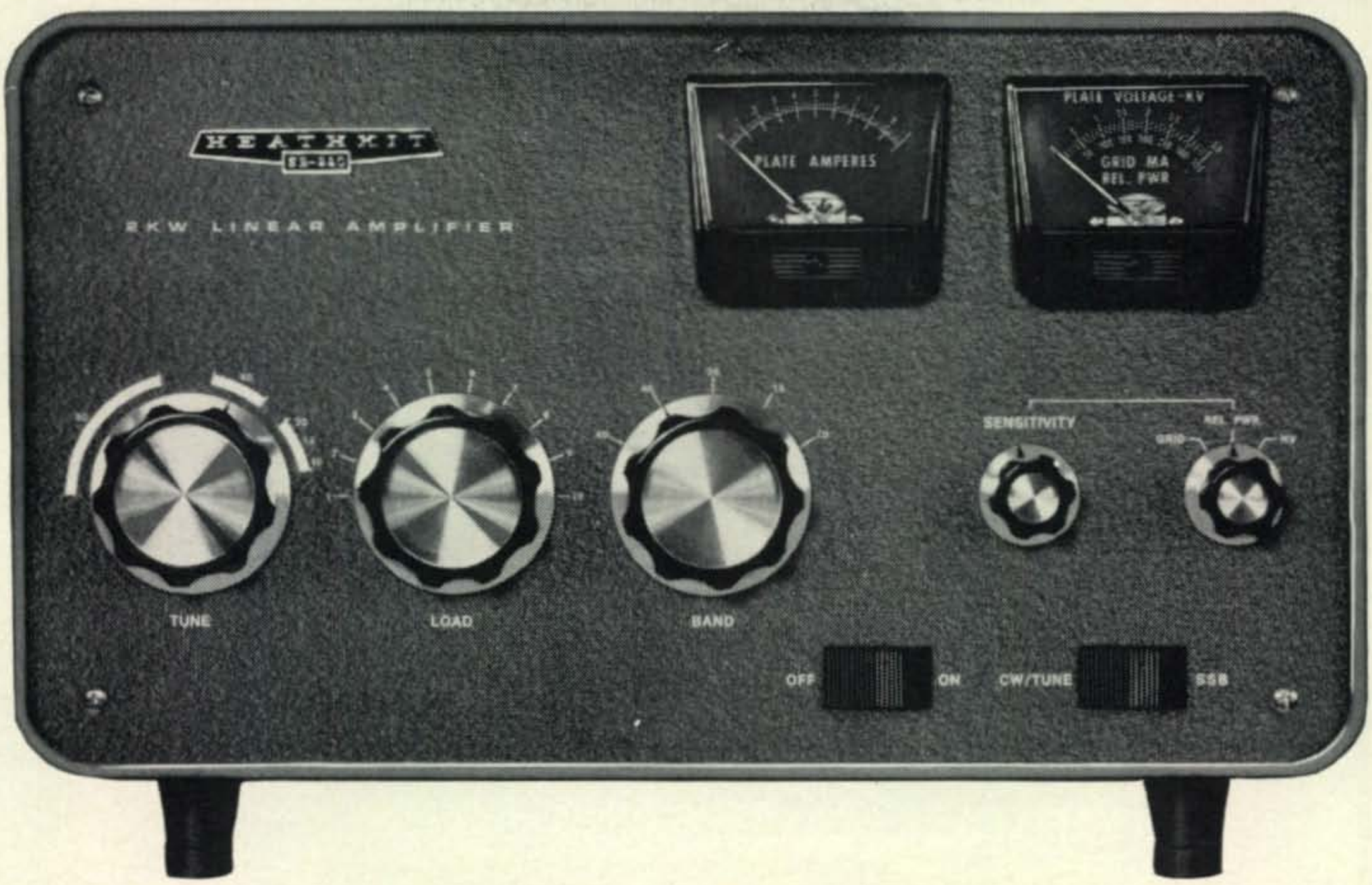
Hot new receiver circuitry delivers improved sensitivity . . . now less than 0.35 uV for 10 dB signal plus noise to noise. This increase gives you solid copy longer when the band is on the way out.

The new "102" brings you all the flexibility and performance that made the "101" the standard of comparison on the air, plus important new features. Start your Maxi-Rig now . . . with the SB-102 — from the Hams at Heath, of course.

• New all solid-state Linear Master Oscillator features 1 kHz dial calibration • Bandspread equal to 10 feet per Megahertz • Less than 100 Hz per hour drift after 10 minute warm up • Dial resettable to 200 Hz • New receiver circuitry provides sensitivity of better than 0.35 uV for 10 dB S+N/N • 180 watts PEP SSB input — 170 watts CW input • 80 through 10 meter coverage • Switch-selection of USB, LSB or CW • Built-in CW sidetone • Built-in 100 kHz crystal calibrator • Triple Action Level Control™ reduces clipping and distortion • Front panel switch selection of built-in 2.1 kHz SSB or optional 400 Hz CW crystal filters • Operate with built-in VOX or PTT • Fast, easy circuit board-wiring harness construction • Run fixed or mobile with appropriate low cost power supplies

SB-102, 23 lbs.....**$380.00***
SB-600, Communications Speaker, 6 lbs.....**$19.95***
HP-23A, AC Power Supply, 19 lbs.....**$51.95***
HP-13A, DC Power Supply, 7 lbs.....**$69.95***
SBA-301-2, 400 Hz CW Crystal Filter, 1 lb.....**$21.95***
SBA-100-1, Mobile Mounting Kit, 6 lbs.....**$14.95***

SB-102 SPECIFICATIONS — RECEIVER SECTION: Sensitivity: Better than 0.35 microvolt for 10 dB signal-plus-noise to noise ratio for SSB operation. **SSB selectivity:** 2.1 kHz minimum at 6 dB down, 5 kHz maximum at 60 dB down — 2:1 nominal shape factor — 6:60 dB. **CW Selectivity:** (With optional CW filter SBA-301-2 installed) 400 Hz minimum at 6 dB down, 2.0 kHz maximum at 60 dB down. **Input impedance:** Low impedance for unbalanced coaxial input. **Output impedance:** Unbalanced 8 and 600 ohm speaker, and high impedance headphone. **Power output:** 2 watts with less than 10% distortion. **Spurious response:** Image and IF rejection better than 50 dB. Internal spurious signals below equivalent antenna input of 1 microvolt. **TRANSMITTER SECTION: DC power input: SSB:** 180 watts P.E.P. continuous voice. **CW:** 170 watts — 50% duty cycle. **RF power output:** 100 watts on 80 through 15 meters; 80 watts on 10 meters (50 ohm non-reactive load). **Output impedance:** 50 ohms to 75 ohms with less than 2:1 SWR. **Oscillator feedthrough or mixer products:** 55 dB below rated output. **Harmonic radiation:** 45 dB below rated output. **Transmit-receive operation: SSB:** Push-to-talk or VOX. **CW:** Provided by operating VOX from a keyed tone, using grid-block keying. **CW side-tone:** Internally switched to speaker in CW mode. Approx. 1000 Hz tone. **Microphone input impedance:** High impedance. **Carrier suppression:** 50 dB down from single-tone output. **Unwanted sideband suppression:** 55 dB down from single-tone output at 1000 Hz reference. **Third order distortion:** 30 dB down from two-tone output. **Noise level:** At least 40 dB below single-tone carrier. **RF compression (TALC):** 10 dB or greater at .1 ma final grid current. **GENERAL: Frequency coverage:** 3.5 to 4.0; 7.0 to 7.3; 14.0 to 14.5; 21.0 to 21.5; 28.0 to 28.5; 28.5 to 29.0; 29.0 to 29.5; 29.5 to 30.0 (megahertz). **Frequency stability:** Less than 100 Hz per hour after 10 minutes warm-up from normal ambient conditions. Less than 100 Hz for ±10% line voltage variations. **Modes of operation:** Selectable upper or lower sideband (suppressed carrier) and CW. **Visual Dial Accuracy — "resettability":** Within 200 Hz on all bands. **Electrical dial accuracy:** Within 400 Hz after calibration at nearest 100 kHz point. **Dial mechanism backlash:** Less than 50 Hz. **Calibration:** 100 kHz crystal. **Audio frequency response:** 350 to 2450 Hz ±3 dB. **Phone patch impedance:** 8 ohm receiver output to phone patch; high impedance phone patch input to transmitter. **Front panel controls:** Main (LMO) tuning dial; Driver tuning and Preselector; Final tuning; Final loading; Mic and CW Level Control; Mode switch; Band switch; Function switch; Freq. Control switch; Meter switch; RF gain control; SSB-CW filter switch. Audio Gain control. **Internal controls:** VOX Sensitivity; VOX Delay; Anti-Trip; Carrier Null (control and capacitor); Meter Zero control; CW Side-Tone Gain control; Relative Power Meter Adjust control; P.A. — Bias; Phone Vol (headphone volume); Neutralizing. **Rear Apron Connections:** CW Key jack; 8 ohm output; Spare A; Spare B; Phone patch input; ALC input; Power and accessory plug; RF output; Antenna switch; Receiver Antenna. **Power requirements:** 700 to 800 volts at 250 ma; 300 volts at 150 ma; —115 volts at 10 ma; 12 volts at 4.76 amps. **Cabinet dimensions:** 14 7/8" W x 6 5/8" H x 13 3/8" D.



Turn on your Benton Harbor maxi-rig!

The New Heathkit® SB-220

Business end of the Maxi-Rig! Gives your signal the authority it takes to punch through those pile-ups (or start one yourself). And keeps you operating under conditions that drive the other guys QRT.

A pair of conservatively rated Eimac 3-500Z's provide up to 2000 watts PEP SSB input . . . 1000 watts on CW *and* RTTY. Requires only 100 watts PEP drive. Pretuned broad band pi-input coils deliver maximum efficiency and low distortion on the 80-10 meter bands.

The built-in solid-state power supply can be wired for either 120 or 240 VAC and switched back again in minutes if your power requirements change. Circuit breakers provide added protection and eliminate costly fuse changing. And for cooler operation and extended tube life, idling plate current is reduced by Zener diode regulated bias.

The layout of the new "220" is designed for fast, high volume air flow with a husky, quiet fan in the PA compartment doing the job. Result: the "220" actually runs cooler than most exciters.

Other features include two front panel meters for continuous monitoring of Ip plus switch-selected monitoring of Rel. Pwr., Ep & Ig . . . ALC output to reduce overdriving and distortion . . . safety interlocked cover . . . easy 15-hour assembly and handsome Heathkit SB-Series styling.

Tired of stumbling barefoot through the QRM? Order the shoes for your Maxi-Rig now . . . the new "220" . . . another hot one from the Hams at Heath.

• Full 2 kW PEP input on SSB . . . 1 kW on CW and RTTY • Boardband pi-input on 80 through 10 meters • Two Eimac 3-500Z tubes • 120 or 240 VAC wiring options • Zener diode regulated operating bias for reduced idling plate current, longer tube life, cooler operation • Double shielded to reduce stray radiation • Solid-state power supply • Two front panel meters for continuous monitoring of plate current, plus switch selected monitoring of Rel. Pwr., plate high voltage and grid current • Quiet, high volume fan for cool running • ALC output • Easy 15 hour assembly.

Kit SB-220, 55 lbs.....**$349.95***

SB-220 SPECIFICATIONS — **Band coverage:** 80, 40, 20, 15 and 10 meter amateur bands. **Driving power required:** 100 watts. **Maximum power input:** SSB: 2000 watts P.E.P. CW: 1000 watts. RTTY: 1000 watts. **Duty cycle:** SSB: Continuous voice modulation. CW: Continuous (maximum key-down 10 minutes). RTTY: 50% (maximum transmit time 10 minutes). **Third order distortion:** —30 dB or better. **Input impedance:** 52 ohm unbalanced. **Output impedance:** 50 ohm to 75 ohm unbalanced; SWR 2:1 or less. **Front panel controls:** Tune, Load, Band, Sensitivity, Meter switch, Power CW/Tune — SSB, Plate meter, Multi-meter (Grid mA, Relative Power, and High Voltage). **Rear Panel:** Line cord, Circuit breakers (two 10 A). Antenna Relay (phono), ALC (phono), RF Input (SO-239). Ground post. RF output (SO-239). **Tubes:** Two Eimac 3-500Z. **Power required:** 120 VAC, 50/60 cycles, at 20 amperes maximum. 240 VAC, 50/60 cycles at 10 amperes. **Cabinet size:** 14⅞" W x 8¼" H x 14½" D. **Net weight:** 48 lbs.

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This price reduction has been achieved by making 12 volt DC operation an optional plug-in accessory. The DC components are now contained in a 1½ x 3 x 4 inch box which plugs in back of the 270 B, in place of the AC connector. Servicing and maintenance are made easier, and we are able to pass the savings in cost on to those of you who do not require 12 volt operation. The DC converter, model 14A, may be purchased at any time. Except for this difference, the 270 B is identical to the 270. It is truly a top notch performer and an even better value. See the new 270 B at your SWAN dealer today.

Model 270 B **$499**
Model 14A, 12 volt DC converter .. **$39.50**

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SEPTEMBER, 1970 VOL. 26, N. 8

The Radio Amateur's Journal

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DEPARTMENTS

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Postmaster: Please send form 3579 to CQ Magazine, 14 Vanderventer Ave., Port Washington, L.I., N.Y. 11050

Corporate Marriage Certificate

This Certifies that

Hy-Gain Electronics Corporation and Galaxy Electronics were on the first day of June in the year of Nineteen Hundred and Seventy united in the bonds of Corporate Matrimony, this new union to be known as Hy-Gain's Galaxy Line of Amateur Radio Equipment & Accessories. Friends and family are invited to see the new couple.

P.S.

Gifts in the form of orders accepted at the best distributor under the sun — the one who stocks Hy-Gain Antennas and Hy-Gain's Galaxy Line.

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P. O. Box 5407-FH Lincoln, Nebraska 68505

ZERO BIAS

It should be very apparent to most readers for some time now, that from a business point-of-view the Amateur Radio industry has been in pretty sad shape. In spite of severe cutbacks in advertising budgets of those companies who remain in the field, and compounded by the dozens of other former advertisers who have disappeared from the scene altogether, most of the amateur radio publications have attempted to maintain a standard of performance far in excess of what the actual dollar income from ads, subscriptions and single copy sales really justified.

None of the amateur radio magazines can be making a significant profit. Ad rates have been kept low while costs of publishing and mailing have continued to skyrocket. Fortunately, **CQ** has been kept well subsidized by the other publications with the corporate structure. We've been able to maintain an extremely high ratio of editorial to advertising pages, plus the glamor of many features not provided by our competition. But now, with even higher costs facing us in the months ahead, and certainly no sign of an upward advertising trend in sight, we're forced to abandon the glamor image in lieu of simple good business judgment.

Gone this month is much of the color printing that **CQ** has used so lavishly. Gone is the "perfect binding," replaced by the less expensive, but by no means less effective, "saddle stitching." Gone is the extremely expensive manila mailing envelope.

These are cuts we didn't want to make. They are cuts we simply **had** to make, if **CQ** is to survive to continue its twenty-five year record of providing amateurs with the best in interesting and informative reading.

Not a single column has been dropped from our editorial pages. We'll still be out in front with the latest information on DX, contests, propagation, v.h.f., surplus, awards, announcements, etc. And we'll continue to seek out and publish the finest technical articles and general information stories that **CQ** readers have come to expect. Still with us, of course, are Bill Scherer's invaluable Q & A Column and equipment reviews. Naturally, the most popular contests and awards programs in all of hamdom, continue unchanged. In other words, **CQ** basically remains intact with a few minor changes in physical appearance.

We fervently believe that the economic conditions within the industry will take a change for the better in the near future, and when that happens, rest assured **CQ** will restore the items which we've been forced to remove at this time. We hope our readers will recognize the necessity that has caused these changes, and will bear with us as we ride out a rough economic storm.

Richard Cowan, WA2LRO
Publisher, **CQ**

OUR READERS SAY

Brice Tarleton Rebuffed

Editor, CQ:

I am writing in reply to Mr. Brice Tarleton, WA4JW, whose letter appeared in the May issue of *CQ*.

I wonder just where Mr. Tarleton expected the revered and respected patriarchs of the amateur service, the Extra class licenses, to be during Hurricane Camille? The last I heard, most traffic nets were using General class frequencies for their operations for extremely obvious reasons. If I were an Extra class licensee in Podunk, your state, during an emergency I most certainly would not play ostrich between 3800-3825kc. I would be where the action is up in the General portion of the band handling traffic with everyone else. Most locales do not contain enough Extra class licensees to form an exclusively Extra net so an observer could *expect* to find a lack of activity on Extra frequencies during emergencies.

Secondly, regarding incentive licensing, I doubt the most pretentious Extra in the United States would say either of the required exams overtaxed his mental capacity· Very few hams, if any, would blow a fuse trying. The point is it requires the aspiring ham to get off his rotund posterior and DO SOMETHING. As in any other human endeavor, output is directly proportional to input. A ham can find much to complain about in every facet of amateur radio if he confines his activities to turning on the Super Zapper 10,000 and determining the size of the hole he can blast in the QRM. If a ham wants an Extra badly enough he will *create* sufficient time and effort to get it. Two fewer serials on TV three or four evenings a week will do the job.

Finally, I defy any two properly equipped phone operators to handle traffic faster than two properly equipped c.w. operators. Anyone who thinks c.w is dying hasn't spent much time down there lately working Europe an hour after phone conservations became unintelligible·

Author H. Charette, WA6CXK
Vallejo, Calif.

Editor, *CQ:*

I was reading your May 1970 issue and came across a letter written by WA4VJW criticizing radio amateur public services. I have read several letters in your and other journals criticizing the work that amateur radio operators did after Hurricane Camille.

So far, it seems that no one asked those of us, who were the victims of the disaster what we think of their work.

I am a member of the National Guard. My unit was called out to the Gulf Coast just before the storm. The next morning as we deployed along the coast, I noticed that there were several radio amateur mobile units already in the area. I am a radio operator in the Mississippi National Guard, so I tuned in the emergency nets in the 3900-4000 kc sebment of the 80 meter band from time to time to listen.

I failed to hear the QRM and confusion that is mentioned by WA4VJW. What I heard was the passage of some emergency messages, and this was done in a clean and orderly fashion.

I would like to say to all the radio amateurs that were helping out in the work after Hurricane Camille, from one who was a victim of the Hurricane, thank you, very much.

Charles A. Bennett, WPE5SW
Sumrall, Miss.

Mumble-itis

Editor, *CQ:*

Heartiest congratulations for your excellent article, "Have You Mumbleitis?," May 1970.

Some of the slovenly voice transmissions one hears would never be tolerated in code transmissions outside the Novice bands.

When radio began and spark transmissions were used, communication was by means of the Morse code. Logically, when licenses and tests were introduced, a Morse code test was included to satisfy the authorities that the applicant could send and receive Morse code at a certain speed to a very high standard of accuracy.

Telephony was introduced after World War I, yet nearly 50 years later the licensing authorities have apparently not up-dated their tests to include voice transmissions and reception at a given speed to a very high standard of accuracy. Not even your new Advanced and Extra class licenses require an elocution test.

I mentioned reception as well as transmission as it is amazing how often, after receiving a report of "readability 5" the station then copies all wrong. For years on a.m., I ran 150 watts (our legal limit) to a 2-element beam· How often I heard "Roger OM solid copy. OK on your 450 watts and 3-element beam."

I am always amused to read about the ARRL code proficiency tests but never about voice proficiency tests. I am still waiting to see half of these transmissions switched to voice proficency testing at increasing speeds at a high standard of accuracy, thereby bringing them into the modern age.

But so long as the license depends on a Morse code test, and voice is never tested, so long as ARRL run code proficiency tests but no voice tests, so long I suppose the world–official and amateur–will continue to practice good code sending and receiving and tolerate poor voice communications.

E. M. Wagner, G3BID
London, England

P.S.: Might one in phone reports include the third digit as in c.w., thus 393 would indicate– Readability 3, Strength 9, Elocution 3.

Announcements

John Gore Memorial Scholorship

The Foundation for Amateur Radio, Inc., a non-profit organization, with its headquarters in Washington, D.C., announces its intent to make the annual award of the John Gore Memorial Scholarship for either graduate or undergraduate study. The Scholarship pays $500 for the academic year. Upon re-application, it is subject to being renewed for succeeding years.

Licensed radio amateurs who intend making a career in electronics or related sciences may now request the application for covering the academic year 1970-1971. Requests should be addressed to the Chairman, Scholarship Committee, 8101 Hampden Lane, Bethesda, Maryland, 20014. The award will be made during the month of December 1970. Receipt of applications for the award must be received prior to the close of business on the 31st of October, 1970.

To be eligible for the award, applicants must have completed at least one year in an accredited college or university and must be enrolled in a course of studies leading to a degree. They must also be radio amateurs holding a valid FCC license of at least a general class level. All things being substantially equal, preference will be shown to applicants from the area served by the Foundation—the District of Columbia, Maryland and Northern Virginia; however, applicants wherever resident are eligible.

The Foundation is devoted exclusively to promoting the interests of amateur radio and to those scientific, literary and educational pursuits that serve to advance the purposes of amateur radio.

John W. Gore, in whose honor the Scholarship is named, was until his death in 1960, the President of the Foundation. He was a prominent radio amateur and operator for many years. At the time of his death he was a Vice-President of the Bethlehem Shipbuilding Corporation in Baltimore, Maryland.

Radio Control Net

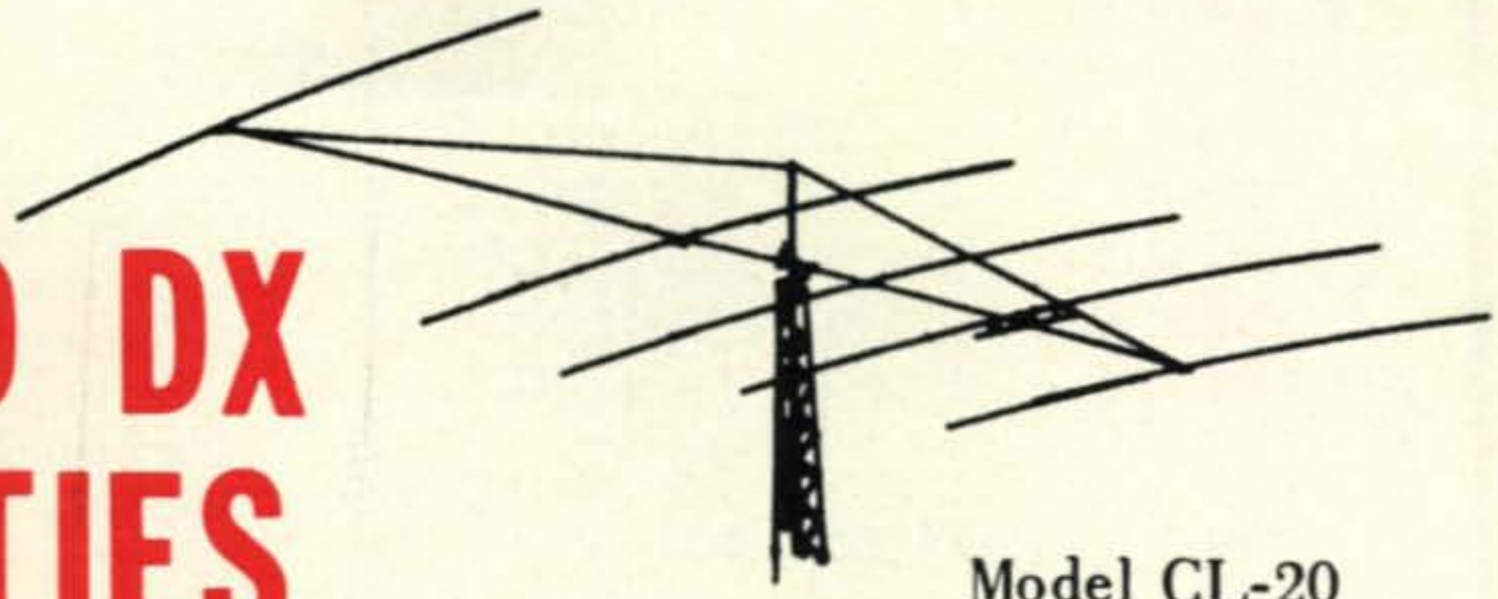
A group of radio control enthusiasts are forming a net with the purpose of exchanging information concerning the hobby of radio control. Any amateurs who are also interested in R/C can contact John G. Mathias, W9FMW, 721 South Meadow Road, Evansville, Indiana 47715 for more details on the net.

Aurora, Illinois

The Fox River Radio League Hamfest will be held at Phillips Park in Aurora, Illinois, on Aug. 23. Free coffee and doughnuts will be served from 9-10 A.M. Talk-in freq.: 145.35, 146.94, 3.94 mc. Advance tickets $1.00, $1.50 at the gate. For further information, contact Tom

NEW SINGLE-BAND BEAM FROM MOSLEY

The Classic 20 WITH EXPANDED DX CAPABILITIES ON 20 METERS



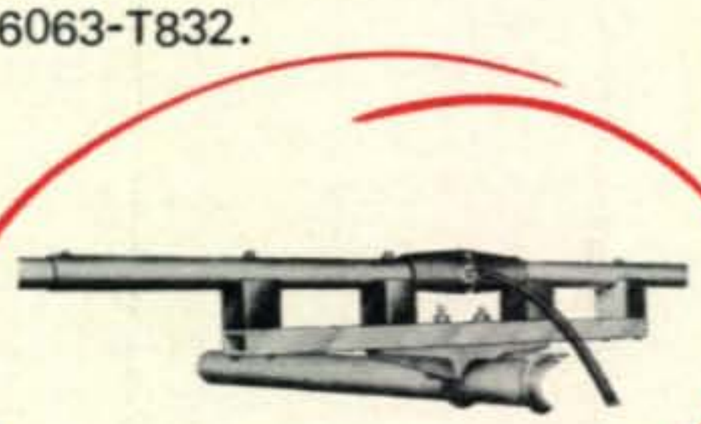
Model CL-20

DON'T LIMIT YOURSELF!

When you install a 20 meter beam, there is only one antenna investment you can afford . . . The NEW CLASSIC 20 with expanded DX capabilities, thanks to the new Classic Feed System, "Balanced Capacitive Matching." This new array promises to be the most universally accepted amateur beam ever developed for 20 meters.

TAKE A LOOK AT THE VITAL STATISTICS!

- FORWARD GAIN: 9.8 db compared to reference dipole; 11.9 db over isotropic source.
- POWER RATED: 1 KW AM/CW; 2 KW P.E.P. SSB input to the final.
- SWR: 1.5/1 or better.
- MATCHING SYSTEM: Balanced Capacitive.
- FEED POINT IMPEDANCE: 52 ohms.
- NUMBER OF ELEMENTS: 5. Aluminum tubing; 6063-T832.
- MAXIMUM ELEMENT LENGTH: 38 ft. 1½ in.
- BOOM LENGTH: 46 ft.
- RECOMMENDED MAST SIZE: 3 in. OD.
- TURNING RADIUS: 28 ft.
- WIND SURFACE: 18.7 sq. ft.
- WIND LOAD (EIA Std. 80 MPH): 364.45 lbs.
- ASSEMBLED WEIGHT: Approx. 139 lbs.
- SHIPPING WEIGHT: Approx. 145 lbs. via truck.



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Rogers, WA9WBV, Box 323, Oswego, Illinois 60543.

Danville, Illinois

The Vermilion County A.R.A. will hold its 2nd annual hamfest on Aug. 30, 1970 at Douglas Park in Danville, Ill. There will be door prizes, hourly drawings, and the main drawing at 3:00. Free coffee and goughnuts until 10 A.M. Donation: $1.00. For further info or advance registration write: Tom Stover, WA9ULI, 1611 N. Vermilion, Danville, Ill. or call 217-446-3293.

Lincoln, Nebraska

The Lincoln, Nebraska Amateur Radio Club will operate a special events amateur radio station 24 hours a day from the Nebraska State Fair Grounds in Lincoln, September 3 through the 9th inclusive. Using the call KFØNEB, transmitters will be on 10, 15, 20, 40 and 80 meters. Operations will be conducted on both c.w. and s.s.b. A novice station will be operating on 15 and 40 meters. DX contacts will be automatically QSLed via Bureaus. Stateside contacts must send s.a.s.e. to WØYOY, 3030 Shirley Court, Lincoln, Nebraska 68507. A special QSL card for the occasion will be used.

Uniontown, Pennsylvania

The 19th annual Gabfest sponsored by the Uniontown Amateur Radio Club will be held on Sept. 5th 1970. Events are planned for Saturday afternoon and evening at the club grounds off Route 51, just north of Uniontown. There will be prizes, raffles, swap & shop and plenty of food available. Registration: $2.00. For more details contact: Joseph Sofranko, 438 Braddock Ave., Uniontown, Pa. 15401.

Malaga, New Jersey

The South Jersey Radio Association will hold its 22nd annual Hamfest on Sunday, Sept. 13th at Molia Farms, off Route 47 at Malaga Lake, Malaga N.J. 1000-1700 hours E.D.S.T. Talk-in and hidden station hunt on 2, 6 & 10 meters. Registration is free but modest fee for prize drawing tickets. Swap Shop, swimming, childrens games, snack-bar and lots of eyeball/ragchew contacts. Additional details from Jack Koch, K2MZP, 1529 Dogwood Drive, Cherry Hill, N.J. 08034. Tel: 609-429-2642.

Walla Walla, Washington

The Walla Walla Valley Radio Amateur Club will hold its 24th annual family picnic and hamfest Sept. 26th and 27th at the Jefferson Park field house in Walla Walla. Swap & Shop, contests & awards, also homebrew and antique radio display. Annual meeting of M.I.O.W. and N.W. s.s.b. groups. Lunch served at 12:30 Sunday will be potluck, foffee and punch furnished. Free registration all day. Talk-in frequencies are 3960, 29.6, and 146.760 mc. For more information write: Pat Stewart, W7GVC, 1404 Ruth Ave., Walla Walla, Washington 99362.

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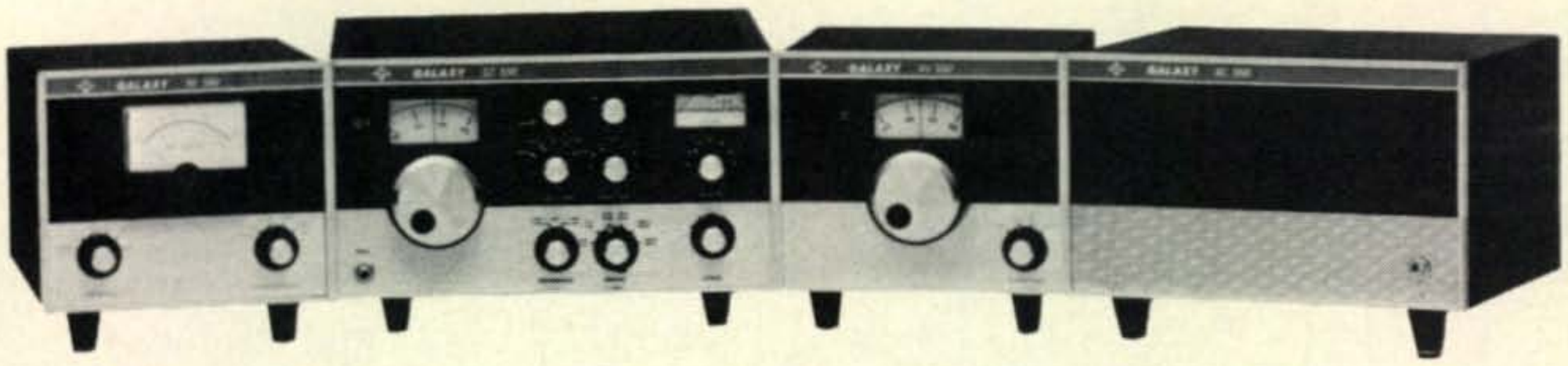
A Complete Amateur Radio Line of Transceivers and Accessories

In order to provide a complete range of equipment for discriminating Amateurs, Hy-Gain Electronics Corporation has acquired all stocks and production facilities of Galaxy Electronics. Now *all* the best distributors under the sun can offer you Hy-Gain's complete line of antennas *plus* Hy-Gain's Galaxy Line of transceivers and accessories. And, now that traditional Hy-Gain and Galaxy quality have been combined, you can look forward to even more outstanding products in the future!

Hy-Gain's Galaxy GT550 Transceiver and Matched Accessories



GT550 Transceiver offers *top* performance—550 watts SSB, 360 watts CW; sensitivity better than ½ uv for 10 db S+N/N ratio. Stable—45 db carrier suppression.
Order No. 800 Price **$550.00**

RF550 contains high accuracy watt meter; calibrated scales; switch for forward or selected power; switch to select 5 antennas or dummy load.
Order No. 805 Price **$ 75.00**

RV550 is a solid state VFO. Function switch selects the remote unit to control Receive-Transceive-Transmit frequency independently.
Order No. 804 Price **$ 95.00**

SC550 Speaker Console with headphone jack for GT550 transceiver. AC400 power supply will mount inside console.
Order No. 803 Price **$ 29.95**

AC400 Power Supply is a heavy duty solid state supply to operate the GT550 at full power, on SSB or CW, and with switch selection of 115/230 VAC, 50/60 Hz input voltages. Wires cable/plug for the GT550.
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Hy-Gain's Galaxy FM-210 2 Meter FM Transceiver

This American-made, solid state, FET front end wide band FM transceiver offers no compromise performance for direct or repeater communications...a full 10 watts of power.
Order No. 813 Price **$229.50**

Many more accessories are available. Contact the best distributor under the sun, your Hy-Gain dealer, for the full Galaxy story.

The Galaxy Line by HY-GAIN

HY-GAIN ELECTRONICS CORPORATION

P.O. Box 5407-FH, Lincoln, Nebraska 68505

SCRATCHI

Feenix, Ariz.

Deer Hon. Ed:

I just figyouring out that hamdom are facing reel big problem, and on off chance you not knowing about it, I riting you post-hasty to making sure you fully alerted. This could be 1/c crisis, so reeding carefooly.

Certainly you are knowing that everything to doing with pollution are getting reel hard look by politishuns, speshul interest groups, and outraged citizenry.

Our waters are being polluted by chemicals and wastes, our land is being polluted by beer cans and soft drink cans, an dour air is being polluted by smoke and chemicals and radioactivity from factories, cars, A-Bomb tests and you-name-it.

So, how abouts the radio spectrum—isn't it being polluted too? Hah!! I see you sitting strate up in your chair! Not thinking about that area of polluion, were you!

Everything quiet rite now, and nobuddies complaining about it. But, supposing some guy like this Hon. Ralph Nadar feller are getting wind of the problem! Boy oh boy, we better have some answers ready.

Just between you and me and a cupple hundred thousand amchoors, I thinking maybe we not having much legs to stand on if somebuddy comes around asking about how we doing. Let's analyzing this.

What would you call "radio spectrum pollution?" Maybe a fair answer being "any radiation which is not needed for necessary and essential communications."

Traffic. Well, you can stretching point and saying all official traffic being necessary. Maybe a message like "Hon. Ant Fuji sends birthday greetings" are not reely necessary, but a lot of traffic is. And, maybe Ant Fuji not having any other way to sending birthday greetings. We might squeeking by on that one.

Dee-x. This is a hard one. It all very well to

foster international frendship by talking to our frends across the seas. Howsumever, nobuddies talking to dee-x very long. Can't fostering much frendship if not talking about anything except signal reports. I can't desiding if this pollution. What you thinking, Hon. Ed?

Ragchewing. This is a dandy. I'm surely some ragchewing can be called essential communications. Two fellers talking about scientific stuff or exchanging thoughts on major issues of the day—that's pretty important. But tune across the band some day taking a listen to some of the amchoor conversayshuns.

Like the guy trying out umpteen different mikes—"how's my modulayshun now, old man." Hah! Any ossillyscope could telling him more in ten seconds than that other amchoor could in ten minutes. In most cases that other amchoor not having any way to reeding modulayshun, so what did the first amchoor expect the other amchoor to do?

Boy oh boys, can't you imagine being investigated by a Congressional committee! Some stern-faced Hon. Senator are asking you "what is so essential about asking for a modulayshun check on the air?" The sweat poring off me just thinking about it.

Of coursely, pollution being caused by more than just what we doing on the air. I meening, does it take a California Kilowhat to talking across town? Unnecessary power would be called pollution by practically anybuddy I knowing.

Samelike with using unnecessary space in the spectrum. What good is that second harmonic of your signal doing when it bouncing into countries around the world? Don't trying to defending that! Likesame too much bandwidth. Unless you using SSB, you probably could be called a polluter.

So now what you thinking, Hon Ed? You not thinking we mite be having reel nice mess if we not being more careful? You being reddy if sumbuddy wants some answers to radio spectrum pollution by amchoors? You thinking maybe our time is running out?

I'm only surely of one thing. If they getting after us amchoors, you telling 'em to looking into commercial tellyvishun first. If ever there were spectrum pollution, that's where it being. So, maybe we have some time yet. Let's not waste it. Happy Amchoor's necessary and essential? Respectively yours
Hashafisti Scratchi

DIGITAL CQ AND METEOR SCATTER DATA GENERATORS

BY G. E. GOODWIN,* G3MNQ

Part I

Part I of this two part article on the subject of digital techniques of generating morse code covers the basic building blocks used. Discussed are digital circuit concepts, gates, pulses, oscillators, multivibrators, counter chains, code breakdowns and programmers. Part II will show how to assemble these circuits to provide a digital CQ generator and meteor scatter data generator for automatic transmissions.

THE development of the Meteor Scatter data generator was prompted by an extensive series of tests using the meteor scatter mode of propagation. The requirements were for a reliable unit on which data could easily be changed or selected. It was to replace a machine which was basically a tape recorder using continuous loops of tape. These had to be prepared in advance and were impossible to modify once they were made.

At the time some integrated circuits were available on the surplus market, plus transistors at reasonable prices and untested silicon diodes at give-away prices. It was therefore decided to use the IC's for the complex operations of counting and transistors and diodes for the simpler gating circuits.

The CQ generator was evolved at the same time using the same basic circuits, though the control circuits presented different problems. Two systems were developed, one simple, providing a limited amount of information and the other more complex providing all the data normally included in a CQ call. It also has add-on facilities which need not be included necessarily.

Two versions of the MS data generator were designed this being due to a change in the information required to be sent. Both of these are described as the data exchanged in this type of QSO is largely a matter of agreement between the operators involved.

*Elfin Grove, Dunton Bassett, Rugby, Warks, England.

Basic Circuits

Many amateurs will not be familiar with digital circuits and a brief description of the principles involved may be of help.

Digital circuits are either on or off, that is, there is no half way state as in the audio circuits, and the output is either at full supply voltage or at zero. For convenience these two states are termed '1' or '0.'

If a simple circuit is considered as in fig. 1 the output voltage, *V*out, will be the same as the supply voltage when the input voltage, *V*in, is zero. When *V*in is made equal to the

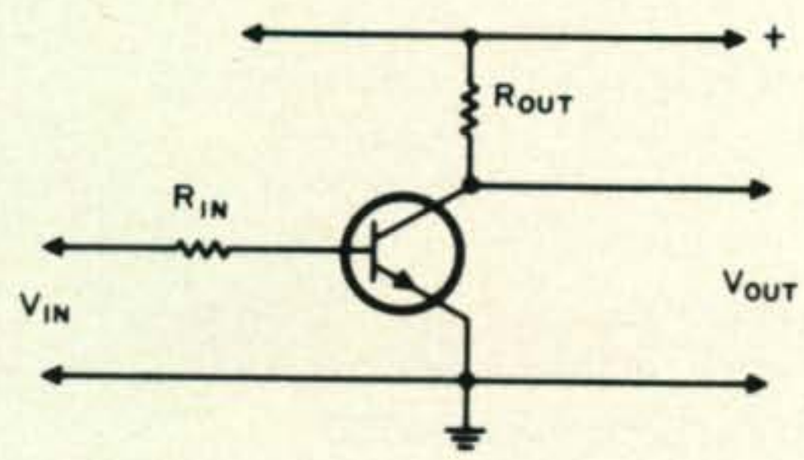


Fig. 1—Inverter circuit uses almost any medium or high gain transistor. The value of *R*in is usually made ten times *R*out.

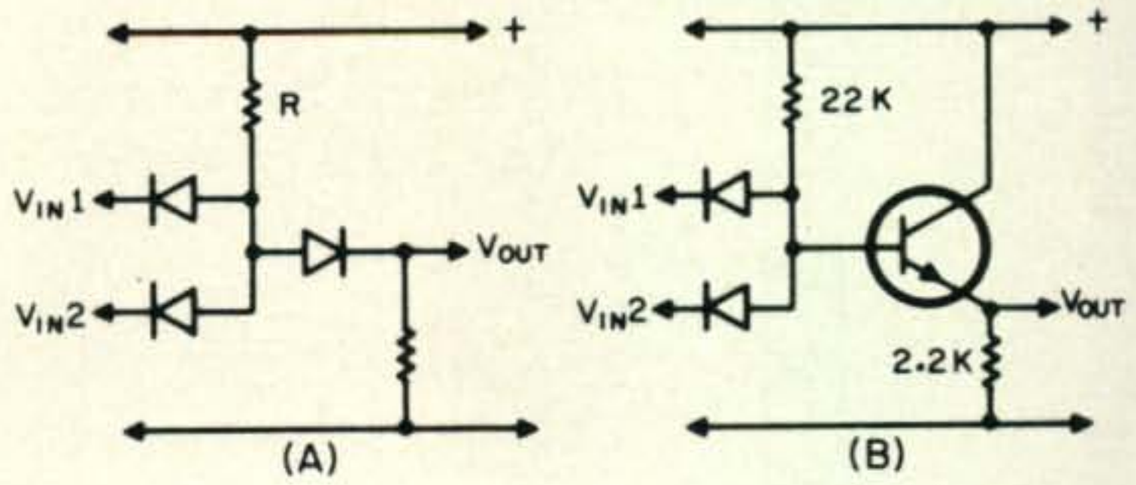


Fig. 2A—Diode AND gate. Any small silicon diodes can be used. The value of *R* can be from 22K to 33K. B—Diode-transistor AND gate.

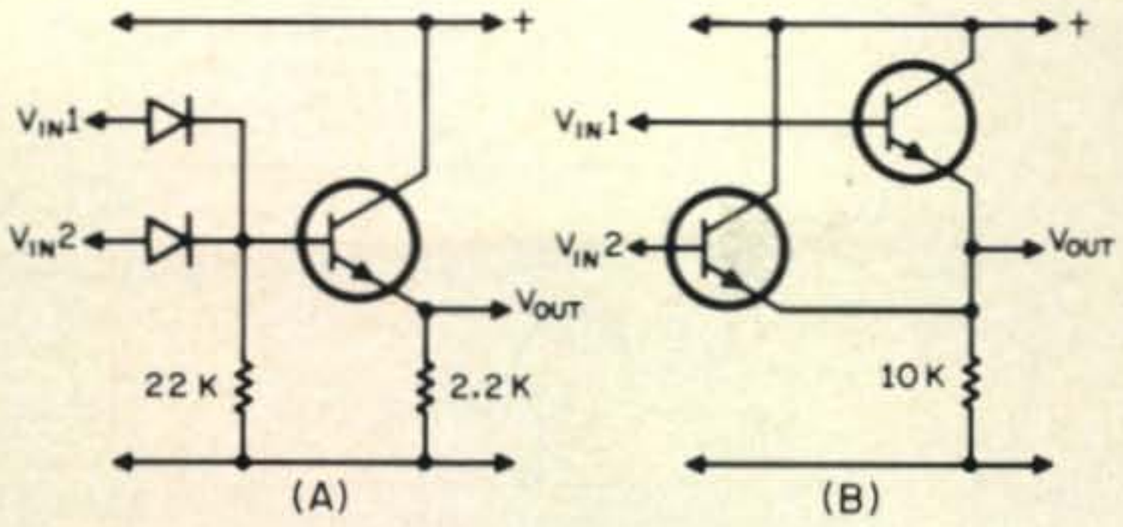


Fig. 3A—Diode-transistor OR gate. B—Transistor OR gate featuring high input and low output impedances.

supply voltage *V*out will be very nearly zero as the transistor is now biased fully on. (Obviously *R*in and *R*out have to be chosen to suit the prevailing conditions). Putting this in digital terms:

when *V*in = 0 then *V*out = 1
and when *V*in = 1 then *V*out = 0

It will be noticed that the inputs and outputs are the inverse of each other and this circuit is known as an inverter. It is a very simple but very useful.

Gates

As the name implies these control the flow of information through a system. Those used in this unit are AND and OR gates and the varieties are shown in fig. 2 and 3.

In fig. 2A if either input is 0 then current will flow from the supply line through R and the relevant diode and *V*out will be 0. When both inputs are '1' then current cannot flow and *V*out rises to '1.' The action is the same in fig. 2B but here the output diode is replaced by an emitter follower which decreases the loading on the diode gate and is capable of supplying a significant output current.

Among the different varieties of OR gates fig. 3A shows a diode-transmitter type where either input going to '1' will make the output '1.' Fig. 3B is really two emitter followers with a common load but either input being '1' makes the output '1' and also provides considerable isolation between input and output circuits.

Other variations of AND and OR gates are NAND and NOR gates which give the same gating effects but invert the output at the same time. This can be done by replacing the emitter followers in figs. 2B, 3A and 3B by the inverter shown in fig. 1. A simple resistor-transistor configuration of the NOR gate is now possible as in fig. 4.

Another type of gate is used in the MS data generator, this using a single transistor

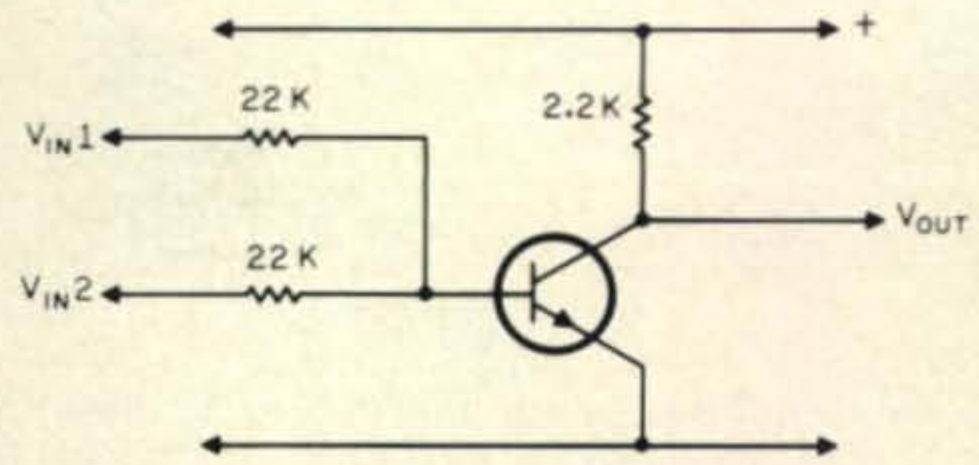


Fig. 4—Resistor-transistor NOR gate.

(fig. 5). Here, when *V*in1 is '0' *V*out can only be '0' whatever *V*in2. When *V*in1 is '1,' *V*out will be '1' for *V*in2 = 0 and '0' when *V*in2 is '1.' *V*in2 will always be inverted while *V*in1 is not.

Pulses

In the previous discussion a change in levels has been assumed without really defining this change. In digital circuits pulses are used; these are bursts of energy which may last for any period of time. There are positive and negative pulses which are shown in figs. 6A and 6B. The names are shortened versions of positive going and negitive going since it is possible for a voltage level to be at say −10 volts and then rise to say zero for a time and then to return to −10 volts again. This would be called a positive pulse since the leading edge goes in a positive direction.

Oscillators

In electronic equipment of this sort which operates in a controlled sequence there is usually some device which generates pulses. The one used here is the Unijunction oscillator which is very simple and easy to control, that is, turn on and off and vary the rate at which it produces pulses. The basic circuit is is shown in fig. 7A while fig. 7B shows the addition of an inverter to produce a sharp negative pulse to drive the following circuits.

The pulse width is determined by *C* and the resistance of the base 1—emitter junction plus the 51 ohm resistor, while the number of times the pulse occurs per second (p.r.f.) is

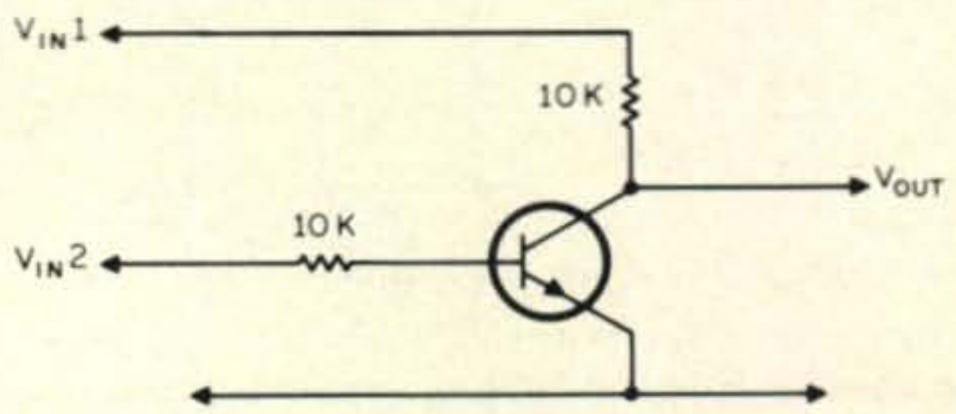


Fig. 5—Transistor gate used in the meteor scatter data generator.

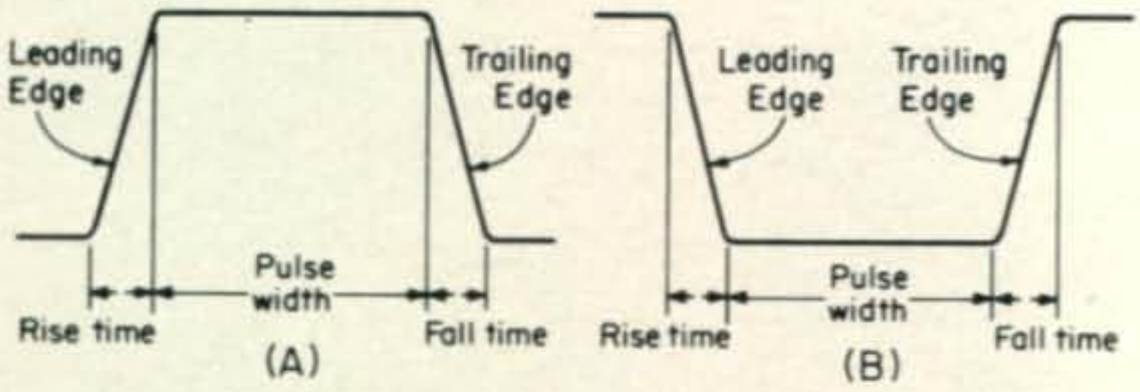


Fig. 6A—Positive going pulse and B, negative going pulse.

determined by R and C. For $C=3.3$mf the pulse width is about 100 microseconds with a rise time of about 0.2μs and the p.r.f. is variable between 6 and 20 p.p.s.

In practice the resistor R is not taken directly to the positive supply as shown, but to a supply which can be switched on and off electronically so that the oscillator output can be controlled.

Monostables

These are a class of circuits which produce pulses only when required to do so and then only one pulse is generated per command or trigger.

Usually two transistors are used in a configuration where one is biased into the conducting state and the other in the non-conducting state as in fig. 8.

When triggered by a positive pulse Q_1 conducts and Q_2 is cut-off for a time determined by C_2 and R_2. After this time the circuit returns to its original state until the next trigger pulse. Two outputs are available, one from each collector and take the form shown in the circuit diagram.

The main use of this circuit is to produce a pulse of definite width from a trigger pulse which may be anything between very short to very long. It is the positive edge of this pulse which does the triggering and so long as this is more than about 1.5 volts in amplitude and has a rise-time of less than 1 millisecond the circuit will operate.

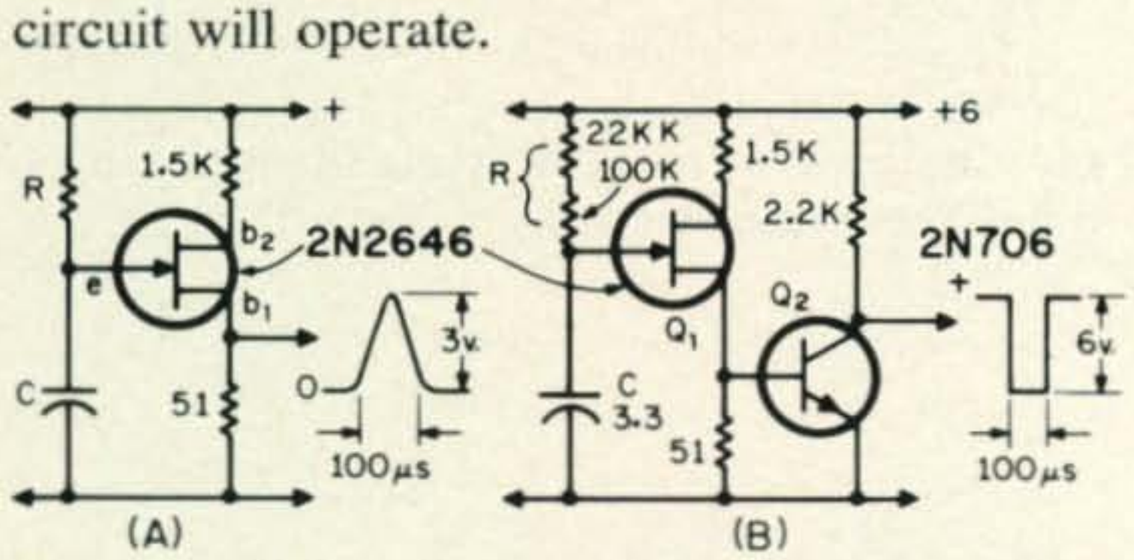


Fig. 7A—Unijunction oscillator circuit used to generate pulses. Transistor Q_1 is a 2N2646 or any similar type. B—Complete oscillator circuit with an inverter. Transistor Q_2 is a 2N706 or a similar type. See the text for the discussion on connecting R to the supply line.

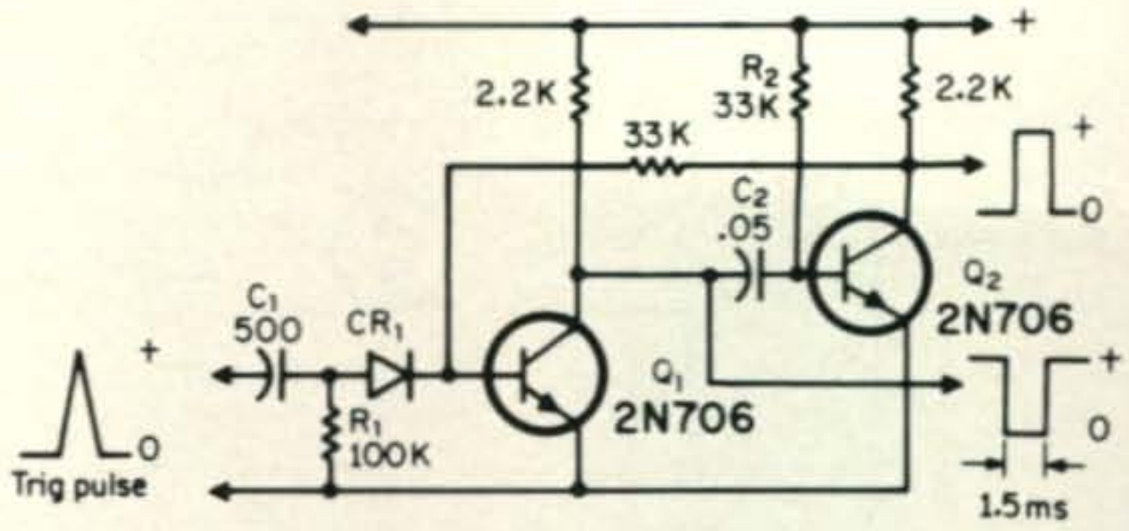


Fig. 8—Circuit of a monostable pulse generator. Diode CR_1 is a small silicon type. Components C_2 and R_2 provide a pulse width of about 1.5 ms.

The trigger input can be expanded so that more than one source can be used merely by adding further circuits consisting of C_1, R_1 and CR_1 to the base of Q_1.

Bistables

As the name implies these are circuits which have two stable states and are triggered into these states in the same way as the monostables. They can be made very complex in order to extend their facilities into counting chains which are resettable. It is here that the integrated circuits (ICs) become useful and save a lot of constructional time and effort.

The main use of bistable oscillators here is as pulsed dividers, that is, two input pulses are required to change the output from '0' to '1' and back again to '0.' Thus one '1' state is achieved for two input '1' states. By putting two bistables in series a divide by 4 is obtained, three in series give divide by 8, *etc.*, so that any division can be obtained which is a power of 2.

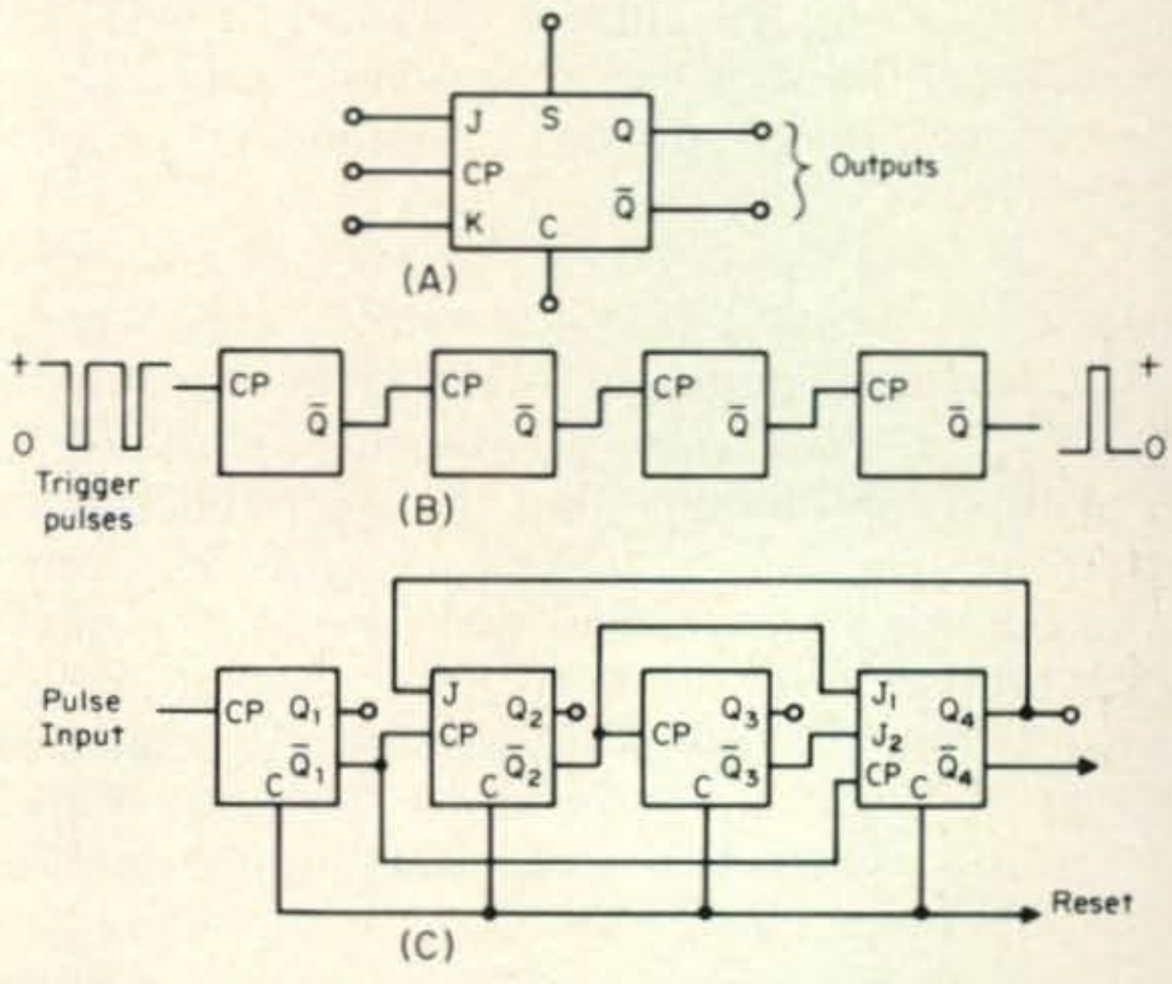


Fig 9A—Symbol for a bistable multivibrator (JK flip flop). *CP* is clock pulse, C is clear and *S* is set. The *CP* terminal is sometimes called the *T* terminal. B—Bistables used in a "divide by 16" circuit. C—Bistables connected in a "divide by 10" configuration with facilities for setting zero.

Other numbers which are not powers of two can be obtained by the use of feedback or feedforward circuits and fig. 9 shows the derivation of a divide by 10 used in these units. Figure 9A shows the basic bistable (a JK flip flop) and as can be seen it is quite complex with 5 different inputs and two outputs. Two of the inputs, J and K, may be expanded in the same way as the monostable trigger and some ICs have 3 Js and 3 Ks. The actual operation is beyond the scope of this article[1] as is the relationship between the inputs and outputs, but his should not deter the constuctor as they are simple to use in practice if the diagrams are adhered to.

Figure 9B shows four bistables connected in series and this will require 16 input pulses for one output pulse.

By means of interconnecting these as shown in fig. 9C the 16 input pulses are reduced to 10 for one output pulse. Although this circuit divides by 10 there are only 8 outputs (two from each bistable) and a system is required which has ten output lines, a true decimal system. To do this a diode network is shown in fig. 10 and really consists of 10 AND gates, each with an emitter follower. These operate exactly the same as the circuit of fig. 2B except that most of them have more than the two input diodes shown.

The decoder output is ten lines and only one of these lines is positive at any given time, all the others being zero. If a divide by 10 and a decoder are connected together before any pulses are fed in, the '0' line from the decoder will be positive, others zero. Say 3 pulses are applied to the input, line '3' becomes positive and so on up to 9. On the tenth pulse the output returns to 0 and counting will continue from 0-9 as long as pulses are fed in.

There are times when it is required to put the bistables back into a zero state and one of the other inputs is used for this purpose. All the 'clear' inputs are joined together and held positive while counting takes place. To reset, this line is made zero for a short time and the count can then recommence from 0.

Complete Counter Chain

The requirement here is that up to 100 lines are selected one at a time in sequence and the selected line is made positive while all the others remain at zero.

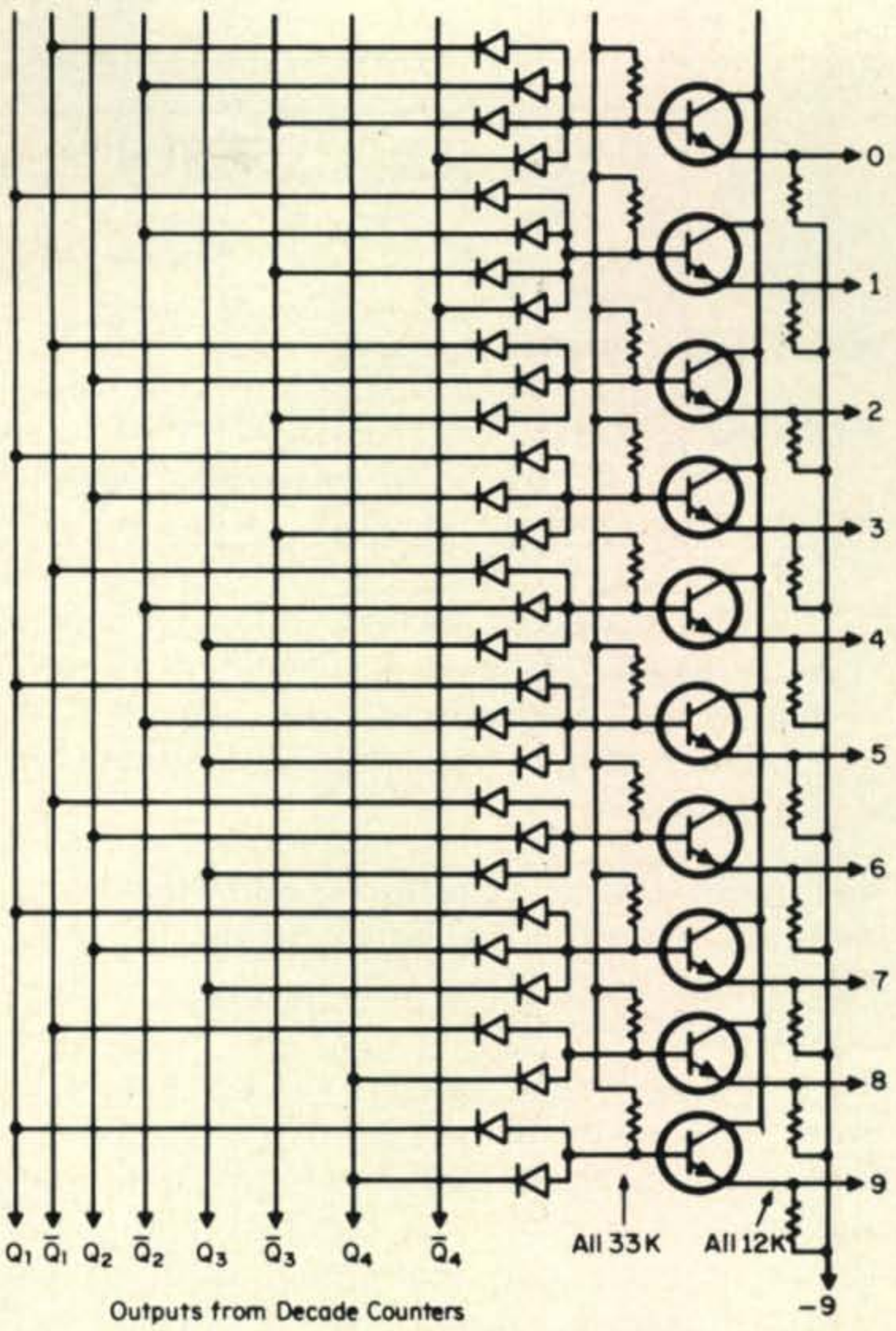


Fig. 10—Diode-transistor decoder circuit. Terminals marked Q_1 to Q_4 refer to the terminals of the "divide by 10" circuit of fig. 9C.

Two divide by 10s with decoders are connected in series by joining the Q output on the last stage of the first divide by 10 to the clock input of the second. When starting from zero the first divide by 10 will count up to 9 while nothing will happen to the second and its decoder '0' line will be positive. On the tenth pulse the first decoder returns to 0 and the second moves to 1 and on the 20th pulse the second moves on to 2 and so on up to the 100th pulse when both return to zero.

There are now two decoders each with one output positive and to achieve the aim of one

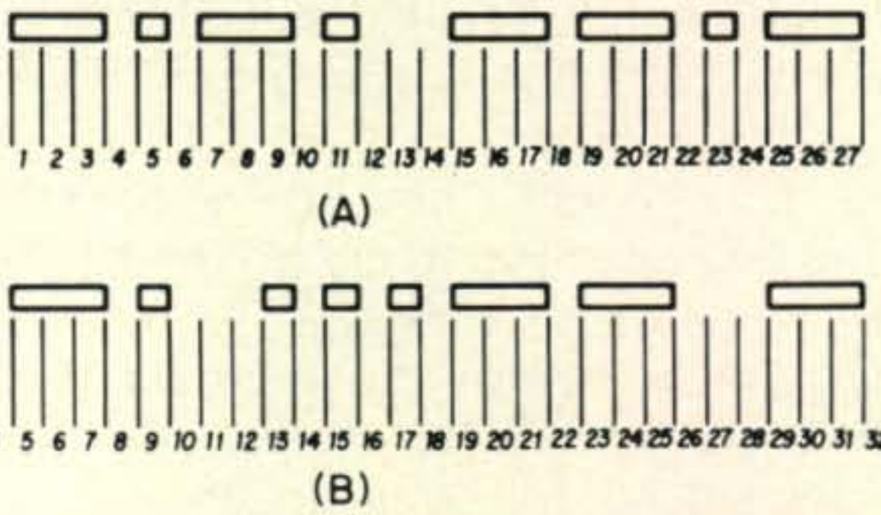


Fig. 11A—Breakdown of the letters CQ into dot lengths or "bits". B—Breakdown of G3M into "bits."

[1]McWilliams, F. B., "Introduction to IC Binary Logic," *CQ*, February 1969, p. 14.

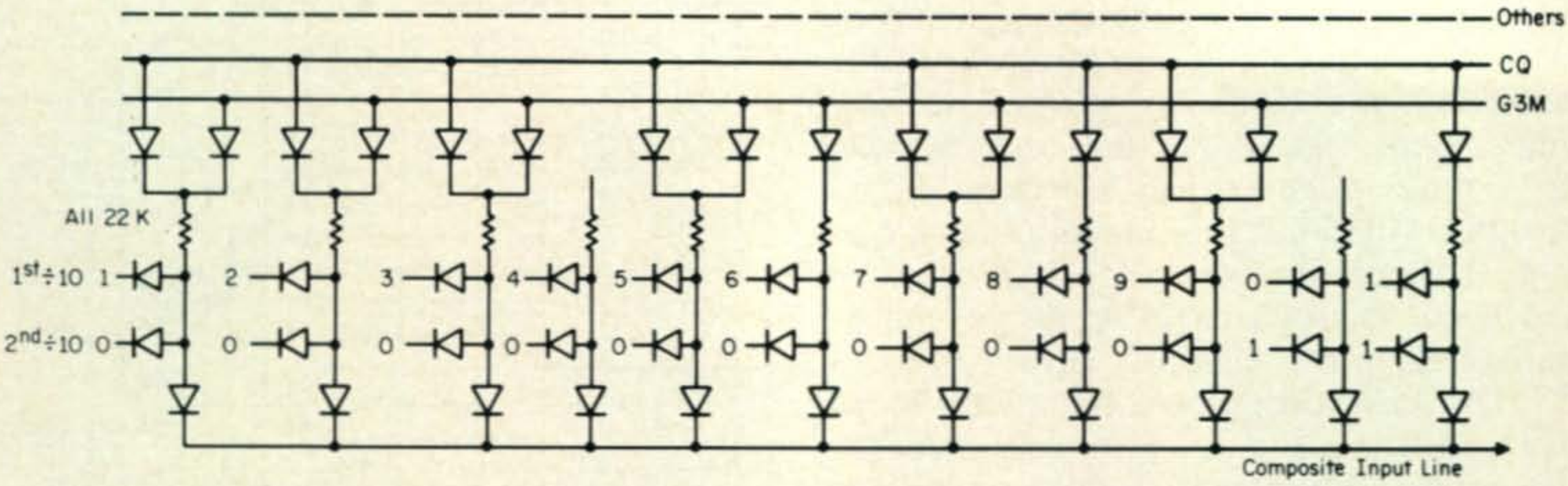


Fig. 12—Section of the "Code Selection Diodes." The upper lines are the positive lines referred to in the text and there may be up to 14 of these in the circuits described. The numbers to the left of each AND gate are the output lines from the decoder of fig.10. The composite output line will be discussed in Part II under Relay Drive Circuit.

line out of 100 being positive, 100 diode AND gates are required as shown in fig. 2A. For the first of these *V*in1 will be taken to the first divide by 10 '1' line and *V*in2 to the 2nd divide by 10 '0' line. The second AND gate will have *V*in1 taken to the 1st divide by 10 '2' line and *V*in2 to the 2nd divide by 10 '0' line and so on to build up the full 100. The *V*outs of each AND are joined together to form a composite output line.

But here there is something else to consider and that is the production of the required code. If 100 AND gates were used just as shown in 2A there would be 100 resistors 'R' taken to the positive line. In practice these resistors are taken through diodes to a number of positive lines which are selectable electronically. The inclusion or exclusion of these last mentioned diodes depends on the code to be produced.

Code Breakdown

Consider the letters CQ. In code these are written as shown in fig. 11A. The dashes are 3 times the length of a dot, the spaces between characters is the same length as a dot and the space between letters is 3 dots length. Thus, these letters can be broken down into many 'bits' each one dot in length, there being 27 bits in CQ.

The same system is used for any letters to be sent. For example the G3M part if a call sign is shown in fig. 11B.

The number below the character indicate which number from the counter chain each is connected to but this must be through diodes as previously mentioned. The diodes are taken to separate 'positive lines', one for the CQ and the other for the call sign. One of these lines is furnished for each piece of different code required to be sent. Diagrammatically this is shown in fig. 12.

The first three AND gates are used by both codes but the 4th is not used by either hence no diodes go to the positive lines while the 6th is used by G3M only, the 8th by CQ only, *etc.* If, after all the required codes are put in and it is found that some numbers are not used they can be omitted completely. For example 4 and 10 could be left out of the above example.

The system has a capability of 100 bits but very few codes will fill this completely and long spaces would occur between codes if the system were not reset at the end of each. To achieve this 2 'bits' are left as spaces after the last character of each code and then an AND gate is put in as before except that the output of this is not taken to the composite output line but separately to a reset circuit. This would be a monostable with a number of trigger inputs from the different reset points of the codes involved.

[*Continued on page 87*]

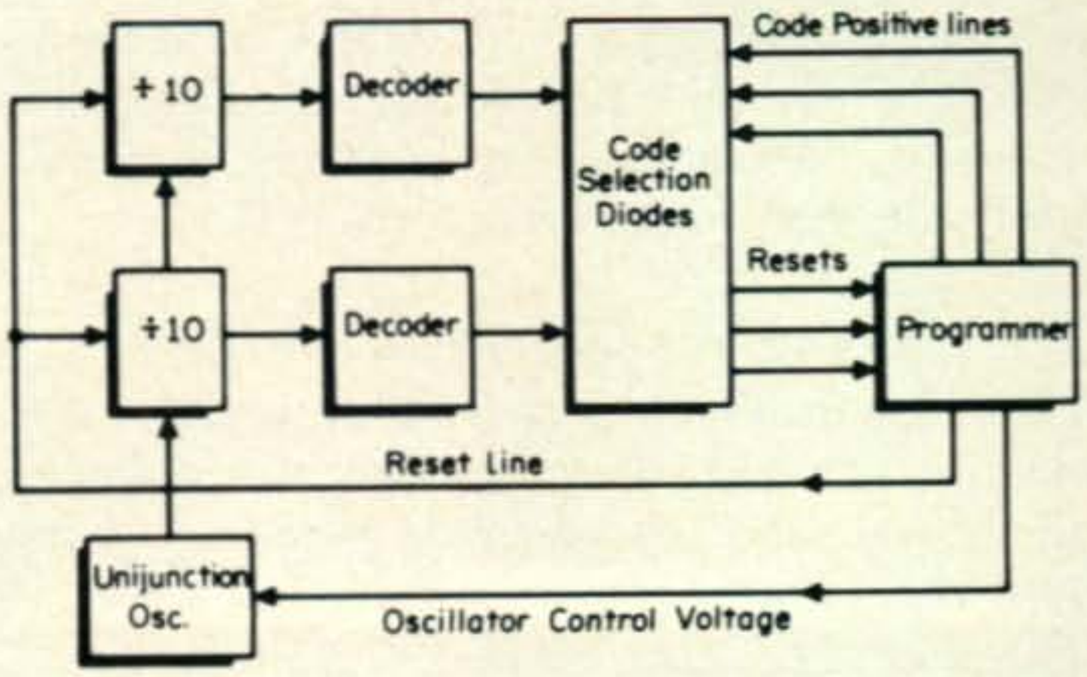
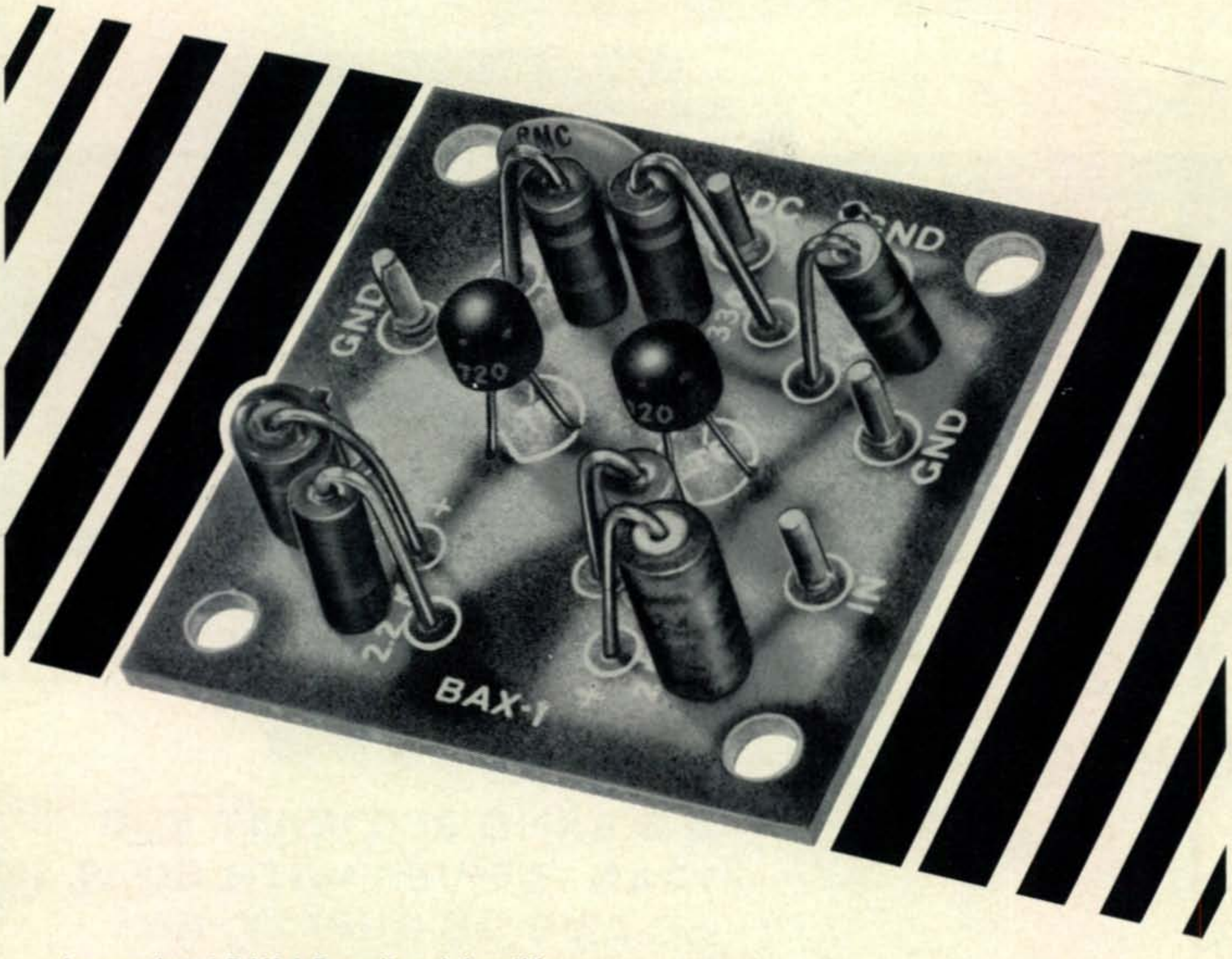


Fig. 13—Block diagram of the complete generator.



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   down 15 db at 100 mhz
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1969 DX-PEDITION TO HEARD ISLAND

BY LT. W. N. ROHRER,* W7ZFY, Ex-VKØWR

THE possibility of an amateur radio operation from Heard Island began to develop in July of 1968. At this time *USCGC Southwind (WAGB-280)*, a polar icebreaker, was preparing for her 7-month trip to the Antarctic to participate in Operation Deep Freeze.

The U.S. Army Topological Command (formerly the U.S. Army Map Service) made inquiries of us about the feasibility of establishing a Passive Geodetic Survey (PAGEOS) satellite tracking station on Heard Island.

The preliminary discussions between the U.S. Army and the U.S. Coast Guard took place in July and August 1968, and, when *Southwind* sailed for the Antarctic on October 12, 1968, plans for Heard Island were still indefinite. However, with the possibility of such a stop in mind, I reached deeply into the pocketbook and procured the Heathkit SB-301 and SB-401 receiver and exciter. These equipments, together with a Swan Mark II linear were used throughout the trip for phone patching. This was how I rationalized the expense, but I was really thinking about a DX-pedition.

Upon our arrival in Wellington, New Zealand, in mid-November 1968, things were firming up, and it looked like we really would go to Heard Island. At this time, I made preliminary inquiries of the Australian Government about licensing. It was December before I received a reply, and in the meantime I made contact with Jim Rumble, VK6RU, who certainly proved himself a friend in deed to a friend in need.

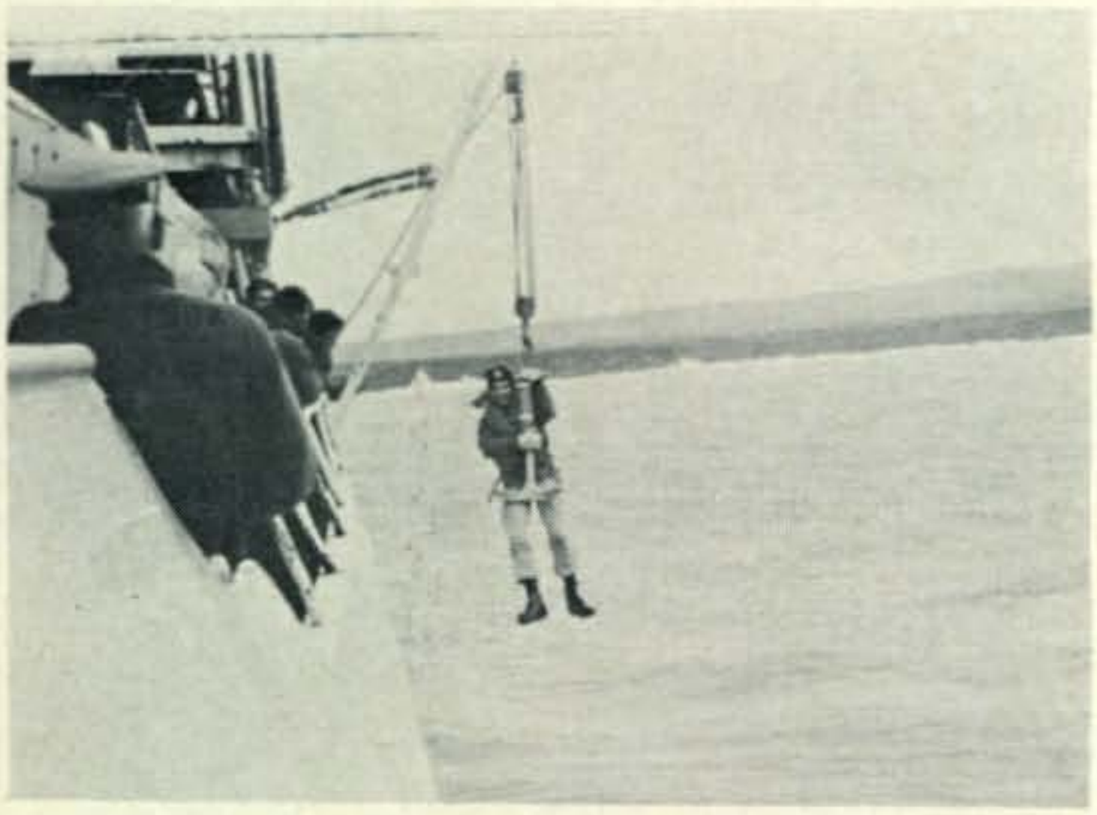
Jim advised me of the rather delicate situation that existed in regards to licensing at Heard Island, and further advised me of the proper channels and procedures to go through in submitting my license application. To make a long story short, I did exactly as Jim advised, and in February 1969 received word from Jim that the license had been issued in my name with the call VKØWR. The Postmaster General's Office had forwarded the license to Jim to hold for my arrival in Perth in late February. This procedure was followed to preclude any mix-up in international mail.

During our trip from the Antarctic to Perth (Port of Fermantle), Australia, I kept a daily schedule with VK6RU, and thus kept track of the progress on the station license application. Also, as a result of our daily QSO's and discussion of the pending DX-pedition, we developed quite a following of interested parties and well wishers. It was also through these daily schedules that publishers of the various DX bulletins learned the basic information concerning the pending operation, and thus eventually almost the entire DX fraternity throughout the world was aware of what we were trying to do before we arrived in Australia.

About 10 days out of Fremantle, disaster struck. As I stepped into the ham shack, the odor of burnt insulation assaulted me. Salt water had leaked in the shack and dripped into the exciter and receiver. I couldn't believe it. One circuit board in the exciter was

The *USCGC Southwind (WAGB-280)* leaving Baltimore in November 1968.

*Quarters 12-N-6, Governors Island, New York, N.Y. 10004.



Bill Rohrer, W7ZFY, being transferred from the *Southwind* to a LARC for the trip in to Heard Island.

burned in two, and the power transformer was shot. The receiver looked like it might be okay, but the exciter was beyond repair without parts. I thought sure this was the end of the Heard Island operation.

The receiver was flushed out with soap and fresh water, and restored with no damage. We dug out the old Swan 350 transceiver that belonged to the ship and renovated it as best we could without spare parts. It had been idle for over a year and was suffering from exposure to salt water and salt air.

When the 350 was finally activated, it worked, though intermittently. That evening I told Jim what had happened. It was his opinion that parts for the SB-401 could never be supplied in time, and as it turned out, he was right. At this stage, Arie Bles, VK2AVA, broke in and stated the problem quite concisely. Since the 350 we had was unreliable, we needed another. He then went on to say that he would provide one. Bill May, W3RX, then chipped in with a supporting contribution which he sent directly to Arie. And so it was, we were saved from disaster by Arie and Bill. W3RX was allso instrumental in obtaining spares from Heathkit for the eventual repair of the SB-401.

Jim met the ship on arrival at Fremantle on Thursday morning February 27, 1969, and showed me what West Australian hospitality means. Besides taking me into his home for several days, he took 2 days off from work in order to show me around. Jim also expended considerable time, energy, and gasoline tracking down the missing air shipment from Arie. The Swan 350C was finally located and picked up on Saturday night. Jim and I could breath easy now and relax. Everything to do with the trip had been accomplished. This included the printing of three thousand QSL cards a few days previously.

On Tuesday, March 4, 1969, *Southwind* sailed for Heard Island. On board were several tons of cargo comprising a PAGEOS satellite tracking station, the crew of six men who were to remain on the Island, a team of Australian research scientists, and two radio amateurs, Henery Roesing, WB4HWP, and myself. I wish to point out here that Henery and I were regularly assigned members of the *Southwind's* crew. Henery was the Chief Radioman, and I was the Operations Officer.

We had heard many stories of the poor anchorage, difficult landing, and the high winds prevalent at the Island. We were concerned about getting our gear safely ashore intact. After all, we were pretty low priority, since certain critical items for the PAGEOS team must be landed first.

Upon our arrival at Atlas Cove, Heard Island, the morning of March 11, it seemed all our fears were justified. The wind was 40 knots, gusting to 60, and the ship was rolling 15 degrees in 8-foot seas while at anchor.

One of our landing craft, an LCVP, was finally put over with only one small hole punched in the side where the boat had swung against the ship during a particularly vicious roll. The initial landing party of 15 men and certain vital equipment was somehow loaded into the boat and they were off for the landing.

In December 1968, a cargo vessel had landed a major portion of the equipment which we were now going to set up. This equipment included three 15 kilowatt diesel generators, diesel fuel to last a year, and two LARC V 5-ton amphibious vehicles.

Several hours after our LCVP went in, one of the LARC's came out to the ship. It was impossible for him to take a line, as the heavy seas would have pounded him to pieces against the hull of the ship. However, by maneuvering, the LARC could safely stay alongside for several minutes at a time before being forced to go around and make a new approach. During the few minutes the boat was able to stay alongside, we were able to pass small pieces of cargo down by block and tackle. In this manner, the most urgently needed cargo was passed to the LARC and ferried ashore.

Finally, late on that first day, all of the critical gear was off the ship, and there was room in the last boat for Henery, myself, and our carefully packaged gear. I had had many

reservations and had decided several times that it was foolish and dangerous to go in in conditions such as these. However, all the previous trips had been without mishap, and I finally gave in and committed myself to going in then.

The gear was all safely lowered (I didn't watch this operation as it was too nerve racking to see that new Swan 350C suspended over the side.), and then it was my turn. A special sling was rigged, and I was suspended over the side. Naturally, the LARC couldn't stay alongside while the sling was being rigged. So there I was, dangling over gray heaving seas, feeling very vulnerable to the forces of nature. Finally, the boat was maneuvered alongside, and I was safely lowered into the boat. It was on a similar personnel transfer that tragedy was to strike on our last day at Heard Island.

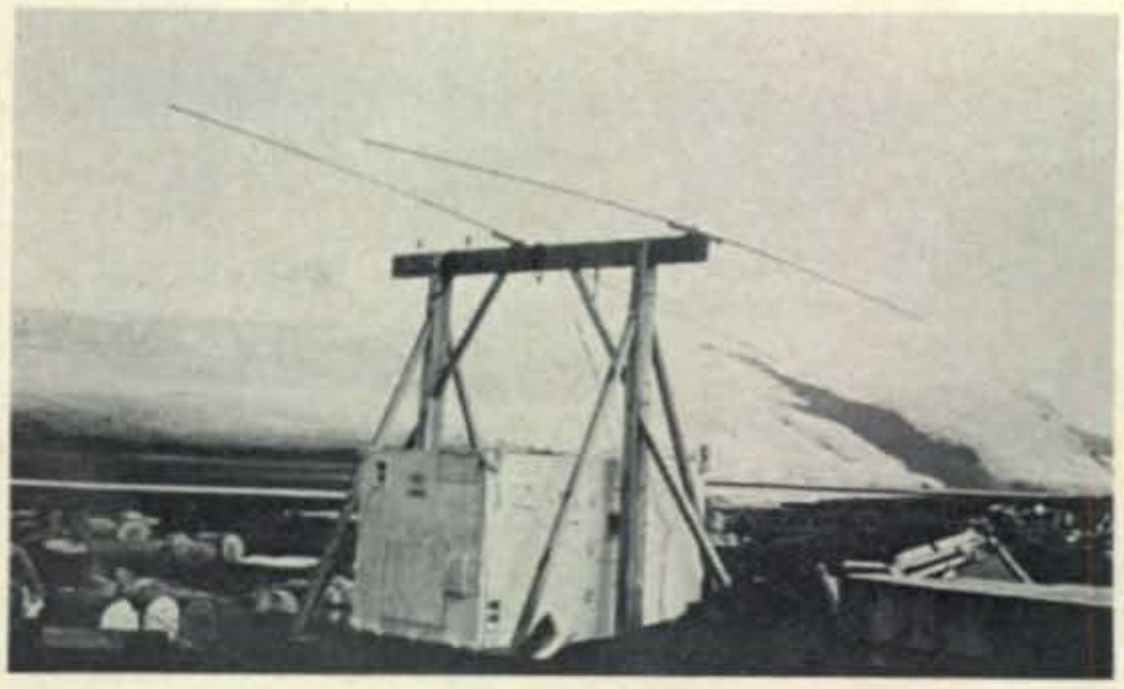
Henery had watched the entire operation and prudently decided he would wait for a calm day before making the landing.

Without further incident, the LARC made a perfect trip to the beach and all gear was safely unloaded at the site of the old station, abandoned several years previously by the Australians.

I had expected very little of the Australian station to be left and really had no idea where I was going to set up. I figured that would have to take care of itself once the actual landing had been accomplished. I was amazed after an initial quick survey. Most of the buildings were in excellent shape, and one in particular was obviously built for the express purpose of sheltering the 1969 DX-pedition to Heard Island. It was a small hut, measuring about 10 feet by 10 feet, completely intact and empty, save for a desk built along one wall, a coil of line stored in one corner, and lots of fine black sand. The hut was absolutely perfect, it even had a feed through insulator through one wall. Furthermore, the hut was located next to the building that was destined to house the generators. After sweeping out most of the sand, we began unpackking and setting up the gear.

Several antennas had been provided. Jim, VK6RU, had built the elements for a two element beam. This was paid for by an anonymous donor in W5 land, so Jim told me. Jim also gave me a ground plane that he had used for many years. In addition, we brought along about 1,000 feet of wire and an antenna coupler.

By the time the gear was set up, it was



The 2 element beam in position.

quite late and daylight was fading rapidly. The easiest antenna to erect in the 60 knot wind was the ground plane. It was put up without any serious difficulty and, with the aid of a little Mighty-Lite generator, we were in business.

While putting up the antenna, the door to the shack blew open and the gear was quickly covered with a fine layer of black sand. I was able to get most of it out, but I doubt that I will ever get rid of all of it. However, the sand seemed to have no ill effects on the operating, but a sleeping bag full of sand was a bit difficult to get used to.

First QSO was at 1430 GMT on March 11, 1969, with VK6RU, then the fun started. Everything was swell, making contacts at about one a minute until 1554 GMT when signals suddenly disappeared. What happened? The wind had broken the vertical in half. A dipole was rigged, but didn't do much

Henery Roesing, WB4HWP, at the operating position.

Bill Rohrer, W7ZFY, on the right, Henery Roesing, WB4HWP, on the left. This is the last day, all equipment is packed in the foreground and Bill has the logs in his hands.

good. I finally went to bed and the next QSO wasn't until 0424 GMT on the 12th of March. We had experienced an Aurora, and while band conditions in most of the world were unaffected, we were completely cut off for several hours, and then for the entire stay of 7 days, band conditions were erratic.

On the second day, the 15 kilowatt diesel generator was operational, and from then on we had excellent power with only one or two short interruptions. While using the gasoline plant, I would invariably forget to refuel, and about every 45 minutes, the power would go off.

Also, on the second day, the weather improved considerably, and in the afternoon Henery showed up with a bag full of goodies and the mast we intended to mount the beam on.

Early on the second day, while the band was dead, one of the fellows volunteered to take the end of a wire to the top of a 90-foot steel mast that had been left standing. The mast was in good condition and all of the guys were intact. The pole was about 200 feet from the Ham Shack and ideally suited for a single wire antenna. The wire loaded easily, and was used for most of the operation.

On day three, during a period of no signals, Henery and I assembled the two element beam and attempted to raise it on the aluminum mast we had secured for the purpose. It was our intention to anchor the mast against a 20-foot high A-frame that was already in existence. Naturally, as these things seem to be, the mast broke in two when a third of the way up. Fortunately, there was no damage to the antenna. If we wanted to use the beam, our only choice was to secure it to the A-frame and leave it in a fixed position. We did this, left the antenna pointing North. Alas, the beam was not as good as the long wire and was used very little.

On day five, during a slack period, I decided to lengthen the antenna a bit. The view from the top of the pole would have been terrific, I am sure, but everything was covered by a mist and blowing rain. The 40 knot wind that was blowing at the time detracted from what view there was. Henery and I did succeed in adding about 300 feet of wire. The antenna for the last 3 days was an inverted vee 90 feet high at the apex, running North and South and fed at the southern end.

The Island is the habitat for several varieties of seals, penguins, and other sea birds. The most obnoxious of the animals at Heard Island are the huge elephant seals that lie about in groups and roar at each other all night long. That first night I fully expected the radio shack to be invaded by one of these monsters, and that would have been the end of the DX-pedition and me. However, I did find out that the elephant seals are harmless and all bluff, even if they do weigh in at 2 tons or so.

Finally, came the last day, the 17th of March. The project had been completed, the six PAGEOS man were self sustaining, and it was time to return to the ship. Again the weather was miserable, but this time we had no choice. We signed off the air at 0936 GMT, packed the gear, took a few last minute photos, and loaded up the LARC for the return trip. The sea was quite as bad as when we landed, but the crew had had plenty of practice this past week. The loading onto the ship was uneventful and all gear was recovered intact.

Over 2800 QSO's were made with the following equipment. Heathkit SB-301 receiver, Swan 350 transceiver on c.w. and Swan 350C transceiver on s.s.b., a Collins antenna coupler, and a home brew s.w.r. bridge. On s.s.b. there were 2000 QSO's and 800 on c.w. We found the fastest we could operate on c.w. was one QSO per minute and on s.s.b. two QSO's per minute. While the pile-ups were tremendous, almost all amateurs did as we asked and thus helped speed up the operations. Henery and I extend our thanks to the many thousands of courteous radio amateurs throughout the world who made this DX-pedition a success. ■

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Instant Service Nets
WCARS—MWARS—ECARS

BY ED GRIBI,* WB6IZF

LET's hope the worst happened first—the column I wrote in Ambon, Indonesia, for the June issue was entrusted to a carrier pigeon which is still fluttering away somewhere short of California. In the meantime, I've accumulated enough for a couple of columns so I'll try to spread it out. If the column starts a little more international flavor it's because I've just completed an extended trip and we'll be living in Singapore by the time you read this. The first order of business is the three "Instant Service" Nets however—West Coast Amateur Radio Service, Midwest Amateur Radio Service, and East Coast Amateur Radio Service. These three groups actively monitor a single frequency (WCARS and EASTCARS on 7255 and MIDCARS on 7258) for the purpose of providing service to the public and other amateurs, particularly mobiles. In order to make effective use of these frequencies you should be familiar with a few of their calling and operating procedures:

"Break-Break-Break"—*Emergency only*—used for messages having a life and death urgency—such as highway accidents—all stations stand by while control determines method of handling.

"Break-Break"—Priority or urgent traffic having a specific time limit. Traffic hazards and obstructions are priority.

"Contact"—Notifies control that you wish to contact a station just heard.

"Information"—Notifies control that you have information that may explain or expedite traffic at hand or for any other contingencies.

"Recheck"—Used on MIDCARS and WCARS to indicate to NCS that you have returned to frequency after a QSY.

Your call letters only—The only proper way to break for routine matters—never say "break."

Never transmit more than one brief sentence without dropping your vox or mike button.

Always move all routine messages and contacts at least 4 kc off of Service frequency.

*c/o Gulf & Western Indonesia, Box 42, Singapore 11.

Around The World In 69 Days

23 February—Left King City in a Cessna 182 for Monterey—dropped the SB-33 off at Linear Systems, Watsonville, for a physical. Air West to San Francisco, United to Denver, a day of business there and then on to New York.

25 February—Busy day in New York—marathon meetings, just barely time to call Dick Baldwin, W1IKE, at ARRL for names of several hams in the Far East—then on KLM non-stop to Amsterdam.

26 February-6 March—In The Hague, Netherlands—happened to meet and have a nice eyeball with PAØXOG, Gerard.

7 March—On to Rome and Singapore.

10 March—Then to Djakarta, Indonesia.

12 March—Met YBØAAB/WB4GCL, Gene Cannon, and YBØAAC/K1EJT, Jack

Irwan Setiadi, YB1BD, and Ed, WB6IZF, aboard Teledex IV, Namlea, Buru, Indonesia.

Hales, at U.S. Embassy and discussed amateur radio operation in the Far East. They even have a Conditional licensee, Tom Masimgill, eagerly awaiting his ticket. Then to the Dewan Telekomunikasi to see Mr. F. M. Jasin, second-in-command of Indonesian Telecommunications. We discussed amateur radio in Indonesia and he got me oriented on forms and procedure for reciprocal licensing. I brought him greetings from Dick Baldwin – they had gotten acquainted in Geneva at ITU during the reciprocal negotiations. There are about 1000 hams in Indonesia with three levels of licensing.

18 March–In Ambon, eastern Indonesia–talked to Samsu Anwar, YB1AL, local Telekom head. Samsu is hesitant in English so for the first part of the conversation my two business associates translated from Indonesian for me. Then I asked them to ask Samsu about his last rig (he hasn't been on the air for a year or so) and suddenly we were conversing directly in the universal language of radio and my two associates needed an interpreter! I left my last U.S. amateur magazine with him (happened to be Brand "Z") and he was genuinely grateful.

23 March–Djakarta, Telekom again–delightful visit with Lt. Engkus, YDØHW, in charge of amateur licensing; YBØBR, Harry Sembel; and Mr. Hassan, YDØJC.

25 March-11 April–Aboard the *Teledex IV*, marine seismic vessel of Teledyne Exploration Co., Houston, Texas, making a survey from Ambon around the islands of Ceram and Buru. Four senior electronics students from the Institute of Technology, Bandung, were aboard to observe operation of the various types of gear including YB1BD, Irwan Setiadi. Irwin became my unofficial interpreter among other things and we sure wished we had a rig aboard. His capabilities reached their peak of utility the day the military at Buru (who apparently hadn't gotten the word about our work) fired two shots over our bow and hailed us in to Namlea. A couple of cups of tea and several beers later we all parted friends.

14 April–Visited Samsu Anwar again and discussed our proposed company sideband communications net operating between Ceram and Ambon. Sure helps to be able to talk the same language even though my basic job is oil exploration.

19 April–Back in Singapore for a lot of busy catching up as well as house-hunting (with an eye out for antenna placement, of course). Met John Van Lear, VE7IR, 9VIOQ, YBØAAH, etc. Big John installs and maintains communications systems for a number of oil companies throughout Indonesia and the Far East–a service we really need. John is a dedicated ham and a storehouse of information about communications and amateur activities. He packs his small Yaesu rig all over much as I've packed my SB-33.

30 April–Back to the States via Philippine Air Lines–Manila, Honolulu, San Francisco. Picked up the SB-33 at LSI and saw their new SB-35–wonder if they'd trade even-up?

Impressions–You can go either way–you can never leave home or you can immerse yourself in the local environments. For instance, the big hotels everywhere provide an insulated environment–order a martini and the waiter says "on the rocks, Sir?" And they all know how to make Irish Coffee but I couldn't get one in Iron Mountain, Michigan, last year. On the other hand, I felt awfully lonely watching the plane leave Ambon with my associate aboard and wondering how I was going to request ice to put *in* my beer. Communication is the thing–lots of listening, a few gestures and words, a smile, and liberal use of "Terima kasi" (thank you)– and you can accomplish wonders. Long distance communications are certainly one great problem area in a place like Indonesia when one tries to do business. But my several new ham friends are among those working very hard trying to improve this situation and thus facilitate progress. Speaking of progress, you ain't seen nuttin until you have seen a traffic traffic jam in Amsterdam or Djakarta. Progress–who needs it?

Texas Tornadoes

A tremendous number of hams were involved in communications backup when twin twisters devastated portions of the Texas panhandle on 17 April. 7255 was chosen as the operating frequency necessitating QSY by the Instant Services, but it was done without hesitation. Will try to include a longer report on this in the next column.

MWARS News (from *Radio Watch*)

The new President of Midwest Amateur

Radio Service is WØWYJ, Ed Brown, that well known voice from St. Louis. Ed headed up a MIDCARS Forum attended by 96 amateurs on April 24th at the Dayton Hamvention.

K8COT reports increasing participation in "CWARS" the 7100 mc c.w. alternate to 7258. And Marv, W9WWE, a MIDCARS founder, is really serious about TRANSCARS when long skip comes in: "Take over service control and work all states in one hour."

MIDCARS participating stations provided back-up communications for a Union Carbide chemical plant in Louisiana when a cable was accidentally cut. WA9EYQ was NCS. Other MIDCARS stations provided comunications during a river-dragging operation near Nashville, Tennessee.

K4MH/9, K9GPM, WØWYJ, K9VFE, WA5PPO, WA8JDH, W8QHW, WA8ETY, K9VJJ, and K9DMV were involved in various types of assists for mobiles ranging from requesting a new fan belt to calling an ambulance in early 1970.

For information on joining MWARS send an SASE to K9GPM, Ray Wilson, 25W013 Lacey Avenue, Naperville, Illinois 60540.

WCARS News (from *The Sentinel*)

W6HCD and W6HIT repport that the JPL Search and Rescue Radio Team assisted the Sierra Madre Search and Rescue and Ventura County Sheriff's Department in a search for a lost boy in a remote mountainous area. WCARS, 7255, was utilized for a working frequency.

WB6RZP utilized 7255 to call for help when high winds threatened his houseboat in the Sacramento Delta. W6VMB provided the helping hand.

WB6OAO, that busy WCARS VP, reports the starting of a c.w. operation on 7155.

Otherwise the usual vehicle incidents—accidents, snowbound cars—and one different one—a report of finding a patch of marijuana. These several incidents were handled with the usual speed and efficiency by K6CVA, K6OAM, WB6WUZ, WA6HNK, WB6OAO, WB6WCY, K6KZI, WB6DPP, WB6NFL, WB6YFT, WA6SNE, K6PDS, and K6MVF.

WA6UPA is the new club station call for West Coast Amateur Radio Service.

For information regarding WCARS send a card to Wayne Nail, WB6CBW, 4924 Omar, Freemont, California 94538.

EASTCARS News (from *The Monitor*)

Nice story about East Coast Amateur Radio Service on page 57, Feb., '70, *QST* by the Communications Manager. Thanks, George.

EASTCARS provided instant weather reports over a wide area to Connecticut Civil Defense when requested to trace a cold front during a flood alert. WA3GKD was service control and W1EOR operated the CD station. WA3GXE, WA3LRS, WA2KHL, W2WSP, W2FSC, W1TWG, and WA5RTT responded to a variety of mobile needs including a car on fire.

Net Manager, K1LTO, has appointed 19 stations in various localities as Service Coordinators.

For information on joining EASTCARS send an SASE to WA1KRN, James R. Lightfoot, Station WBZ, Boston, Massachusetts 02134.

WORLDCARS?

WB6YCQ tells me that the Southern California Amateur Network is providing service in a manner similar to WCARS on 14.325 at 2100-2200 GMT.

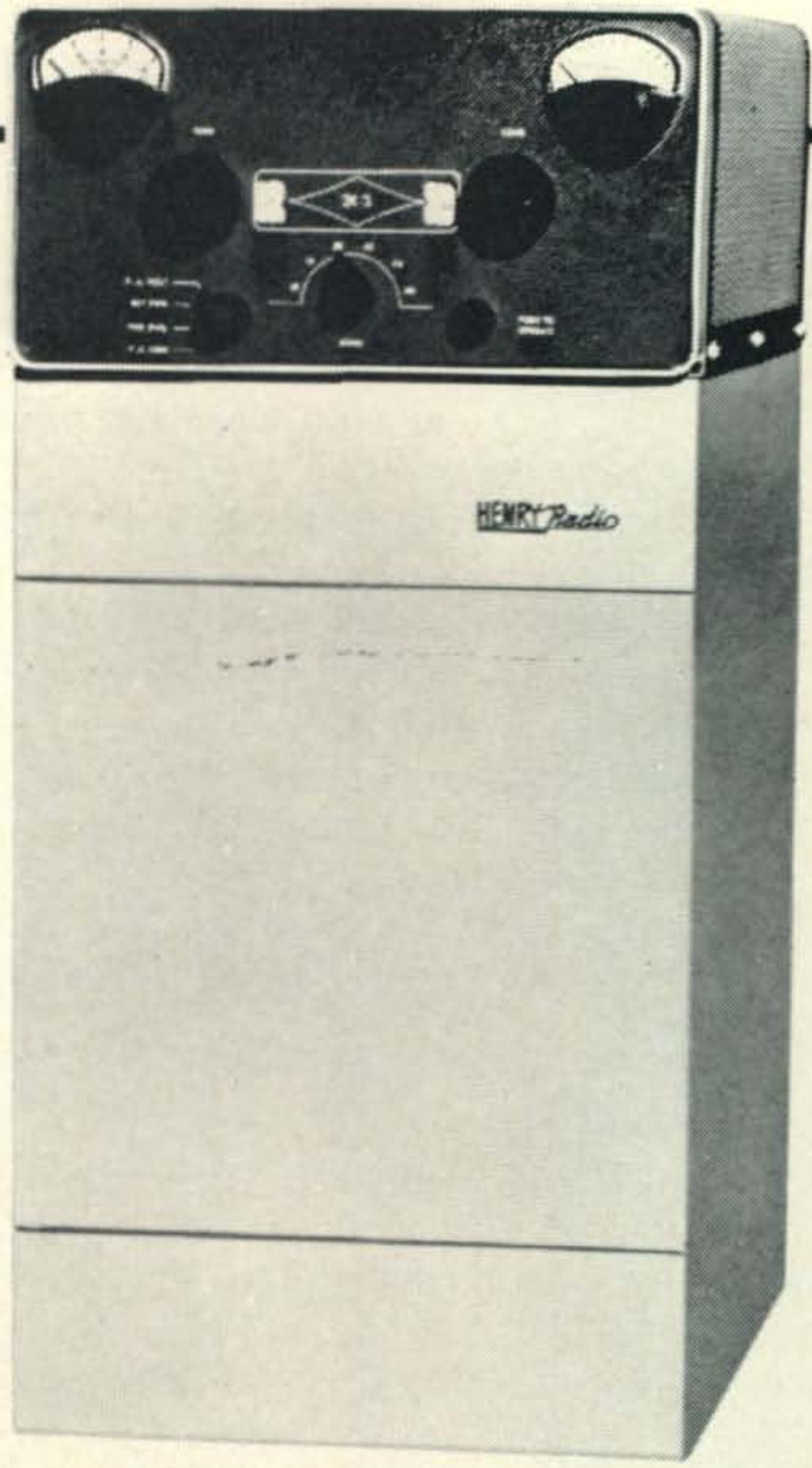
Next Column

Pictures of some Instant Services stars, mailbag, lots of other accumulated stuff. By the time you read this I hope I'll be operating from Singapore and Indonesia. I'll be favoring around 14,320 and 21,360 and looking for all of you around 1100-1600 GMT. Meanwhile, keep those cards and letters coming—the King City address will eventually reach me but mail can be sent directly care of Gulf & Western Indonesia, Box 42, Singapore 11.

73, Ed, WB6IZF, YB8?, 9V1?

"The v.o.x. here is pretty sensitive"

the 2K-3



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Results of the 1969 CQ World Wide DX (C.W.) Contest

BY FRANK ANZALONE,* W1WY

THE c.w. section of last year's contest, (Nov. 1969) like the previous year was again somewhat of a disappointment, especially when compared to the excellent conditions and activity that had been experienced during the phone week-end the previous month.

Returns on the average were below normal, and I had given up on any hopes of even equaling last year's overall total. But after everything had been totalled we got the surprise of our life, we finally broke 3,000. How come? An unusually high return from the USSR block and a few other European countries. The c.w. total was 1636 logs, well above last year's level. Add that to the ever increasing participation in the phone section (1377 logs in 1969) and we have a grand total of *3013*.

Now if we could only wake up the fellows over in Africa, the areas south of us and the boys "down under" we would really have a good thing going. Even the additional W3AA and W6RR awards failed to produce the desired activity. Once again the Caribbean/C.A. award will not be given due to a lack of eligible entries. Nor will they be presented in the future unless we see a definite improvement in the activity from these areas.

Many General license holders are passing up the contest because they feel the handicap is unfair. On the other hand K2MFY has other thoughts, says Ed, "having an Extra

*Chairman, Contest Committee.

Jim Neiger, 9Y4AA winner of both the Phone and C.W. All Band Trophies in this year's contest. Jim was also "Top Banana" as ZD8Z in last year's phone section.

PLAQUE & TROPHY WINNERS

Single Operator, Single Band

WORLD—North Jersey DX Association, Earl Lucas, W2JT Memorial Trophy. Won by Jorge Branco, CR6GO (14 mo)

Single Operator, All Band

WORLD—Larry LeKashman, W9IOP Trophy. Won by James Neiger, 9Y4AA.

U.S.A.—Frankford Radio Club Trophy. Won by James D. Ahlgren, W4YHD.

EUROPE—W3MSK Operators' Trophy. Won by Villea K. Hiilesmaa, OH5SE.

AFRICA—Gordon Marshall, W6RR Plaque. Won by Guttorm Amdal, 5H3KJ.

Multi-operator, Single Transmitter

WORLD—Dr. Anthony Susen, W3AOH Trophy. Won by Station UA9KAX. (Opers. UA9BE, UV9AK, UV9AS, UW9-BC, UAØBP, UA9-1657.)

Multi-operator, Multi Transmitter

WORLD—Hazard Reeves, K2GL Trophy. Won by Station CV2AA. (Opers. CX1-AAC, CX1BBV, CX3BH, CX7CO, CX8-CZ, CX9BT)

Contest Expedition

WORLD—Dr. Donald Miller, W9WNV, Dr. Harold Megibow Memorial Trophy. Won by Station PJØCW. (Opers. K4BAI, PJ2VD, W1BIH, W2EQS, W2TA, W4-BRB, W4GF, W4KFC, W4YWX, WB4-GTS.)

SPECIAL CQ PLAQUES

World Champions

Multi-operator Multi Transmitter

Station PJØCW

Club Award

Potomac Valley Radio Club

The "big gun" out of Venezuela, 4M5ANT #4 in the All Band Top Ten listings. José found conditions good on the low bands but very difficult raising the Europeans who were busy working each other.

class license is no bargain in the contest, all the guys eventually operate above 25 kc anyway."

We receive many requests to give separate awards for each class of license, and W2DYS wants us to give certificates of merit to all those who score above a given level. I'm sure that would increase the returns but would that get involved. We average well over 700 certificates a year, which I am sure far exceedes those issued by any other activity.

Jim Neiger, 9Y4AA went and did it again, polished off the competition and added the W9IOP All Band C.W. Trophy to the one he had already won on phone. Jim is now back in the States and will be operating the next one from the West Coast. He will find things a bit different from this side of the fence.

Last year CR6GO set a new world's record on 21 mc, and this year Jorge was out to break Don Miller's record on 14 mc. He didn't quite make it but easily captured the NJDXA Single Band Trophy. Nice going Jorge.

We are happy to see the W3AOH Multi-Single Trophy go to the boys at UA9KAX for a productive and well organized operation.

Also high on the list was the ZF1AN Contest Expedition by three members of the "Boiled Owls," Jack, W2GGE, Larry, W2PCJ and Andy, WB2CKS, our ex-committee member who has been too busy to give a hand but did find time to get in a little operating during his vacation.

Awarding the K2GL Multi-Multi Trophy to CV2AA required a bit of checking back into the records. Both PJ$\emptyset$CW and W4BVV the top stations were previous winners within the past three years. The CV2AA operation was organized by Horacio, CX3BH and practically drained all the c.w. talent in the area, so there was little other activity out of Uruguay.

This was the 3rd "Flying Contest Expedition" for the PJ$\emptyset$ group, a joint operation by the PVRC, Conn. Wireless and a few outside "ringers." Its a new world's record and the *CQ* Championship Plaque for them. And in addition we, (the Committee and its donor Don Miller), have also awarded the Contest Expedition Trophy to them for their complete coverage on all bands and making Curacao available to over 6600 stations.

Its the same old story with the *CQ* Club award. The Frankford boys have the largest turnout but the Potomac Valley takes home the bacon. Its the PVRC's multi "big guns" that makes the difference. Of course the big PJ$\emptyset$-DX phone score is the reason for the wide spread in the scores, but they would have won without it.

The FRC insists that expedition scores should not be included in a club's total. However we feel that Contest Expeditions add excitement to the contest, and if a club goes to all the trouble of organizing an expedition and the station is manned by members, the score should be credited to that club. (My feelings are that if those same members operated their own home stations they would turn in a comparable score anyway.)

Once again the Northern Cal. gang beat out their arch rivals the Southern Cal. club, mostly due to the fact that they had more stations on the air.

And the Florida DX Club soundly trounced the Ohio Valley ARC for the K4IIF Trophy. Whatever happened to those high scoring OVARC stations?

Among the foreign clubs the Rhein-Ruhr seems to be the only one that is making an organized effort to win the *CQ* Plaque.

Let me once again remind you that to be listed a club must have a minimum of 3 log entries, and we also require a list of participating stations from the club's activities manager.

Only two new world's records were set in this one, the single operator, all band score by 9Y4AA and the multi-multi score of PJ$\emptyset$CW. There may be a few new continental scores. Check W2IWC's all time records in next month's issue. Freddie will have a new up-dated list, including the Phone section which will have quite a few changes.

Single Operator — All Band

	Station	QSO's						Zones						Countries					
		1.8	3.8	7	14	21	28	1.8	3.8	7	14	21	28	1.8	3.8	7	14	21	28
U.S.A.	9Y4AA		128	373	603	819	700		12	23	30	32	26		23	44	77	74	61
	KV4FZ	60	354	589	791	490	583	7	16	21	33	25	25	8	40	56	77	52	54
	PY4OD		1	47	1078	601	278		1	17	37	31	24		1	32	110	68	66
	4M5ANT	17	161	338	796	545	207	4	7	12	28	26	19	4	8	21	63	60	34
	5H3KJ		11	117	559	498	518		3	16	33	31	27		3	36	68	66	62
	KH6RS		113	183	531	727	601		11	19	29	26	24		13	20	46	35	30
	OH5SE	11	82	239	541	376	125	2	10	23	30	31	28	4	44	54	65	70	61
	KH6IJ	5	144	161	592	493	563	1	11	12	33	22	20	1	11	14	62	24	24
	UB5CV		278	140	297	427	290		13	16	27	27	33		46	50	63	63	60
	DJ2BW		71	183	207	492	335		11	16	27	29	29		46	46	65	57	58
	W4YHD	4	41	100	226	292	192	3	14	23	34	28	25	3	24	50	77	69	55
	W9IOP		28	72	288	271	211		11	22	37	30	25		16	37	88	74	52

Multi-Operator — Single Transmitter

	UA9KAX		115	223	739	283	241		11	20	31	26	25		38	53	82	68	64
	ZF1AN		222	435	752	597	346		12	16	34	21	18		23	37	56	43	29
	DLØWR		188	198	320	382	331		10	18	33	26	31		48	60	77	55	58
	YU1BCD		112	245	207	490	228		8	18	27	31	30		36	59	69	69	58
	UAØKFG		99	171	357	394	274		12	19	32	31	31		14	32	65	52	43
	GD3TXF	65	321	392	290	325	539	2	9	13	22	20	23	10	34	34	43	44	44

Multi-Operator — Multi-Transmitter

	PJØCW	55	478	1296	1981	1569	1257	6	15	26	32	32	30	8	33	63	85	76	70
	W4BVV	16	134	529	668	723	423	6	18	33	40	35	30	8	52	86	118	104	77
	CV2AA		14	133	1488	1338	1173		8	16	35	29	30		8	20	76	66	60
	WA2ZAA	6	154	540	719	608	374	4	19	32	40	35	29	4	54	83	120	98	69
	K1JGD	21	247	336	773	571	464	7	18	28	38	32	28	10	57	71	121	92	75
	W3MSK	23	164	421	677	589	378	7	17	31	40	32	28	10	52	80	124	90	73

Band-by-band breakdown of top scores.

YL operators in the contest? Sure, but not as many as in the phone week-end. We did note Kaarina, OH2YL, Dot, WA8DOY and Jinny, 9N1RA who borrowed an old Viking transmitter with only one crystal from Fr. Moran, and made over 400 contacts using a 3 band Mosley vertical for the antenna. (Jinny, please send me your state side address for your certificate.) Too bad PY2SO did not make it this year. Sonia was on her way back from an extensive tour of Europe and the States.

If you think Father Time is slowing you down and you find contesting a bit rugged, think of the "Grand Old Man" of the contest, Gene Rosseel, ON4CE who was 81 on Oct. 19th 1969 and has been in our contests for years.

And if you should hear G3NSY trying to break thru a pile-up in the next one, QRX and give him a break. Fred is a blind operator who has faithfully sent us his log. Some of the other U.K. operators should be that dedicated.

The VK3's claim they were beaten before they even started. Due to a strike by the electric commission employees the whole Victoria area was restricted in the use of power and they were unable to do any operating until 0200, two hours after the start of the contest.

It was with nostalgic feelings that I recorded W2JB's score at the bottom of the W2 all banders. Ben, our departed committee member, always found it humorous being "low man on the totem pole," as he put it. Maybe that was why he was high in the hearts of his fellow operators.

We ran across a real ambitious looking score on 160, but I guess OL6AIU didn't realize that his log was going to be checked by a knowledgeable "top bander." That one is being emphatically disqualified.

Once again we received valuable assistance from some of the European clubs. We wish to thank Karel Krbec, OK1ANK and Milos Prostecky, OK1MP of the Central Radio

[*Continued on page 87*]

TOP SCORES

SINGLE OPERATOR

ALL BAND

9Y4AA	**3,088,968**	KH6RS	1,617,935
KV4FZ	2,719,152	**OH5SE**	**1,419,186**
PY4OD	2,286,783	KH6IJ	1,375,825
4M5ANT	1,751,178	UB5CV	1,258,476
5H3KJ	**1,727,415**	DJ2BW	1,249,151

SINGLE BAND

28 mc

CR6IK	498,800
LU5FEH	212,065
OA4PF	184,800
ZE8JN	184,072
W8VSK	153,080
4Z4BG	117,935

21 mc

VQ8CR	269,010
CX1JM	248,512
G3HCT	222,488
K1NOL	204,442
W4ZCY	193,050
ZM1AMO	190,260

14 mc

CR6GO	**774,750**
VK2APK	292,820
SM4CMG	254,600
TJ1AK	250,478
ZE3JJ	186,030
ZS5DC	183,655

7 mc

SM5BLA	168,590
K6NA	119,691
W5WZQ	101,530
W2DXL	94,374
VK5NO	87,542
UA4QX	63,038

3.5 mc

OZ5DX	73,788
UP2KNP	65,132
DJ2YA	59,340
LZ1KPG	58,156
SM7BIC	52,820
DJ5DT	41,250

1.8 mc

HB9NL	1,526
K1PBW	1,071
OL2AIO	876
OL6AKP	574
OK1ATP	533
OK1IAR	516

MULTI-OPERATOR

SINGLE TRANSMITTER

UA9KAX	**1,904,408**	YU1BCD	1,261,170
ZF1AN	1,465,808	UA0KFG	1,236,361
DL0WR	1,356,576	GD3TXF	1,141,936

MULTI-OPERATOR

PJ0CW	**9,333,884**	WA2ZAA	4,127,197
W4BVV	4,403,785	K1JGD	4,040,154
CV2AA	**4,246,992**	W3MSK	3,704,896

Number groups after call letters denote the following: Band (A-all); Final Score: Number of QSOs; Zones and Countries. Certificate winners are listed in **bold face.**

C.W. Results

SINGLE OPERATOR

NORTH AMERICA

United States

W1WAI	**A**	**629,958**	**690**	**95**	**223**
W1AX	"	508,144	483	108	256
WA1FHU	"	447,672	578	86	190
W1GT	"	189,472	342	64	127
W1DXB	"	183,084	292	69	140
W1EZD	"	162,400	273	65	135
W1FQL	"	149,633	239	80	143
W1DIT	"	80,984	170	67	109
W1ETU	"	71,451	161	51	102
W1WY	"	31,753	104	40	73
W1FLN	"	13,125	66	31	44
K1KNQ	"	189	7	3	6
K1LWI	**28**	**108,150**	**357**	**28**	**77**
WA1FBX	"	15,390	93	18	39
W1DDO	"	5,656	38	20	36
K1NOL	**21**	**204,442**	**586**	**31**	**88**
K1HVV	"	171,928	530	31	81
W1NU	"	95,130	317	32	73
W1MDO	"	48,504	180	30	64
W1PLJ	"	2,327	12	6	11
K3RIW/1	"	1,984	25	14	18
W1PYM	**14**	**82,700**	**237**	**38**	**81**
K1THQ	**7**	**16,473**	**111**	**15**	**36**
W1SWX	**3.5**	**4,680**	**40**	**14**	**25**
K1PBW	**1.8**	**1,071**	**26**	**8**	**13**
K2QIL	**A**	**377,503**	**484**	**87**	**184**
K2BK	**A**	**370,804**	**540**	**75**	**163**
W2SUC	"	208,816	293	80	168
K2DNL	"	163,795	248	83	152
W2HUG	"	154,780	255	79	139
W2YCW	"	139,332	229	75	129
W2NIN	"	92,803	308	28	75
W2IRV	"	81,984	170	62	106
W2HL	"	79,570	148	57	89
K2MFY	"	78,986	195	52	94
W2UI	"	76,653	185	54	99
W2CVW	"	67,473	157	53	100
K2CPR	"	57,575	126	67	108
WA2IZS	"	52,815	163	55	90
W2HO	"	49,966	110	68	98
W2CKR	"	37,758	140	33	60
WB2GGO	"	22,610	90	31	54
W2JB	"	874	16	8	11
W2BQF	**28**	**107,730**	**351**	**29**	**76**
K2BMI	"	63,640	257	25	61
W2DKM	"	46,545	184	24	63
W2BJH	"	29,564	133	22	54
W2EUO	"	10,604	85	13	31
WB2SQN					
	21	**142,346**	**463**	**30**	**73**
K2DDK	"	54,184	182	30	74
W2DYS	"	3,520	15	8	11
W2AIR	**14**	**23,970**	**99**	**33**	**52**
WA2CSP	"	4,932	46	12	24
W2DXL	**7**	**94,374**	**337**	**28**	**70**
W2LXK	"	84,410	301	26	69
K2DJD	**3.5**	**10,660**	**76**	**16**	**36**
WA2UJM	"	7,080	63	14	30
W3GRF	**A**	**968,240**	**860**	**112**	**270**
W3WPG	**A**	**835,244**	**834**	**107**	**239**
W3MFW	**A**	**741,727**	**635**	**122**	**269**
W3MWC	"	628,894	643	115	224
W3GN	"	569,096	623	101	218
W3DQG	"	554,919	602	102	225
W3CRE	"	477,988	555	100	201
W3OV	"	425,109	494	101	202
W3MFJ	"	414,640	487	96	196
K3WJV	"	342,000	418	95	190
W3NX	"	311,457	339	98	195
W3AZD	"	270,678	417	77	152
W3AXW	"	261,555	349	92	173
W3BYX	"	247,275	383	74	151
WA3EPB	"	231,061	354	75	154
W3KT	"	210,663	316	92	175
W3GRS	"	183,855	254	77	138
K3AIG	"	177,662	299	73	138
W3FHR	"	112,710	220	68	127
W3NNK	"	93,644	199	58	106
K3TGM	"	92,713	229	44	95
K3JLI	"	91,374	208	57	100
W3AIZ	"	82,890	208	51	84
W3DRD	"	62,370	151	58	96
W3ECW	"	43,820	119	57	83
W3ALB	"	40,626	250	75	144
W3GID	"	29,212	94	41	68
W3CBF	"	24,360	95	24	63
W3KE	"	22,572	84	41	58
W3HVM	"	21,186	80	43	56
W3CGS	"	18,375	83	27	48
W3AEL	"	13,200	59	32	43
W3GHD	"	11,640	67	23	37
K3RDT	"	4,905	37	16	29
WA3LXL	"	1,000	16	11	14
W3FU	**28**	**69,064**	**241**	**27**	**70**
W3BWZ	"	42,550	197	23	51
W3QQL	**21**	**82,863**	**289**	**30**	**69**
W3CSZ	"	2,397	35	7	16
WA3JBN	"	1,512	20	11	16
W3FTG	"	348	10	5	7
W3AFM	**14**	**89,568**	**216**	**38**	**106**
K3HPG	"	50,710	157	36	74
W3KA	"	24,264	114	26	46
K3UZE	**3.5**	**17,442**	**110**	**14**	**43**
W4YHD	**A**	**1,002,160**	**855**	**127**	**278**
K4TIG	**A**	**628,176**	**603**	**110**	**258**
K4II	**A**	**531,720**	**518**	**119**	**241**
K4CG	"	511,880	535	106	229
K4SHB	"	478,464	495	104	232
K4PQL	"	337,736	447	101	158
W4ZXI	"	265,887	331	91	188
W4ZSH	"	256,286	355	85	169
K4EZ	"	225,345	337	84	151
W4DM	"	177,313	278	87	146
K4DSN	"	174,900	287	78	142
W4NBV	"	154,880	246	86	134
K4ARP	"	139,528	239	83	131
K4BBK/4	"	116,522	207	80	123
W4ZM	"	109,604	210	72	114
W4TMR	"	105,623	210	77	114
K4ZA	"	101,332	186	72	124
W4TKN	"	92,442	183	72	114
W4EZ	"	76,650	158	66	109
W4JBQ	"	75,762	184	46	92
W4BJ	"	72,324	200	48	75
W4WBC	"	61,731	141	75	96
W4NQV	"	56,642	158	46	81
K4KQ	"	51,810	121	62	103
W4JK	"	36,720	120	41	67
W4OMW	"	34,476	124	35	67
W4FRO	"	7,026	41	25	34
W4KMS	"	6,300	36	26	34
W4KBS	"	2,800	28	16	19
WB4IRD	"	1,524	24	10	16
WB4JJJ/4		840	20	10	15
W4CRW	**28**	**76,436**	**272**	**28**	**69**
K4JWM	"	60,628	223	28	64
K4KJN	"	58,230	222	27	63
WB4EPJ	"	40,560	180	26	52
W4ZCY	**21**	**193,050**	**602**	**30**	**80**
W4ORT	"	102,102	341	31	71
K4ORQ	"	49,056	198	26	58
WB4JSV	**14**	**85,120**	**272**	**36**	**76**
W4BYB	**7**	**36,893**	**167**	**23**	**56**
W4SHX	**3.5**	**16,190**	**90**	**17**	**45**
W4ONO	"	3,737	42	14	23
WA4SGF	**1.8**	**462**	**30**	**6**	**8**
W5IOU	**A**	**622,325**	**606**	**122**	**243**
W5WMU/5		539,500	732	88	172
W5OB	"	112,690	220	76	115
WA5YMV	"	53,975	152	51	76
W5QNY	"	41,262	123	63	75
K0HIL/5	"	4,080	33	21	27
WA5NUK	**28**	**45,969**	**208**	**25**	**42**
W5RMC	"	23,270	131	23	42
W5OJZ	"	6,437	53	15	26
W5QNQ	"	600	15	8	7
W5GO	**21**	**95,142**	**324**	**30**	**71**
W5EQT	**14**	**79,968**	**262**	**38**	**74**
K5YAA	"	44,755	175	29	56
W5WZQ	**7**	**101,530**	**320**	**31**	**79**
W5AB	**1.8**	**377**	**42**	**6**	**7**
W5RTQ	"	260	20	6	7
W6RR	**A**	**915,204**	**957**	**120**	**218**
W6DQX/6					
	A	**707,952**	**726**	**125**	**218**
K6AHV	**A**	**702,936**	**784**	**115**	**197**
WA6EPQ	"	679,224	762	116	196
WB6KBK	"	478,272	612	106	176
W6BH	"	399,130	575	84	155
W6CYX	"	*387,600*	*564*	*94*	*146*
W6ISQ	"	*344,320*	*455*	*105*	*164*
W6EJJ	"	273,265	448	93	122
K6AUC	"	245,644	411	89	128
W6BIP	"	238,612	357	97	145

W6CS	"	223,293	369	87	130	**WA8NYB**	**7**	**42,960**	**175**	**23**	**54**			Canada			
W6ERS	"	194,220	312	100	134	WA8CAL	"	9,150	57	20	41	**VE1EK**	**A**	**31,680**	**119**	**37**	**62**
W6UUI	"	183,040	316	88	120	WA8QJK	"	756	15	9	12	**VE1TG**	**28**	**99,900**	**430**	**27**	**63**
W6NKR	"	167,860	266	83	135	**W8LT**	**3.5**	**19,459**	**125**	**17**	**44**	VE1AMX	"	20,176	162	16	36
K6DC	"	123,331	243	69	110			(Opr. WA8AJZ)				**VE1AJJ**	**21**	**21,294**	**249**	**17**	**25**
W6KJS	"	117,603	277	78	101	W8BDO	"	4,752	53	9	27	VE1AE	14	4,699	44	12	25
W6EYY	"	116,154	258	71	91	**W8GDQ**	**1.8**	**224**	**8**	**6**	**8**	**VE2AYU**	**A**	**332,737**	**608**	**81**	**148**
WA6IQM	"	104,140	219	77	87							VE2WA	"	281,695	400	92	173
K6MG	"	102,784	247	70	76	**W9IOP**	**A**	**976,472**	**870**	**125**	**267**	**VE3EDC**	**A**	**249,912**	**665**	**74**	**104**
W6JKJ	"	74,260	168	75	83			(Opr. W9AQW)				**VE3WQ**	**7**	**30,368**	**261**	**16**	**36**
W6MXN	"	73,461	180	58	83	**W9LKJ**	**A**	**848,804**	**759**	**125**	**257**	VE3BMB	"	9,200	84	16	30
W6EBO	"	65,660	179	58	74	W9RER	"	456,104	552	101	191	**VE3BS**	**1.8**	**492**	**42**	**3**	**3**
WA6GLD	"	58,880	226	34	58	K9CUY	"	382,755	428	113	210	**VE6AIK**	**A**	**32,422**	**369**	**23**	**20**
W6OL	"	51,590	167	46	64	W9RQM	"	271,469	379	94	159	**VE7BDJ**	**A**	**717,408**	**1096**	**108**	**174**
W6CLM	"	42,230	150	49	54	W9KYZ	"	227,360	356	85	139	VE7BZC	"	115,440	417	50	61
K6TZX	"	37,281	114	59	70	WA9REC	"	207,468	335	84	142	**VE7HQ**	**28**	**17,185**	**187**	**16**	**19**
W6EJ	"	27,610	91	47	63	W9DY	"	194,376	261	102	165	**VE7IG**	**3.5**	**11,368**	**202**	**12**	**16**
W6GBY	"	13,790	68	32	38	W9OHH	"	188,784	310	73	143	**VE8NWT**	**A**	**173,814**	**685**	**51**	**67**
K6CNV	"	10,945	70	50	55	W9SDK	"	141,696	235	76	140			Canal Zone			
W6BIL	"	10,220	51	32	38	W9DWQ	"	126,452	234	79	123	**KZ5WJ**	**A**	**190,224**	**612**	**61**	**83**
W6JKR	"	8,890	51	30	40	W9QQN	"	123,520	229	79	114	**KZ5AT**	**28**	**93,522**	**599**	**21**	**45**
W6KHS	"	4,692	36	21	25	K9KDI	"	117,047	248	54	107			Greenland			
OH3UQ/W6						W9WYB	"	116,064	225	73	113	**OX3ZO**	**A**	**85,086**	**425**	**34**	**53**
	"	4,144	32	26	30	WA9WXL	"	57,130	138	56	89	**OX3FD**	**21**	**13,031**	**278**	**12**	**11**
W6EJA	"	3,808	38	16	18	K9UQN	"	32,528	112	44	63	**OX5BL**	**14**	**20,496**	**488**	**14**	**28**
WB6JMS	"	3,120	34	20	20	W9HE	"	25,200	102	32	52			Mexico			
WN6HSJ	"	2,050	33	12	13	K9VQK	"	19,980	80	35	55	**XE0YLY**	**28**	**27,962**	**324**	**20**	**21**
W6VUW	"	975	14	13	12	WA9VOL	"	16,247	78	29	48			Puerto Rico			
WA6PGY	"	210	8	7	7	W9AEM	"	14,760	63	32	50	**KP4DGE**	**14**	**103,824**	**703**	**27**	**45**
K6SXA	**28**	**47,034**	**217**	**29**	**49**	WA9GYZ/9		12,816	67	31	41			St. Pierre			
K6CU/6	"	20,460	112	25	37	W9AZP	"	10,220	52	31	39	**FP8AP**	**A**	**23,584**	**280**	**12**	**12**
K6QC	"	4,676	56	12	16	WA9WVJ	"	1,331	25	10	13			Virgin Islands			
K6PUR	**21**	**115,342**	**389**	**32**	**69**	**W9YYG**	**28**	**67,872**	**245**	**30**	**66**	**KV4FZ**	**A**	**2,719,152**	**2867**	**127**	**287**
KOKHP/6						W9VBV	"	54,509	210	29	62	**KV4AM**	**28**	**33,232**	**215**	**24**	**43**
	"	5,698	55	15	22	**W9VNE**	**21**	**123,328**	**397**	**32**	**77**			AFRICA			
W6FSJ	**14**	**100,045**	**318**	**33**	**74**	K9YHB	"	96,880	304	31	81			Angola			
K6YRD	"	71,496	227	37	71	**K9TQR**	**14**	**30,576**	**142**	**28**	**50**	**CR6IK**	**28**	**498,800**	**1439**	**36**	**80**
K6IH	"	45,390	188	30	55	W9WKU	3.5	364	12	6	7	**CR6GO**	**14**	**774,750**	**1741**	**39**	**111**
W6BUD	"	4,752	44	13	23	OH1XO/W9		170	13	5	5			Ascension Is.			
K6YFZ	"	4,446	40	17	22		**1.8**	**216**	**18**	**5**	**7**	ZD8DB	A	10,340	68	29	26
K6NA	**7**	**119,691**	**439**	**30**	**63**	**WB9BUV**								Botswana			
W6NJU	**3.5**	**8,487**	**81**	**16**	**25**	**WØHP**	**A**	**535,848**	**578**	**115**	**217**	**A2CAU**	**14**	**35,778**	**186**	**25**	**42**
W6ANN	"	6,688	67	16	22	WAØEMS	"	301,455	413	97	164			Cameroon			
W6KWE	**1.8**	**35**	**21**	**4**	**3**	WAØKDI	"	193,312	302	85	139	**TJ1AK**	**14**	**250,478**	**798**	**34**	**72**
						KØTPF	"	76,776	177	74	94			Canary Is.			
W7IR	**A**	**661,584**	**642**	**122**	**236**	WØGYH	"	67,890	169	58	88	**EA8EY**	**21**	**46,740**	**261**	**20**	**40**
W7DI	"	483,832	553	107	200	WØDYA	"	38,390	122	47	63			Cape Verde Is.			
W7AYY	"	254,232	418	87	127	WAØPRS	"	37,791	128	48	69	**CR4BR**	**A**	**22,580**	**124**	**14**	**20**
W7NP	"	211,296	391	81	105	WØBE	"	23,700	76	49	61			Liberia			
W7RI	"	137,550	272	70	105	WØJMB	"	7,623	46	27	36	**EL2BZ**	**A**	**490,567**	**1129**	**61**	**100**
VE7ZZ/W7						W4UDS/Ø	"	1,269	17	11	16	EL2Y	"	6,688	55	22	22
	"	99,509	245	71	80	**WØKBG**	**28**	**20,475**	**114**	**22**	**43**			Mauritius			
WA7JCB	"	53,946	174	49	62	KØARS	"	7,560	48	21	35	**VQ8CR**	**21**	**269,010**	**750**	**35**	**87**
W7HMY	"	33,375	100	57	68	WAØLYO	"	4,960	55	14	18			Mozambique			
W7UDG	**21**	**51,072**	**212**	**27**	**57**	**KØEKR**	**21**	**83,928**	**282**	**33**	**71**	**CR7IZ**	**A**	**237,168**	**449**	**62**	**121**
W7VY	**14**	**148,467**	**421**	**37**	**84**	KØRHK	"	100,688	309	36	76			Rhodesia			
W7DV	**7**	**8,786**	**66**	**20**	**26**	WØEQN	"	15,555	90	26	35	**ZE2JH**	**A**	**175,182**	**456**	**44**	**85**
W7JLU/7	"	8,352	68	19	29	WØJYE	"	5,650	45	23	27	**ZE8JN**	**28**	**184,072**	**809**	**23**	**53**
W7DL/7						WØFII	"	2,848	36	15	17	ZE3JO	"	64,005	398	14	37
	3.5	**12,926**	**105**	**19**	**27**	**WØPAN**	**7**	**1,534**	**30**	**11**	**15**	**ZE1BT**	**21**	**159,330**	**617**	**29**	**65**
						WAØEPG	"	140	5	5	5	**ZE3JJ**	**14**	**186,030**	**597**	**32**	**74**
K8CFH	**A**	**223,913**	**334**	**76**	**157**	**WØNFL**	**1.8**	**240**	**9**	**5**	**7**	ZE1CY	"	158,424	590	31	61
WA8ZDT	**A**	**218,558**	**338**	**80**	**142**			Alaska				ZE2KV	"	108,744	405	30	62
W8AJW	"	97,963	229	63	100	**KL7JDO**	**A**	**410,820**	**1031**	**73**	**91**	**ZE5JJ**	**7**	**9,900**	**121**	**13**	**17**
W8KZO	"	93,789	208	52	101			Bermuda									
K8SBZ	"	79,715	187	57	92	**VP9BY**	**21**	**81,280**	**539**	**20**	**44**						
K8SJU	"	72,329	179	61	90												
W8GOC	"	56,296	160	40	84												
W8YGR	"	54,450	122	64	101												
WA8MCR	"	38,220	131	35	63												
W8HXZ	"	37,664	129	40	67												
W8AQZ	"	19,975	85	35	50												
K8IDE	"	17,040	98	18	42												
WA8DOY	"	13,277	64	28	43												
W8BJ	"	11,622	56	34	44												
W8PCS	"	7,055	40	16	29												
WA8ZGC	"	540	10	10	10												
W8VSK	**28**	**153,080**	**414**	**38**	**95**												
W8HDB	"	102,717	348	30	72												
W8WZ	"	73,746	253	31	71												
W8WVU	"	29,876	140	25	77												
K8BPX	"	15,120	97	18	38												
WB8APJ	"	7,052	58	18	25												
K8YQW	"	880	15	10	12												
WA8QIY	**21**	**83,533**	**308**	**30**	**73**												
WB8ABN	"	40,592	165	29	57												
K8CGD	"	39,646	160	27	59												
WA8ZFM	"	33,712	138	28	58												
W8DSO	"	8,404	64	14	30												
WA8EAS	"	48	4	3	2												
K8ZYO	**14**	**75,154**	**245**	**37**	**69**												
WA8VBY	"	51,987	203	31	62												
WA8CIA	"	51,888	191	32	60												
W8EW	"	4,440	38	16	24												

UB5CV another Top Ten all bander and high scorer for the USSR. Evidently Urus is going to try his luck on phone.

SOUTH AFRICA

ZS5XA	**A**	**334,224**	**648**	**60**	**116**
ZS2RM	"	270,776	512	62	119
ZS6BT	"	205,313	396	64	115
ZS6AYU	"	188,940	678	28	66
ZS5DC	**14**	**183,655**	**558**	**37**	**78**
ZS5SG	"	12,586	73	23	35
ZS2HI	**7**	**29,890**	**211**	**18**	**31**
		Swaziland			
ZD5M	**14**	**45,825**	**212**	**26**	**49**
		Tanzania			
5H3KJ	**A**	**1,727,415**	**1703**	**110**	**235**
		United Arab Rep.			
SU1IM	**A**	**21,660**	**99**	**26**	**50**

ASIA

		Ceylon			
4S7DA	**A**	**85,116**	**224**	**67**	**95**
4S7AB	**14**	**56,448**	**233**	**35**	**63**
		Hong Kong			
VS6AF	**21**	**12,638**	**83**	**26**	**45**
		India			
VUØJN	**A**	**114,840**	**284**	**66**	**99**
		Israel			
4X4MU	**A**	**493,020**	**804**	**66**	**154**
4X4HT	"	27,027	152	22	41
4Z4BG	**28**	**117,935**	**654**	**28**	**67**
4Z4AG	"	13,288	128	17	27
4Z4BP	**21**	**6,789**	**79**	**13**	**18**
		Japan			
JA1AEA	**A**	**955,206**	**1199**	**111**	**183**
JA1MIN	**A**	**348,219**	**520**	**97**	**146**
JA2HO	**A**	**207,184**	**421**	**78**	**106**
JA1PCY	"	178,239	405	74	85
JA1NDO	"	108,120	334	52	68
JA9YCE	"	103,309	390	54	49
JA3EBT	"	54,864	173	60	67
JA1AFF	"	53,460	204	47	52
JAØEVJ	"	46,864	182	56	60
JA1AYO	"	45,513	158	55	62
JA2TH	"	42,579	183	41	42
JA3FYC	"	41,538	185	41	45
JA1DFQ	"	39,200	155	50	48
JA6IGH	"	35,672	169	48	50
JH1LKH	"	29,500	132	48	52
JA3IXL	"	26,588	155	29	39
JH1EFA	"	18,352	123	36	38
JH1MTR	"	13,735	90	32	35
JA1BZM	"	12,656	94	27	29
JA1LRE	"	10,366	61	37	36
JA4FYK	"	6,313	60	28	31
JA3OEA	"	5,929	57	28	21
JA7EWH	"	5,280	58	21	23
JA8FBM	"	4,284	52	17	17
JA4DZ	"	3,451	44	16	13
JA2ECF	"	3,159	37	20	19
JA2AXB	"	2,378	34	12	17
JA1BC	"	1,815	25	16	17
JA2MPX	"	1,575	27	13	12
JAØBOP	"	1,012	17	12	11
JH1NSD	"	260	14	8	5
JA9RO	"	180	10	7	8
JA7JI	**28**	**84,060**	**332**	**31**	**59**
JA6BZI	**28**	**70,470**	**282**	**31**	**59**
JA6TQ	"	50,844	263	26	50
JA9CAF	"	34,569	205	27	42
JA1RUJ	"	23,954	159	24	34
JA1WWY	"	14,700	121	22	27
JA1NPV	"	13,160	112	22	25
JA3BGF	"	12,992	63	19	34
JA5AF	"	2,465	37	14	15
JAØFFL	"	1,900	33	11	14
JA1QIP	**21**	**110,124**	**480**	**31**	**53**
JA4JIG	**21**	**80,568**	**396**	**26**	**46**
JA2ITH	"	68,728	348	25	46
JAØCUV/1					
	"	65,404	295	30	53
JA4GAR	"	36,698	230	24	35
JH1WIX	"	22,032	155	23	28
JA6GPR	"	19,332	143	22	32
JA1VKH	"	14,147	128	19	24
JA2NPS	"	11,908	110	24	28
JA3QOG	"	7,612	74	21	23
JA1MJA	"	4,033	47	17	20
JA2MVU	"	3,861	52	13	14
JA9NB	"	1,540	24	14	14
JA9FB	"	1,525	23	11	14
JH1MRS	"	1,155	24	11	10
JA1NLX	**14**	**27,267**	**191**	**27**	**34**
JA1SR	"	20,097	123	25	38
JA3OLQ	"	11,123	108	21	28
JA1VBW	"	11,001	88	26	31
JA4AQR/5		10,660	89	22	30
JA8GR	"	5,842	67	21	25
JAØGZ	"	70	6	4	3

JA1IBX	**7**	**35,000**	**203**	**27**	**43**
JA1CJF	**7**	**32,550**	**183**	**26**	**44**
JAØSX	"	13,200	93	19	27
JA1LWY	"	9,200	97	16	24
JA6FFV	"	6,579	68	18	25
JA3TZH	"	2,231	42	12	11
JA8GSX	"	2,214	53	10	8
JA2IPE	"	1,246	31	8	6
JA7FWT	"	1,071	31	8	9
JAØDJE	"	455	16	7	6
JA1RQA	**1.8**	**36**	**11**	**2**	**2**
KA2RH	**28**	**46,690**	**251**	**29**	**41**
		Korea			
HL9VQ	**A**	**179,247**	**552**	**63**	**86**
HL9VV	"	74,044	391	48	59
		Lebanon			
OD5LX	**A**	**66,729**	**139**	**60**	**117**
		Malaysia			
9M2LN	**A**	**273,360**	**668**	**83**	**118**
		Maldive Is.			
VS9MB	**A**	**63,635**	**178**	**50**	**93**
		Nepal			
9N1RA	**A**	**134,174**	**428**	**52**	**94**
		Ryukyu Is.			
KR6FT	**A**	**64,752**	**293**	**51**	**63**
KR6HX	**21**	**12,177**	**177**	**17**	**24**
		Singapore			
9V1PM	**14**	**15,665**	**115**	**29**	**36**
		Thailand			
HS3NT	**A**	**731,090**	**1245**	**104**	**186**
		Timor			
CR8AI	**A**	**44,880**	**226**	**36**	**38**
		Turkey			
TA2AE	**14**	**16,020**	**127**	**11**	**34**

U.S.S.R.

Asiatic

UA9WS	**A**	**617,209**	**849**	**65**	**186**
UA9PP	"	562,440	630	100	227
UW9WL	"	422,097	632	60	177
UA9KPW	"	117,272	418	31	76
UA9TS	"	99,590	304	37	95
UA9KAC	"	8,931	85	10	29
UA9UY	**28**	**46,512**	**327**	**19**	**49**
UA9VL	"	17,784	227	12	27
UA9WO	"	7,805	87	10	25
UA9MX/9					
	21	**164,383**	**744**	**29**	**60**
UA9RR	"	144,478	565	27	67
UA9BZ	"	129,883	592	30	67
UA9UG	"	105,182	612	22	55
UA9TT	"	98,568	492	21	53
UW9WB	"	67,512	290	23	64
UA9WJ	"	61,351	281	19	64
UA9OS	"	52,592	306	22	54
UW9WD	"	18,974	134	15	38
UA9AB	**14**	**134,130**	**572**	**24**	**61**
UA9KHL	"	119,866	588	23	50
UA9VK	"	83,586	427	21	52
UA9QF	"	43,472	307	19	33
UA9KAR	"	34,083	199	19	44
UW9PJ	"	20,699	195	15	22
UW9KDV	"	20,319	181	12	27
UA9PG	"	16,910	192	15	23
UA9XN	"	12,728	116	14	29
UV9VC	"	9,006	124	17	21
UA9WL	"	3,375	32	18	27
UAØAG	**A**	**379,900**	**777**	**53**	**127**
UWØIX	"	113,139	456	57	60
UAØTP	"	59,996	257	34	72
UAØGF	"	47,241	368	40	47
UAØYD	"	35,640	234	23	43
UAØFD	"	16,225	176	29	30
UAØSE	"	736	19	10	13
UAØSU	**21**	**60,552**	**375**	**23**	**43**
UAØSH	"	38,808	234	24	48
UAØLJ	"	7,144	96	18	20
UWØBX	**14**	**178,568**	**641**	**32**	**69**
UWØUQ	"	53,856	362	26	42
UWØIW	"	37,672	256	23	45
UAØTD	"	32,269	238	22	39
UAØSA	"	15,351	130	19	32
UAØYT	"	14,620	138	17	25
UAØQP	"	7,202	98	16	22
UAØZX	"	3,603	123	7	12
UAØML	"	1,050	24	12	13
UAØZU	"	473	14	4	7
UWØFB	3.5	287	42	3	4
		Armenia			
UG6GG	**14**	**73,650**	**362**	**21**	**54**
UG6EA	"	48,029	294	19	42
		Azerbaijan			
UD6BW	**A**	**311,640**	**575**	**63**	**147**
UD6AM	**A**	**305,856**	**597**	**74**	**142**
		Georgia			
UF6LA	**A**	**585,144**	**873**	**71**	**172**
UF6AM	"	356,630	710	52	138
UF6DA	"	235,764	493	49	128
UF6DZ	"	151,528	515	28	76
		Kazakh			
UL7BB	**A**	**156,520**	**465**	**45**	**95**
UL7GW	**A**	**155,874**	**455**	**59**	**107**
UL7HV	"	12,551	129	16	41
UL7JG	**28**	**27,878**	**194**	**12**	**41**
UL7JE	**21**	**67,414**	**452**	**22**	**52**
UL7LA	"	9,245	75	14	29
UL7CA	**14**	**40,920**	**256**	**18**	**42**
UL7BK	"	23,040	201	13	35
UL7JT	**3.5**	**10,692**	**119**	**10**	**26**
UL7GG	"	7,955	86	10	27
		Kirghiz			
UM8FM	**A**	**350,837**	**705**	**64**	**135**
UM8AO	"	13,398	97	28	38
		Tadjik			
UJ8AB	**A**	**265,864**	**600**	**57**	**120**
UJ8AH	"	16,579	129	19	40
UJ8BE	"	7,497	64	18	33
UJ8KAA	**28**	**76,228**	**451**	**24**	**52**
UJ8AQ	**7**	**12,150**	**118**	**13**	**32**
		Turkoman			
UH8CS	**A**	**124,962**	**388**	**36**	**82**
UH8BO	"	65,977	349	50	131
UH8DL	**14**	**70,296**	**315**	**29**	**58**
		Uzbek			
UI8AI	**28**	**16,154**	**164**	**13**	**28**
UI8KAA	**21**	**68,746**	**361**	**23**	**51**
UI8OJ	**14**	**77,285**	**447**	**20**	**45**

EUROPE

Aland Islands

OHØNI	A	2,091	37	17	24
OH3XZ/OHØ					
	3.5	**35,526**	**514**	**15**	**47**
OHØNJ	"	5,376	65	4	21
		Austria			
OE4SZW	**A**	**554,931**	**990**	**83**	**196**
OE1ZK	"	301,096	633	75	169
OE1WO	**28**	**13,851**	**98**	**21**	**36**
OE2LEL	"	10,530	158	9	18
		Azores			
CT2AT	**3.5**	**21,320**	**235**	**10**	**30**
		Belgium			
ON5EU	**A**	**2,940**	**63**	**14**	**16**
ON4CE	**21**	**1,656**	**43**	**7**	**16**
ON4XG	**3.5**	**8,385**	**198**	**8**	**31**
		Bulgaria			
LZ2IM	**A**	**121,380**	**202**	**12**	**35**
LZ1CW	**28**	**93,275**	**448**	**28**	**63**
LZ2KDO	**21**	**36,980**	**219**	**26**	**60**
LZ1VM	**14**	**38,448**	**343**	**20**	**52**
LZ1XZ	"	11,466	213	10	32
LZ1ZQ	"	5,810	130	9	26
LZ1KSN	**7**	**41,004**	**407**	**18**	**49**
LZ2KST	"	6,480	141	7	33
LZ1KPG	**3.5**	**58,156**	**597**	**15**	**53**
		Czechoslovakia			
OK1PD	**A**	**805,140**	**900**	**114**	**241**
OK5OM	**A**	**565,147**	**1228**	**76**	**202**
OK2BHV	**A**	**271,816**	**643**	**78**	**189**
OK1IQ	"	228,456	590	62	166
OK3CAU	"	80,997	417	36	97
OK2CES	"	72,558	344	39	100
OK2BPE	"	66,456	454	28	117
OK2PBK	"	38,792	196	36	68
OK2BBI	"	37,752	172	44	88
OK3BT	"	36,772	218	27	89
OK2ZU	"	35,168	165	40	72
OK2BOL	"	33,681	210	38	71
OK1PT	"	31,621	144	35	68
OK2BBJ	"	28,083	107	45	66
OK2SFS	"	28,075	150	35	60
OK2BAC	"	27,945	207	28	87
OK2LN	"	26,312	158	26	66
OK1FAE	"	23,306	181	24	62
OK2BNZ	"	21,111	167	38	73
OK2KFP	"	18,800	175	20	60
OK2BCJ	"	18,512	122	28	61
OK2BIP	"	8,060	47	27	43
OK1KCD	"	7,884	88	17	37
OK1AII	"	6,120	50	20	25
OK1AOR	"	5,185	42	28	33
OK1AMR	"	3,708	52	16	20
OK2KUB	"	1,575	71	6	19
OK1ZW	"	324	15	7	11
OK2BCI	"	132	6	5	6
OK1GT	**28**	**98,388**	**381**	**33**	**75**
OK2QX	**28**	**72,123**	**303**	**30**	**57**
OK1TA	"	57,360	270	31	49
OK2BMF	"	41,745	218	27	42
OK2ABU	"	31,860	249	19	26
OK2BMH	"	25,200	131	26	44
OK1MP	"	11,418	64	26	40
OK1FAR	"	7,828	78	14	24
OK1KTL	"	3,300	49	11	14
OK1CX	"	252	14	3	3
OK1BMW	**21**	**72,850**	**300**	**30**	**64**
OK1VB	**21**	**57,717**	**241**	**32**	**67**
OK1ABP	"	30,744	146	27	57
OK2BPF	"	21,204	211	19	38
OK3KWK	"	15,620	153	18	26
OK1KZ	"	10,965	109	16	27
OK1NC	"	3,534	41	13	25
OK1AQO	"	624	22	6	6
OK1BY	**14**	**113,925**	**461**	**27**	**78**
OK3DT	**14**	**55,777**	**360**	**28**	**65**
OK1EG	"	47,736	421	20	52
OK3CCC	"	34,009	296	20	51
OK3ALE	"	31,920	280	22	54
OK2WDC	"	28,324	262	20	53
OK2BFS	"	27,886	240	21	52
OK1ATE	"	18,459	176	18	45
OK3CAN	"	18,166	198	13	49
OK1MGW	"	17,422	170	16	46
OK3CHX	"	15,812	176	15	44
OK1ND	"	13,080	171	19	41
OK1EP	"	11,154	115	16	50
OK2BON	"	4,031	109	6	23
OK1MSS	"	3,096	68	8	28
OK3YCM	"	1,680	44	9	21
OK3BH	"	350	11	6	8
OK3CFP	**7**	**38,640**	**380**	**18**	**52**
OK1MDK	**7**	**33,361**	**316**	**20**	**53**
OK1ASJ	"	17,577	210	14	49
OK1MSP	"	6,650	151	9	26
OK3EQ	"	3,182	58	10	27
OK1AOU	"	7,450	57	5	20
OK1AEH	"	270	14	5	10
OK1AIA	"	150	13	4	6
OK1XW	**3.5**	**38,556**	**504**	**14**	**49**
OK1WC	**3.5**	**35,910**	**565**	**11**	**43**
OK1STU	"	19,208	291	12	44
OK1DIM	"	17,604	292	11	43
OK1MG	"	17,052	217	12	46
OK2KZR	"	14,405	317	7	36
OK2HI	"	8,541	211	6	33
OK3BG	"	2,805	85	5	28
OK3BJU	"	1,771	68	4	19
OK1JDJ	"	495	34	3	12
OK1AYY	"	336	21	4	12
OK2BBQ	"	242	19	3	8
OL2AIO	**1.8**	**876**	**66**	**2**	**10**
OL6AKP	**1.8**	**574**	**49**	**3**	**11**
OK1ATP	"	533	35	3	10
OK1IAR	"	516	46	2	10
OK2BFY	"	495	45	2	9
OK1FAB	"	434	33	2	12
OK3CDO	"	403	33	2	11
OK3TOA	"	364	33	2	11
OL5ALY	"	216	26	2	7
OL1ALM	"	99	12	2	7
		Denmark			
OZ3PO	**A**	**53,820**	**207**	**42**	**96**
OZ4H	"	35,970	198	37	72
OZ3Q	"	10,488	76	30	39
OZ5CI	"	9,234	89	21	36
OZ1RK	"	2,597	49	15	34
OZ1CZ	"	1,952	27	16	16
OZ2NU	"	308	12	8	6
OZ7YY	**28**	**31,280**	**154**	**28**	**57**
OZ7BQ	"	16,983	123	18	33
OZ7G	"	4,200	46	14	21
OZ4UN	**14**	**47,547**	**391**	**22**	**59**
OZ1W	**7**	**25,325**	**177**	**15**	**60**
OZ5DX	**3.5**	**73,788**	**681**	**17**	**61**
		England			
G3FXB	**A**	**665,567**	**969**	**82**	**209**
G2DC	"	118,597	297	63	107
G3EDW	"	87,894	331	44	127
G3JKY	"	50,900	257	37	63
G2BOZ	**28**	**83,749**	**364**	**29**	**60**
G3ESF	"	72,335	340	27	58
G2BW	"	13,500	126	17	33
G3CWL	"	5,760	72	13	23
G3HCT	**21**	**222,488**	**794**	**34**	**82**
G3RUX	"	**53,562**	**369**	**26**	**53**
G8DI	"	8,541	122	14	25
G3XYC	"	7,337	135	9	20
G3NSY	**14**	**19,529**	**227**	**19**	**40**
G3KMA	**7**	**24,360**	**289**	**12**	**44**
G3TVW	"	17,270	199	12	43
G3XAP	"	17,105	147	13	42
G3HZL	"	16,320	185	12	39
G3IGW	**3.5**	**29,358**	**330**	**12**	**51**
G3KDB	"	19,027	278	11	42
G3DYY	"	6,426	80	11	31
G3NT	**1.8**	**253**	**24**	**2**	**9**
		Finland			
OH5SA					
	A	**1,419,186**	**1374**	**124**	**298**
OH2BH	**A**	**973,110**	**980**	**118**	**280**
OH1VR	"	515,822	805	103	246
OH2XF	"	243,380	427	81	202
OH3TE	"	241,056	463	76	167
OH2RI	"	69,524	221	60	122
OH2XM	"	48,484	326	29	95
OH2YL	"	32,994	154	40	77
OH1LU	"	7,579	134	11	42
OH1PG	"	7,107	83	22	47
OH2BCD	"	6,004	79	30	46
OH2VZ	"	4,699	51	17	20
OH1VA	**28**	**49.749**	**220**	**30**	**73**
OH6RC	"	8,509	57	21	46
OH2BAH	"	2,006	21	14	20
OH2BHU	"	60	6	4	6
OH2RD	"	42	3	3	3
OH1TN	**21**	**90,062**	**430**	**30**	**68**
OH2VB	"	35,150	152	32	63
OH2BIJ	"	24,236	131	27	56
OH5RZ	"	19,328	172	17	47
OH8RV	"	2,688	85	8	20
OH6VV	"	2,194	39	10	28
OH2EF	"	114	7	3	3
OH5VT	**14**	**116,788**	**564**	**30**	**67**
OH2BDP	"	95,200	457	31	88
OH1SY	"	86,828	452	31	67
OH2BAD	"	22,320	106	26	67
OH7NW	"	14,472	148	18	36
OH2BAQ	"	4,788	70	14	24
OH5UQ	**7**	**46,920**	**319**	**22**	**63**
OH3NS	"	10,348	168	15	37
OH2BCP					
	3.5	**25,132**	**357**	**13**	**48**
OH3MM	"	15,620	251	12	43
OH1PS/2	"	14,091	238	10	44
OH1SH	"	13,083	231	9	40
OH2BAM	"	6,392	183	5	29
OH5YF	"	170	19	3	7
		France			
F8IH	**A**	**323,904**	**591**	**77**	**147**
F8TC	**A**	**307,008**	**843**	**51**	**113**
F6AAV	"	193,614	528	63	120

TOP U.S.A. SCORES

Single Operator

All Band	**W4YHD**	**1,002,160**
28 mc	W8VSK	153,080
21 mc	K1NOL	204,442
14 mc	W7VY	148,467
7 mc	K6NA	119,691
3.5 mc	W8LT	19,459
1.8 mc	K1PBW	1,071

Multi-Operator

Single Trans.	W9EXE	930,510
Multi Trans.	W4BVV	4,403,785

F5KZ	"	123,342	428	42	80
F8TQ	"	119,695	322	47	138
F3AT	"	64,564	223	45	81
F8TM	"	54,264	250	40	93
F9RO	"	52,662	251	40	91
F9RM	"	24,633	116	43	76
F5IN	"	15,105	169	19	34
		Germany			
DJ2BW	**A**	**1,249,151**	**1288**	**112**	**272**
DJ3KR	**A**	**704,781**	**849**	**104**	**235**
DJ8RR	**A**	**586,672**	**818**	**83**	**213**
DL7AA	"	536,952	782	102	210
DJ5JH	"	335,921	501	85	198
DJ8FF	"	237,144	504	64	177
DJ1XC	"	234,972	591	70	174
DJ1XP	"	226,782	448	72	186
DJ6QL	"	219,840	674	59	133
DL8AJ	"	195,168	436	61	153
DJ2HH	"	189,002	390	75	167
DL8UF	"	180,360	454	58	122
DL8BU	"	171,672	489	55	129
DL8YR	"	130,150	370	64	126
DL8FR	"	118,816	300	58	130
DL2JO	"	115,209	402	44	109
DJ7PB	"	99,873	311	57	80
DJ4HR	"	99,710	314	45	124
DL8AM	"	96,730	321	50	120
DL9PE	"	91,015	277	48	119
DL7BQ	"	77,556	299	48	90
DL1AM	"	43,680	150	56	126
DJ2GG	"	36,414	160	40	79
DL6BP	"	18,318	112	28	43
DL8DF	"	16,720	90	31	57
DJ5QK	"	13,950	112	27	48
DL9RP	"	13,601	93	28	39
DJ2EL	"	11,175	77	32	43
DK1YK	"	6,360	89	19	34
DJØUP	"	2,310	49	13	22
DL8WA	"	598	26	6	17
DL1JW	**28**	**75,696**	**355**	**27**	**56**
DL1KS	"	58,029	253	29	58
DJ3YU	"	33,170	211	24	38
DL6EN	**21**	**162,282**	**588**	**33**	**69**
DL8AN	"	87,843	396	28	61
DJ4XG	"	67,470	354	24	54
DL1RB	"	48,025	232	26	59
DL3BK	"	42,976	257	22	46
DL8IG	"	5,206	58	12	26
DL9EY	**14**	**28,016**	**276**	**20**	**48**
DJ2YA	**3.5**	**59,340**	**516**	**16**	**53**
DJ5DT	**3.5**	**41,250**	**431**	**14**	**52**
DJ5PN	"	33,284	362	10	43
DL1QT	"	12,932	168	11	50
DL4QQ	**A**	**676,184**	**843**	**101**	**245**
DM2EDL	**A**	**167,384**	**376**	**66**	**130**
DM2BTO	**A**	**162,656**	**471**	**59**	**149**
DM3BE	"	60,554	345	35	102
DM2DEO	"	44,202	176	39	100
DM4SJJ	"	28,208	183	25	61
DM4YEL	"	21,780	96	44	66
DM2CHM					
	"	20,116	72	47	60
DM2ADJ	"	13,260	91	31	47
DM3UE	"	12,506	69	31	43
DM3LOG	"	11,808	88	30	52
DM3XI	"	10,360	62	32	42
DM3WYF	"	8,316	108	18	48
DM3XUE	"	7,744	46	27	37
DM4EL	"	5,544	44	24	39
DM3OC	"	4,860	68	14	40
DM3XHF	"	4,183	86	10	37
DM2BJB	"	2,040	47	12	28
DM4WKL	"	1,638	23	13	13
DM3YYA	"	1,426	40	9	22
DM2BBE	"	1,155	39	9	24
DM2DQN	"	460	13	8	12
DM2DHO					
	28	2,025	27	12	13
DM2BML	"	1,440	24	10	10
DM2CXN	"	513	19	4	5
DM3MWG					
	"	152	13	3	5
DM2AUD					
	21	**16,912**	**143**	**20**	**36**
DM3JJ	"	4,619	70	10	21
DM2BBK	"	4,558	47	17	26
DM2BFK	"	3,168	30	17	19
DM2BYE	"	1,288	16	13	15
DM3YK	**14**	**14,352**	**189**	**14**	**38**
DM2CED	"	7,040	125	12	32
DM4ZWD	"	5,616	104	11	25
DM3PQO	"	3,081	62	9	30

Leszek is a newcomer and had only been active 6 months before the contest. SP3DOI was one of the few stations using the SP prefix, most were using the new 3Z prefix for Poland.

DM2ATL	"	1,680	32	9	19
DM2APG	"	760	32	5	15
DM6VAK	**7**	**20,870**	**294**	**14**	**48**
DM4XNL	**3.5**	**4,588**	**118**	**6**	**31**
DM5SDL	**3.5**	**4,305**	**122**	**5**	**30**
DM3PEL	"	4,183	56	8	39
DM4ZSA	"	3,008	92	5	27
DM3OGB	"	2,340	77	6	24
DM3THH	"	2,233	81	5	24
DM4ROL	"	1,674	64	5	22
DM2AMF	"	675	25	5	20
		Hungary			
HA8UU	**A**	**115,200**	**472**	**34**	**110**
HA8UF	**A**	**105,168**	**440**	**41**	**127**
HA5FE	"	90,153	380	44	115
HA1SB	"	64,845	269	46	85
HA7LU	"	53,193	292	30	89
HA5CQ	"	23,925	163	27	48
HA8VM	"	17,760	220	21	53
HA7LW	"	6,532	147	15	31
HA7MC	"	5,970	124	13	26
HA8UY	"	5,310	210	14	31
HA3MA	"	3,844	78	15	17
HA9PE	"	1,426	42	9	22
HG5EA	**28**	**17,920**	**125**	**21**	**35**
HA5BI	**21**	**7,480**	**103**	**12**	**22**
HA9PA	"	5,088	91	9	23
HA7LF	**14**	**43,068**	**400**	**19**	**55**
HA5AM	"	32,480	231	24	56
HA9OA	"	2,015	43	9	22
HA7MG	**7**	**3,103**	**80**	**9**	**20**
HA7MD	"	1,800	52	8	22
HA7KNB	"	1,060	64	4	16
HA3KMA	"	546	16	7	41
HA9OX	"	390	26	4	11
HA3GA	**3.5**	**21,648**	**198**	**23**	**59**
HA8UD	"	3,920	159	5	23
HA7JLE	"	3,213	132	9	18
HA8UI	"	1,501	100	4	15
HA5FA	"	1,288	55	7	19
HA3MM	"	504	36	4	10
		Iceland			
TF3SF	28	880	22	8	12
TF3OJ	14	676	20	7	6
		Ireland			
EI5F	**A**	**14,504**	**102**	**27**	**47**
		Italy			
I1ASE	**A**	**351,526**	**572**	**79**	**159**
I1YCZ	**21**	**7,733**	**102**	**11**	**26**
I1ALU	**7**	**21,730**	**272**	**11**	**42**
		Luxemburg			
DJ6SI/LX					
	A	**207,762**	**678**	**62**	**124**
		Madeira			
CT3AS	**A**	**69,792**	**327**	**31**	**65**
		Malta			
9H1BL	**28**	**58,950**	**487**	**22**	**53**
		Netherlands			
PAØXPQ	**A**	**282,880**	**600**	**68**	**153**
PAØLOU	"	147,515	364	60	121
PAØVB	"	137,293	425	51	128
PAØINA	"	123,559	337	57	100
PAØTAU	"	98,462	270	60	122
PAØJR	"	13,912	128	27	67
PAØWAC	"	13,268	112	20	42
PAØYN	"	12,300	100	22	59
PAØUV	21	1,450	32	8	17
		Norway			
LAØAD	**A**	**900,666**	**1083**	**100**	**251**
LA1OA	**A**	**425,079**	**1094**	**73**	**146**
LA8OM	"	72,885	338	38	75
LA2Q	"	51,840	195	34	94
LA9M	"	3,080	68	11	33
LA3XG	**28**	**29,963**	**176**	**24**	**59**
LA2NL	**21**	**10,434**	**148**	**14**	**23**
LA1P	"	8,624	79	16	33
LA8WG	**7**	**9,102**	**203**	**7**	**34**
LA3UF	"	3,116	63	8	30
LA6U	**3.5**	**2,436**	**77**	**5**	**23**
		Poland			
3Z9PT	**A**	**201,824**	**522**	**68**	**170**
3Z2LV	**A**	**188,980**	**465**	**61**	**159**
3Z8AQN	**A**	**156,681**	**508**	**55**	**134**
3Z9ZD	"	134,984	414	63	125
SP3DOI	"	128,432	392	52	132
3Z2IU	"	125,385	400	62	133
SP6ASD	"	112,200	309	61	109
3Z8CNR	"	71,195	315	47	98
3Z8AFS	"	66,640	311	37	99
SP9CTW	"	56,000	423	32	93
3Z8AWP	"	55,372	275	38	89
3Z8ARU	"	50,141	276	37	96
3Z9BPF	"	33,170	191	40	67
3Z8MJ	"	24,200	179	27	61
3Z5ATO	"	21,463	114	31	86
3Z2BBD	"	19,240	148	24	50
3Z7ASZ	"	14,040	171	18	47
3Z5CJU	"	11,745	125	23	58
3Z2AOB	"	8,856	45	32	40
SP7CKF	"	7,300	95	14	59
3Z9DN	"	5,684	73	17	32
3Z2BMM	"	4,182	49	19	32
3Z6PH	"	3,652	74	13	31
3Z3BVD	"	3,312	62	13	35
SP3CTQ	"	1,850	40	13	24
SP6LL	"	1,350	34	7	20
SP2AN	"	306	11	8	10
3Z8CCC	"	228	20	5	15
3Z3AIJ	**28**	**48,954**	**217**	**30**	**52**
3Z8AWL	"	17,670	113	21	36
3Z8HR	"	16,250	122	20	30
3Z8CFZ	"	16,128	109	21	42
3Z3AOT	"	4,140	44	16	20
3Z9BQX	"	2,596	42	12	10
SP2UU	"	24	2	2	2
SP5ACN	**21**	**31,776**	**129**	**30**	**66**
3Z3AUZ	"	20,629	175	16	33
3Z8AG	"	11,132	115	14	32
3Z4AGR	"	9,944	120	16	28
SP2BYT	"	6,897	104	14	19
SP3BHG	"	5,832	98	10	14
3Z6AQA	"	4,674	57	13	25
SP2GL	"	72	6	2	2
3Z8CP	**14**	**36,970**	**226**	**24**	**62**
3Z2AJO	**14**	**36,190**	**304**	**20**	**57**
3Z9AI	"	33,200	231	25	55
3Z3KAI	"	24,095	240	20	41
3Z5BCT	"	17,960	133	21	48
SP2KDS	"	15,484	219	13	36
3Z5QP	"	15,344	150	17	39
3Z9BDQ	"	10,175	118	14	41
3Z9AWV	"	4,387	90	10	31
3Z5ARN	**7**	**37,050**	**407**	**17**	**48**
3Z9DH	**7**	**36,556**	**367**	**18**	**58**
3Z9ABE	"	34,038	378	15	47
SP2AVE/2		29,852	317	17	51
SP4DCS	"	6,756	206	7	26
3Z8KAF	"	6,475	150	10	27
3Z2AEK	"	2,754	84	6	28
3Z9VC	"	1,768	56	7	19
SP5AIB	"	630	17	7	11
3Z6CDP	**3.5**	**9,360**	**221**	**6**	**34**
3Z6UK	"	6,912	233	5	27
SP4DCR	"	5,355	158	5	30
3Z9AAB	"	3,480	121	5	30
3Z1AAY	"	2,850	106	5	20
		Portugal			
CT1GD	**7**	**5,751**	**146**	**6**	**21**
		Romania			
YO9DL	**A**	**192,708**	**478**	**59**	**143**
YO3AC	**A**	**100,925**	**453**	**40**	**112**
YO9APJ	"	92,274	307	58	124
YO6AWR	"	78,183	377	41	112
YO8AGZ	"	76,346	487	20	98
YO4KCE	"	64,904	334	38	84
YO6AW	"	58,797	261	42	98
YO8DD	"	24,934	184	28	63
YO3YZ	"	21,505	171	27	58
YO5ALH	"	14,274	223	12	49
YO3QO	"	9,100	100	18	52
YO8ME	"	8,004	103	18	40
YO8AEZ	"	7,628	100	18	51
YO6ADM	"	7,059	121	11	28
YO6AFP	"	5,472	97	12	36
YO8GP	"	4,992	62	17	35
YO2QY	"	3,360	42	14	34
YO8APT	"	1,375	56	6	19
YO8GF	"	368	24	5	11
YO3RT	**28**	**6,520**	**86**	**15**	**25**
YO5PJ	"	4,880	50	17	23
YO2ASJ	"	660	20	7	8
YO3JW	**21**	**14,410**	**159**	**16**	**39**
YO3BGG	**14**	**2,548**	**74**	**7**	**21**
YO6GZ	**7**	**22,330**	**194**	**12**	**46**
YO8FR	"	15,895	219	12	43
YO3RF	"	9,635	167	9	38
YO2AVP	"	5,120	100	9	31
YO2ASX	"	2,368	49	9	23
YO7ARZ	"	1,682	51	6	23
YO9HF	"	262	23	3	9
YO6MY	"	24	2	2	2
YO5AIR	**3.5**	**9,462**	**241**	**6**	**32**
YO6AJK	"	1,520	81	5	14
		Scotland			
GM3CFS	**21**	**43,734**	**280**	**22**	**52**
GM5AME	"	42,228	268	21	48
GM3JDR	"	20,384	215	16	36
		Spain			
EA3KT	**A**	**74,801**	**320**	**35**	**96**
EA2DT	"	46,852	213	38	68
EA2FA	"	29,106	199	30	68
EA2CR	"	22,659	145	26	57
EA5BS	"	17,040	152	22	38
EA3IH	**28**	**48,930**	**349**	**25**	**45**
EA2HR	"	7,623	109	10	23
EA2MW	14	4,290	59	11	28
		Sweden			
SM5BYF	**A**	**233.999**	**597**	**65**	**146**
SM5CVH	**A**	**182,286**	**345**	**76**	**158**
SM5BXP	"	91,606	240	58	105
SM6CUK	"	82,344	230	58	130
SMØFT	"	53,019	268	39	90
SM7TV	"	39,096	203	36	72
SM7AIL	"	23,394	173	27	77
SM2CTY	"	15,252	96	31	51
SM7BUG	"	6,579	59	21	30
SM3DVN	"	5,005	35	29	26
SM4AZD	"	3,726	55	16	35
SM6CZU	"	2,030	38	11	24
SM6AFH	**28**	**98,900**	**389**	**31**	**69**
SMØDSG	"	53,360	249	29	63
SM5CDY	"	39,355	204	27	58
SM4ARQ	"	35,061	170	28	59
SM5API	"	12,120	63	24	59
SM4CIY	"	4,125	68	11	22
SMØKV/0					
	21	**97,788**	**402**	**32**	**84**
SM3CXS	"	53,184	243	29	67
SM6CJK	"	35,583	200	28	59
SMØFO	"	4,095	84	11	24
SM5EUL	"	882	35	8	10
SM4CMG					
	14	**254,600**	**831**	**37**	**97**
SM7CCU	"	179,552	737	38	88
SM5BRS	"	18,180	193	16	44
SM4EAL	"	11,968	82	21	47
SM5UQ	"	7,524	108	15	29

SM5BLA	**7**	**168,590**	**550**	**32**	**83**
SM6DKH	"	68,807	506	20	63
SM6CKU	"	56,304	406	19	53
SM5DSF	"	9,909	216	8	33
SM7BIC					
	3.5	**52,820**	**457**	**20**	**56**
SM6MX	"	35,784	416	15	56
Switzerland					
HB9UB	**A**	**731,728**	**1052**	**85**	**219**
HB9PQ	"	87,360	305	52	130
HB9KC	"	30,008	162	34	54
HB9QA	"	286	23	4	9
HB9DX	**21**	**28,877**	**186**	**21**	**46**
HB9AND	**14**	**12,936**	**143**	**17**	**46**
HB9NL	**1.8**	**1,526**	**108**	**3**	**11**
United Nations					
4U1ITU	**A**	**87,632**	**384**	**43**	**101**
(Opr. HB9AW)					
Wales					
GW3LZQ/A					
	A	**62,320**	**266**	**39**	**113**
GW3GHC					
	28	**33,001**	**244**	**20**	**41**
Yugoslavia					
YU1NOH	**A**	**199,342**	**654**	**49**	**172**
YU1LW	"	95,485	358	48	121
YU2OB	**28**	**111,200**	**458**	**33**	**67**
YU2NEG	"	36,816	194	28	50
YU3NP	"	4,884	51	16	21
YU3TXT	**21**	**9,282**	**135**	**12**	**27**
YU2REB	**14**	**17,877**	**194**	**18**	**41**
YU3CST	"	12,192	150	12	36
YU4VDM	"	6,800	105	11	39
YD1SF	**7**	**11,703**	**214**	**11**	**36**
YU3CCD					
	3.5	**16,728**	**448**	**7**	**34**
YU3TGR	"	13,365	287	8	37
YU4VXW	"	2,808	106	5	22

U.S.S.R.

Estonia					
UR2QI	**A**	**64,476**	**398**	**47**	**115**
UR2OV	28	1,020	23	8	12
UR2LO	**21**	**60,204**	**350**	**26**	**61**
UR2KAY	"	43,676	332	21	40
UR2FU	**14**	**60,825**	**519**	**21**	**54**
UR2ZN	**7**	**10,412**	**246**	**8**	**30**
UR2JW	"	10,184	233	10	28
UR2AO	**3.5**	**9,191**	**217**	**8**	**35**
UR2LL	"	476	26	4	13
European					
UA1DZ					
	A	**1,191,214**	**1336**	**117**	**281**
UA3UJ	**A**	**573,759**	**899**	**91**	**242**
UA3RH	**A**	**571,480**	**1061**	**84**	**230**
UA4QM	"	377,145	798	82	207
UA4KHW	"	159,558	489	64	139
UA3QO	"	113,373	572	35	118
UA3JD	"	82,432	248	55	106
UA1SW	"	76,342	303	42	91
UA3BF	"	76,254	255	48	131
UW6NM	"	70,148	298	41	101
UW6LC	"	66,960	299	44	111
UV3GW	"	65,534	244	42	109
UA3TV	"	46,176	239	40	71
UA3KUO	"	44,732	268	33	73
UA3HR	"	42,616	213	31	62
UA1UD	"	40,664	286	28	76
UW6CY	"	30,492	297	15	48
UA3TA	"	22,695	135	25	64
UA1DA	"	19,712	120	36	76
UA3DB	"	19,656	100	30	61
UA3RO	"	14,700	116	21	54
UA3YH	"	13,144	143	17	36
UA1UJ	"	12,558	122	19	50
UW6CW	"	11,650	158	11	39
UA1NE	"	11,484	184	17	49
UV3MM	"	9,296	67	24	32
UA4WA	"	8,833	105	21	52
UA1YY	"	6,912	105	13	35
UA6KAC	"	3,150	58	12	30
UA3KYA	"	2,112	36	18	33
UA1DF	"	396	12	10	12
UA3LN	**28**	**65,448**	**285**	**34**	**74**
UA3AZK	**28**	**34,490**	**224**	**27**	**51**
UW6DR	"	18,616	292	17	35
UA4RK	"	12,096	146	16	38
UW4AF	"	8,800	168	12	32
UA3RF	"	6,437	76	14	27
UA4FV	"	2,542	48	10	21
UV3NC	"	1,464	46	8	16
UW4AZ	"	798	27	6	13
UA3OL	"	462	29	5	9
UUA4PA	**21**	**109,040**	**543**	**33**	**83**
UA1DH	**21**	**61,800**	**352**	**25**	**75**

Number Fibe on the Top Ten list, 5H3KJ, winner of the W6RR Plaque for the highest score out of Africa. Guttorm had a 3-band quad at 160 ft. and sloping long wires on the low bands.

UA3BK	"	33,192	214	21	51
UW3YC	"	19,000	156	17	33
UA4MX	"	9,202	154	11	32
UA3YR	"	6,336	66	14	30
UW3XX	"	4,480	91	10	22
UA1MA	"	3,780	72	9	26
UA3CU	"	782	34	6	17
UA3GO	"	756	24	5	13
UW3EG	"	420	16	5	10
UA1KUA	**14**	**159,681**	**699**	**30**	**63**
UA4SM	**14**	**103,648**	**528**	**25**	**57**
UA4KKG	**14**	**101,322**	**610**	**25**	**61**
UW4IK	"	87,922	429	28	60
UW3HY	"	61,665	411	24	61
UA1NR	"	57,684	388	24	52
UA3DF	"	36,156	350	21	48
UA4LK	"	32,360	336	17	39
UA1ZL	"	31,045	228	20	35
UA4QQ	"	19,557	199	16	37
UA3PE	"	13,248	148	14	34
UA6FL	"	13,140	204	11	34
UA3UH	"	12,720	156	15	38
UA3DU	"	10,353	118	20	31
UA3HH	"	8,492	116	13	31
UA3AJ	"	7,920	111	14	30
UW6CV	"	6,981	79	11	28
UA6BV	"	6,952	99	11	33
UW6AX	"	5,577	98	12	27
UV3GE	"	5,180	97	11	24
UA6FC	"	4,384	97	7	25
UV3NG	"	3,240	63	8	28
UA3NU	"	3,024	50	10	18
UA4IX	"	2,331	59	12	25
UW3HD	"	1,218	29	8	6
UV3AB	"	1,122	31	8	14
UA3FK	"	378	22	3	4
UA4QX	**7**	**63,038**	**526**	**23**	**64**
UA6KOD	"	55,760	490	22	58
UA3LM	"	40,824	401	17	55
UW1AB	"	14,498	193	13	39
UW3UO	"	13,156	235	12	32
UW3XO	"	1,066	26	7	14
UA6AL	**3.5**	**23,705**	**367**	**12**	**43**
UA1DX	"	12,188	252	8	36
UA1NA	"	10,320	240	6	34
UA4RU	"	607	26	6	13
Kaliningrad					
UA2DM	**A**	**218,751**	**567**	**58**	**155**
UA2EC	"	44,940	284	23	72
UA2BI	"	7,150	70	20	30
UA2KBR	**14**	**13,200**	**185**	**14**	**36**
Latvia					
UQ2PP	**A**	**86,180**	**450**	**52**	**87**
UQ2PG	"	22,184	177	26	68
UQ2IL	**14**	**35,632**	**309**	**21**	**47**
UQ2GA	**7**	**60,228**	**579**	**19**	**55**
UQ2GW	**3.5**	**28,851**	**449**	**14**	**45**
UQ2OO	"	11,352	252	7	36
UQ2OM	"	7,668	211	6	30
UQ2OF	"	3,480	111	5	25
Lithuania					
UP2NK	**A**	**503,250**	**712**	**95**	**235**
UP2OX	"	259,560	887	56	150
UP2KBA	"	182,910	579	54	141
UP2CY	"	60,116	464	25	88
UP2NA	"	29,682	270	23	74
UP2DV	"	9,128	144	20	36
UP2OQ	**28**	**56,995**	**289**	**23**	**59**
UP2AY	**21**	**54,000**	**340**	**21**	**54**
UP2NX	"	40,211	249	27	52

OH5SE—With that happy expression Ville must have been confident of his chances of winning. We would like to see his expression when he learns that he is the top European and winner of the W3MSK operators Trophy.

UP2PA	**14**	**110,250**	**580**	**30**	**68**
UP2CV	"	63,510	588	18	55
UP2OJ	"	9,287	221	12	25
UP2OE	"	5,588	84	9	35
UP2NR	"	323	13	7	10
UP2SA	**7**	**8,840**	**207**	**9**	**27**
UP2GW	"	2,349	86	6	21
UP2AW	"	1,564	66	5	18
UP2KNP					
	3.5	**65,132**	**650**	**17**	**59**
UP2GF	"	8,224	247	6	26
UP2BL	"	1,104	40	10	14
Moldavia					
UØ5GS	**A**	**102,573**	**523**	**33**	**98**
UØ5AP	**28**	**38,157**	**255**	**23**	**46**
UØ5GR	"	6,560	76	15	26
Ukraine					
UB5CV					
	A	**1,258,476**	**1432**	**116**	**282**
UB5WL	**A**	**130,410**	**510**	**48**	**113**
UT5DL	"	117,477	407	35	136
UB5TR	"	114,120	393	46	134
UB5DW	"	113,900	280	52	118
UB5IU	"	104,611	404	46	123
UB5WK	"	93,765	477	46	95
UT5HT	"	34,963	210	32	73
UB5NS	"	29,120	176	38	53
UY5UW	"	28,288	132	36	68
UY5XR	"	26,800	207	25	75
UB5QT	"	24,192	194	23	73
UY5TE	"	23,520	216	26	58
UB5TH	"	15,833	144	21	50
UB5ZE	"	9,720	104	22	50
UB5QA	"	8,208	118	16	32
UT5GR	"	6,028	137	8	36
UB5VY	"	4,230	82	13	32
UY5AP	"	3,871	41	22	27
UY5XA	"	2,170	34	12	23
UT5BY	"	1,320	20	11	19
UB5KEQ	"	484	21	8	13
UY5HI	**28**	**52,080**	**295**	**27**	**66**
UB5DUO	"	35,700	173	28	56
UB5EM	"	27,664	174	24	52
UY5OB	"	17,615	123	22	43
UB5VK	"	11,550	93	17	33
UB5DUK	"	11,475	124	19	32
UY5EM	"	10,769	103	19	34
UT5HP	"	10,504	136	15	37
UY5LF	"	3,105	57	11	26
UB5EC	**21**	**135,184**	**591**	**32**	**80**
UB5MZ	"	124,542	524	29	70
UB5PT	"	82,818	364	32	75
UB5KLD	"	65,565	325	30	63
UB5WJ	"	42,978	224	24	54
UB5RS	"	16,402	142	18	41
UB5KBV	"	2,583	58	7	14
UY5ZP	**14**	**67,830**	**432**	**26**	**69**
UT5OZ	"	39,750	319	22	53
UB5QR	"	30,020	198	21	58
UT5BW	"	25,830	220	18	52
UB5VX	"	5,809	122	8	29
UY5UI	"	4,700	50	15	35
UB5KHL	"	3,332	76	7	27
UT5KCF	"	2,728	73	9	22
UY5EX	**7**	**21,184**	**221**	**16**	**48**
UB5KBA	**7**	**20,952**	**306**	**9**	**45**
UY5SP	"	2,835	70	7	28
UB5HY	**3.5**	**16,238**	**274**	**10**	**36**
UT5BX	"	7,800	192	8	31
UT5GZ	"	1,435	56	5	20
White Russia					
UC2AI	**A**	**242,520**	**691**	**65**	**170**
UC2XW	"	66,638	438	26	82
UC2WP	**28**	**34,400**	**182**	**29**	**57**
UC2KAB	**14**	**29,951**	**302**	**16**	**45**
UC2XT	**14**	**25,925**	**317**	**18**	**43**
UC2KNU	**7**	**38,335**	**425**	**13**	**42**
UC2WG	"	21,006	309	13	41
UC2RL	**3.5**	**19,800**	**410**	**9**	**36**
UC2AR	"	5,577	127	7	32

OCEANIA

Australia					
VK2BKM	**A**	**871,884**	**1180**	**97**	**146**
VK2GW	"	280,720	548	74	102
VK2APK	**14**	**292,820**	**820**	**34**	**87**
VK3RJ	**28**	**13,230**	**108**	**18**	**24**
VK3AXK	**21**	**110,960**	**481**	**30**	**50**
VK3XB	"	1,408	44	12	20
VK3QI	**14**	**44,608**	**243**	**24**	**40**
VK3OP	**7**	**23,048**	**179**	**17**	**26**
VK3APN	**3.5**	**8,904**	**130**	**11**	**17**
VK4FH	**A**	**113,490**	**395**	**42**	**55**
VK4SS	**28**	**18,207**	**121**	**24**	**27**
VK5FM	**A**	**141,008**	**422**	**40**	**72**
VK5NO	**7**	**87,542**	**411**	**26**	**48**

VK6HD	**A**	**318,400**	**560**	**70**	**130**
VK6RU	**28**	**116,172**	**477**	**26**	**58**
VK6AJ	**14**	**85,904**	**324**	**29**	**62**
VK7CH	**A**	**43,014**	**142**	**49**	**58**

Hawaii

KH6RS	**A**	**1,617,935**	**2155**	**109**	**144**
KH6IJ	**A**	**1,375,825**	**1958**	**99**	**136**
KH6AA	**21**	**26,064**	**245**	**16**	**20**

New Zealand

ZM1AJU	**A**	**1,184,976**	**1298**	**114**	**198**
ZM1AFW	"	135,300	465	42	58
ZM1TZ	"	6,864	38	24	28
ZM1AMO	**21**	**190,260**	**616**	**35**	**70**
ZL1IL	"	117,218	480	31	55
ZM4BO	**7**	**10,225**	**150**	**10**	**15**

Samoa (American)

KS6DH	**A**	**29,640**	**188**	**28**	**29**

SOUTH AMERICA

Antarctica

KOGP/KC4	A	6,000	100	11	9

Argentina

LU5AD	**A**	**321,552**	**612**	**68**	**108**
LU3FG	"	198,840	556	52	68
LU2ABZ	"	124,244	470	39	50
LU4ECO	"	11,796	60	32	36
LU5FEH	**28**	**212,065**	**860**	**28**	**55**
LU6FA	**14**	**106,958**	**450**	**28**	**53**
LU5AES	"	76,800	351	26	49
LU6AX	"	20,856	120	24	39
LU3DSI	"	17,394	91	29	49

Brazil

PY4OD	**A**	**2,286,783**	**2005**	**110**	**277**
PY3APH	"	8,520	82	19	21
PY2BNX	21	2,346	26	16	18
PY2ACT	**14**	**45,567**	**307**	**29**	**54**
PY2YC	"	28,704	158	28	41
PY5ATL	"	1,243	39	6	5
PY2EWL	**7**	**6,804**	**92**	**12**	**16**

Chile

CE4AD	**A**	**95,760**	**430**	**37**	**39**
CE2CR	"	43,148	170	45	47
CE2DI	**14**	**120,100**	**421**	**33**	**67**

Ecuador

HC2GG	**A**	**795,405**	**1375**	**71**	**124**

Netherlands Antilles

PJ2PS	**A**	**79,698**	**364**	**35**	**39**
PJ2HT	"	17,787	89	35	42

Peru

OA4MS	**A**	**804,750**	**1576**	**67**	**107**
OA4PF	**28**	**184,800**	**711**	**27**	**61**

Trinidad

9Y4AA	**A**	**3,088,068**	**2623**	**123**	**279**

Uruguay

CX1JM	**21**	**248,512**	**952**	**32**	**56**

Venezuela

4M5ANT	**A**	**1,751,178**	**2064**	**96**	**190**
YV4ID	"	103,120	431	27	53
VE2DHF/YV1	**28**	**57,816**	**272**	**23**	**49**
YV5KL	"	52,875	375	17	30

MULTI-OPERATOR

Single Transmitter

NORTH AMERICA

U.S.A.

WA2CFA	**99,522**	**203**	**63**	**108**
W3NZ	**461,770**	**528**	**96**	**209**
W3BIP	286,794	357	95	187
W4JD	**467,200**	**554**	**100**	**192**
K4LK	197,496	337	81	130
W5LES	**684,904**	**707**	**118**	**226**
WA6IVN	**745,550**	**794**	**114**	**211**
W6KG	349,622	516	102	136
W9EXE	**930,510**	**770**	**132**	**290**
W9YT	716,000	713	120	230
W0UCE	**229,244**	**364**	**78**	**145**

Contest activity from the 8th district has been improving the past few years. Mike, K8SJU has contributed his share to this activity.

Canada

VE2UN	**878,370**	**1056**	**111**	**234**
VE4JB	**262,651**	**625**	**77**	**102**

Grand Cayman Is.

ZF1AN	**1,465,808**	**2352**	**101**	**188**

AFRICA

Ethiopia

ET3USA	**1,117,130**	**1407**	**86**	**204**

ASIA

Hong Kong

VS6BC	**481,240**	**1189**	**88**	**139**

Japan

Club Stations

JA5YEO	**628,334**	**877**	**104**	**155**
JA3YBF	**392,450**	**883**	**67**	**100**
JA6YAF	121,196	311	76	88
JA1YAC	84,588	280	58	56
JA6YCL	58,765	213	50	65
JA0YBO	6,223	59	26	23
JA0YBY	6,120	68	21	24
JA0YAW	814	23	11	11
KA9MF	**167,055**	**515**	**48**	**63**

Korea

HL9UU	**142,790**	**481**	**57**	**74**

Ryukyu Islands

KR6VX	**1,045,518**	**1588**	**97**	**174**

U.S.S.R.

Club Stations

Asiatic

UA9KAX	**1,904,408**	**1601**	**113**	**305**
UA9KAG	890,605	1123	77	220
UA9KCE	831,080	1141	76	187
UA9KAZ	599,616	974	66	150
UA9KHB	224,616	572	45	102
UA9KVN	121,347	367	48	91
UW9KDL	51,448	316	20	39
UA9KMD	6,212	92	15	21
UAØKFG	**1,236,361**	**1319**	**125**	**206**
UKØA	**771,820**	**1177**	**81**	**178**
UAØKCO	238,326	728	76	81
UAØKZD	132,070	708	49	45
UAØKCA	49,345	510	36	35
UAØKCW	34,662	361	19	34
UAØKFJ	19,380	219	23	45
UAØKSB	14,435	156	17	32
UAØKCS	8,096	192	16	16
UAØKCG	4,340	115	15	16

Armenia

UG6KAF	8,217	91	9	24

Kazakh

UL7KAD	**90,688**	**352**	**32**	**72**
UL7KFA	89,252	307	25	81
UL7KBK	6,032	87	12	17
UL7KFG	3,892	65	10	18

Uzbek

UI8KBA	**654,810**	**1059**	**63**	**167**
UI8KAB	226,629	528	45	114

EUROPE

Bulgaria

Club Stations

LZ1KAA	**409,896**	**982**	**75**	**173**
LZ1KSA	375,200	733	76	204
LZ1KRD	333,336	945	54	150
LZ1KWF	120,528	554	38	106
LZ1KEZ	115,420	527	47	152
LZ2KSK	103,846	610	35	102
LZ2KBI	80,416	468	33	79
LZ2KPD	42,951	296	30	83
LZ1KBG	19,530	210	16	54
LZ1KBU	11,868	232	8	35

Czechoslovakia

Club Stations

OK3KAG	**501,801**	**900**	**91**	**230**
OK1KTL	480,260	799	89	206
OK1KYS	82,566	385	42	97
OK3KGQ	20,292	175	20	56
OK3KIC	10,230	292	11	22
OK3KAH	4,944	210	5	19

CLUB SCORES

United States

Potomac Valley Radio Club	**44,441,644**
Frankford Radio Club	25,098,409
Northern California DX Club	18,263,203
Southern California DX Club	17,236,776
128 Contest Club (Mass.)	10,208,621
Northern Illinois DX Assoc.	9,361,398
Golden Triangle DX Club (Fla.)	6,419,512
Florida DX Club	3,476,418
Central Michigan A.R.C.	3,355,451
Oak Park A.R.C. (Mich.)	3,100,027
Order of Boiled Owls (N.Y.)	2,153,478
Richardson A.R.C. (Texas)	992,076
Ohio Valley A.R.C.	930,707
West Park Radiops. (Ohio)	837,627
Overlook Radio Society (N.Y.)	648,343
Minnesota Wireless Association	537,382
Grand Rapids A.R.A. (Mich.)	290,808
Murphy's Marauders (Conn.)	259,332
Brightleaf A.R.C. (N.C.)	211,472

Canada

Calgary Amateur Radio Assoc.	2,450,235
Edmonton DX Club	638,161

Canal Zone

Canal Zone Amateur Radio Assoc.	2,333,921

Foreign Clubs

Rhein–Ruhr DX Association	26,719,329
Radio Club Venezolano	15,229,944
Uruguay DX Club	9,700,970
Saar–Pfalz Radio Club (Germany)	6,558,705
OH-DX-Ring-Ry. (Finland)	6,333,220
Kaunas Poly. Tech. A.R.C. (Lith.)	5,037,643
Moscow City Radio Club (USSR)	3,370,053
SP DX Club (Poland)	2,821,248
Lampertheim–Bergstr. (Germany)	2,745,384
Leningrad Radio Club (USSR)	2,676,996
Radio Club of Riga City (Latvia)	2,228,568
Radio Club of Tallinn (Estonia)	2,109,184
Lvov DX Club (Ukraine)	1,706,143
Radio Club "M. Pupin" (Yugoslavia)	1,613,328
Sakhalin Island A.R.C. (USSR)	1,236,361
Gateway to Europe R.C. (Germany)	1,022,698
Swiss DX Club (Switz.)	945,597
Kiev Radio Club (Ukraine)	854,743
Radio Club Voronezh (USSR)	711,844
YO DX Club (Romania)	642,171
Kharkov Radio Club (Ukraine)	204,188
Vasteras Radio Club (Sweden)	183,168
Hammarbyhoejden R.C. (Sweden)	104,591
Gdanski/Morski R.C. (Poland)	37,151

Denmark				
OZ1LO	**918,740**	**1218**	**105**	**250**
England				
G3ATD/A	**249,798**	**608**	**56**	**130**
G3CXX	208,262	583	62	140
G3VYI	151,522	519	43	94
Finland				
OH5UX	**410,750**	**712**	**90**	**220**
OH2BFJ	324,921	601	73	204
OH6AA	201,468	618	63	143
France				
F2QQ	**122,460**	**561**	**41**	**89**
Germany				
DLØWR	**1,356,576**	**1419**	**118**	**298**
DLØWN	885,204	1052	107	260
DJ4ZR	606,216	981	82	186
DL8CM	571,680	924	90	198
DJ8JP	310,460	854	56	116
DJØJR	254,980	682	66	124
DLØBH	198,376	566	59	122
DM6AO	**382,536**	**781**	**72**	**180**
DM3ML	267,269	612	75	166
DM3DO	1,617	39	9	24
Hungary				
Club Stations				
HA5KDQ	**539,152**	**1057**	**77**	**171**
HA5KFZ/2	230,496	621	72	152
HA3KNA	116,820	511	40	125
HA8KUX	102,300	476	47	108
HA1KSS	43,560	426	26	80
HA9KPE	15,908	188	20	62
HA9KPZ	14,528	202	23	41
HA3YGC	7,500	248	13	17
HA7KLU	5,777	78	20	33
HA8KVP	1,040	67	6	14
Isle of Man				
GD3TXF	**1,141,936**	**1932**	**89**	**209**
Netherlands				
PA0SNG	**682,341**	**1093**	**93**	**226**
Norway				
LA1H	**808,555**	**1119**	**89**	**216**
Poland				
SP5PAW	**58,320**	**356**	**31**	**89**
SP6PBA	53,950	309	36	94
Romania				
YO3KSD	**70,886**	**365**	**38**	**96**
YO9KAG	31,960	283	21	73
Sweden				
SKØTM	**405,548**	**976**	**71**	**167**
SK6AD	92,571	312	53	124
SK7BD	23,790	168	26	52
Switzerland				
HB9AGC	**248,862**	**649**	**53**	**124**
HB9AHP	28,340	164	35	74
Wales				
GW3XEJ	**853,840**	**1507**	**75**	**185**
GW6GW	194,425	850	52	123
Yugoslavia				
YU1BCD	**1,261,170**	**1282**	**114**	**291**
YU1KMN	352,352	601	85	223
YU3EYZ	37,800	412	17	53
YU3ECD	21,712	223	16	43

U.S.S.R.

Club Stations				
European				
UA3KAO	**832,767**	**1176**	**109**	**284**
UA1KAC	**758,176**	**1240**	**88**	**216**
UA6KAA	343,824	1102	62	146
UA4KSA	303,133	736	64	169
UW3KAK	298,920	639	81	184
UA3KND	279,136	562	75	211
UA6KAE	275,578	726	66	161
UA3KUS	159,964	456	63	134
UA3KTV	156,804	518	49	130
UA4KWP	153,438	537	42	112
UA1KBW	153,000	570	40	110
UA1KAG	132,264	403	54	113
UA1KMD	129,087	369	55	134
UA1KAO	118,635	460	49	116
UA3KOE	91,732	355	43	99
UA1KRG	78,968	271	40	88
UA1KFA	62,342	397	38	84
UA1KBC	37,636	196	34	78
UA3KIW	13,350	163	19	31
UA1KCU	13,328	135	21	47
UW3KOI	7,344	114	13	35
Estonia				
UR2KAW	**150,048**	**699**	**42**	**102**
UR2KAD	64,478	485	23	80
UR2KBQ	38,364	351	22	70
Latvia				
UQ2KAA	**492,600**	**983**	**90**	**210**
UQ2KBC	83,496	428	37	105
UQ2KAW	78,603	363	52	81
UQ2KCR	75,096	443	34	92
UQ2KAL	45,955	344	35	66
Lithuania				
UP2KBC	**378,120**	**739**	**81**	**195**
UP2KAB	278,712	550	91	161
UP2KCB	141,206	626	62	111
UP2KPI	132,120	433	51	129
UP2KBI	47,174	310	28	75
Ukraine				
UB5KID	**284,809**	**723**	**67**	**136**
UB5KAW	215,264	553	58	159
UB5KBD	58,380	272	36	104
UT5KCD	33,370	268	29	65
UB5KAU	6,300	94	17	33

OCEANIA

Hawaii				
KH6AHQ	**352,315**	**774**	**71**	**84**

MULTI-OPERATOR

Multi Transmitter

NORTH AMERICA

W4BVV	**4,403,785**	**2493**	**162**	**445**
WA2ZAA	**4,127,197**	**2401**	**159**	**428**
K1JGD	**4,040,154**	**2412**	**151**	**426**
W3MSK	**3,704,896**	**2252**	**155**	**429**
W3GM	3,214,450	2101	152	378
W7RM	**2,927,412**	**2258**	**151**	**315**
W6VSS	**2,886,906**	**2022**	**156**	**342**
K4HF	2,595,700	1788	139	366
K6EBB	2,090,150	1776	140	285
K6UYC	1,872,650	1514	149	281
W4KXV	1,808,941	1352	135	328
K8UDJ	**1,733,631**	**1341**	**132**	**321**
WA8LYF	1,529,910	1189	134	311
K4BVD/6	1,332,943	1214	127	252
W3TV	1,203,840	1084	112	272
K6VZA	1,182,960	933	133	239
K6AN	996,405	949	131	236
W0AIH	**635,180**	**668**	**124**	**225**
WA3ATX	484,480	537	100	220
K8RCT	181,984	376	66	110
W3SS	154,395	273	83	136
W3EQA	119,716	274	54	119

ASIA

XW8CR	**1,314,144**	**1557**	**116**	**235**

EUROPE

DL0KF	**2,356,496**	**2365**	**140**	**356**
SK5AJ	**1,893,882**	**2109**	**126**	**323**
LZ1KAB	**1,538,106**	**2254**	**103**	**286**
DL4UU	1,222,550	1758	101	249
UB5KAB	**1,091,412**	**1462**	**115**	**312**
DLØMU	902,898	1363	93	216
PE2EVO	**733,773**	**1400**	**83**	**194**
OH2AA	**563,760**	**934**	**90**	**234**
OH3AG	446,391	798	83	214
OY6FRA	**405,044**	**1534**	**53**	**165**
DM7DM	**173,160**	**682**	**45**	**135**

SOUTH AMERICA

PJØCW	**9,333,884**	**6636**	**141**	**335**
CV2AA	**4,246,992**	**4146**	**118**	**230**

Our thanks to the following stations who submitted their logs for checking purposes:

DJ0TA, DL1MD, DM2ADC, DM2BJD, DM2CPL, DM4FB, DM-3676, G3WP, HA2RB, HA3NG, HA3YNA, HA4KYB, HA5KJL, HA6NC, HA6NI, HA7PW, HA8JUF, HA8GUX, HA90V, HA9YOE, HA0DD, HA0LC, JA3AVO, K0BYC, KH6GGK, KL7MF, LA6U, LA7JH, LA9HC, LZ2KSU, LZ2KWR, OH2YV, OH3TH, OK1AID, OK1CIJ, OK1FDB, OK1KPP, OK1MAA, OK1STU, OZ8BN, PA0JPC, SK0AL, SM2COR, SM3ARE, SM3CJD, SM4ASJ, SM4CLR, SM5BNX, SM5BZR, SM5UH, SM5UU, SM6BZE, SM0GM, SP2DMG, SP3CTP, SP5BMP, SP6AON, SP6XA, SP6ZAI, SP9DBD, SP6-1462, UA1KGC, UA3DL, UA3KKA, UA4KBR, UA9ES, UA9VX, UA0LL, UB5KFF, UB5OB, UB5PZ, UB5TX, UB5UU, UC2BB, UF6KPA, UH8DC, UJ8KAJ, UL7KAR, UT5KCG, UT5KDS, UV3AA, UV3GR, UV0BB, UW3KSO, UW3UG, UW6CF, UW6MD, UW6NQ, UW9JC, UA0AK, UW0BA, UW0IF, PA0-1283, VK3APN, W2WZ, WA2LLK, WN2LYM, WN2LYN, W3ARK, W3CTE, W3OKN, W4JUK, W6YFV, W9BQM, XE1KD, YV5AK, YV5BPG, ZS1ACD, ZS6D, 3Z1CTN, 3Z2AGH, 3Z3ACB, 3Z3CDD, 3Z3KSI, 3Z5AZQ, 3Z5BAK, 3Z6BAA, 3Z6BZ, 3Z6CES, 3Z6RT, 7P8AB.

Station Operators

Multi-operator Single Transmitter

DJ4ZR & DJ9IE. **DJ8JP** & DJ2YE, DJ5PC, DL1HX. **DJ0JR:** DL7HN, DL7HU, DL7ON, DL7OR, DL7PV. **DL8CM** & DL8CH. **DL0BH:** DJ6LV, DJ8CY, DK1EI, DK1VM, DK4PH, DL2LI. **DL0WN:** DJ3GY, DJ6TS, DJ7IK, DJ9CB, DJ0JX, DK30M, DL1AO. **DL0WR:** DJ4AX, DJ6TK, DJ8SW, DJ2YI. **DM6AO:** DM2BOG, DM6EAO, M6MAO. **DM3DO:** DM3NDO, DM3ODO. **DM3ML:** DM3FML, DM3OML, DM3RML, DM9ADL. **ET3USA:** W4EJP, W4SYX, WA5UKR. **F2QQ** & F2OA. **G3ATD/A:** G3OLB, G3SWH, G3TKF. **G3CXX:** G3YAC, GI3UKS, GI3YDT. **G3VYI** & G3UFY, 3WRR. **GD3TXF:** G3TXF, G3SXW, F5QO. **GW3XEJ:** GW3NJW, GW3OAY. **GW6GW:** GW3TKZ, GW3WTZ, GW3WVG, GW3XNI. **HA5KDQ:** HA5DE, HA5FK, HA5FM, HA5HO, HA5HP. **HB9AGC** & HB9AFZ, HB9ZE. **HB9AHP** & HB9AII, HB9AKM. **HL9UU** & HM1BB. **JA5YEO:** JA5BGX, JA5BIA, JA5BJC, JA5BJT. **JA3YBF:** JA3FGJ, JA3KGF, JA4DFJ, JA0CDC. **KA9MF:** KA9BS, KA9DX, KA9EE, KA9JC, KA9JS, KA9PP, KA9RC. **KH6AHQ:** KH6GOJ, K4AWN, W4FAY, WB8AJW. **KR6VX** & K3JCT. **K4LK** & WA4UFW, WB4EYX, WB4IAE. **LA1H:** LA8UL, LA9OI. **OH2BFJ** & OH2LP. **OH5UX** & OH5UY, OH5WA. **OH6AA:** OH6NH, OH6XP, OH6WI, OH6YA, OH6YD, OH6ZH, OH6ZJ. **OK3KAG:** OK3CIR, OK32AF, OK3CAG, OK3-16580. **OZ1LO** & OZ3QN, OZ4OV. **PA0SNG** & PA0HBO, PA-1555. **SK6AD:** SM6AMR, SM6APH, SM6ASU, SM6BDM, SM6NY. **SM7BD:** SM7AMV, SM7DNB. **SK0TM:** SM0BYD, SM0CER, SM0DZL, SM0FIE. **UA1KAC:** UA1LS, UA1GQ, UA1GY, UW1BA. UA3KAO: UV3AB UY3CC UV300 UW3BW UW6BK, Igor, Slav, Yuri. **UA9KAX:** UA9BE, UV9AK, UV9AS, UW9BC, UA0BP, UA9-1657. **UA0KFG:** UA0EH, UW0FK, UW0FM, UW0FP, Coly, Sarge. **UI8KBA:** UI8IK, UI2IM, UI8IZ. **UK0A:** UA3AZJ, UA3HK, UA0YE, UV3BH, UW3HV. **VE2UN:** VE2DCW, WA3HRV. **VE4JB** & VE4MF. **VS6BC** & VS6AF, VS6DL, VS6FX. **WA2CFA** & K2TKR, WB2VPR, WB2ZLI. **W3BIP** & WA3JYB. **W3NZ** & WA3NUD. **W4JD** & K4LRL, W4CHK, W4DMS. **W5LES** & K5AAD, K5LZO, W5GJ **W6KG** & W6DOD. **WA6IVN** & WA6IVM. **W9EXE** & W9ICE, K9YOE. **W9YT:** K97SE, W9MLO, WA 9TPY. **WOUCF** & WAOMLE. **YO3KSD:** YO3AAJ, YO3FY, YO3NN, YO3RX. **YO9KAG:** YO9AFY, YO9AVD, YO9HT. **YU1BCD:** YU3EY, YU1PCF, YU1QBC, Vlada. **ZF1AN:** W2GGE, W2PCJ, WB2CKS.

Multi-operator Multi Transmitter

CV2AA: CX1AAC, CX1BBV, CX3BH, CX7CO, CX8CZ, CX9BT **DL4UU:** DJ9CN, DL2NO, DL3BA, DL4CM, DL4FB, DL4HY, DL4ND, DL4VF, DL4WS. **DL0KF:** DJ3JB, DJ4FZ, DJ6TN, DJ7SW, DL2ZT. **DL0MU:** DJ1FC, DJ9TQ, DJ9TS, DK1QV, DK3BJ. **DM7DM:** CLUB. **K1JGD** & K1DIR, K1KTH, K1TZQ, K1UHY, W1BPW, W3YUW, WA1IRG. **K4HF:** K4THA, W4DQS, W4ETO, W4JDR, W4LCP,W4QBK. **K4BVD/6:** K2RBT, K6VVA, WA6QGW, WA6TQK. **K6AN** & K6AO, K6ALH, W6RGG. **K6EBB** & K6CQF, K6ERT, W6CUF, W6WX, WB6ENX, WB6KIG. **K6UYC** & K9LBQ, K9ZMS, VE2AKQ, VE2LO, W6GP, W6IXX, W6LEX, W7CFJ, WB6OLD, WB6WIT. **K6VZA** & K5YUR, K6SDR, W6EPZ, W6ITY. **K8RCT** & WB8BTU. **K8UDJ** & K1ZND, K7NHV, K8VQP, WA8LWK. **LZ1KAB:** LZ1AF, LZ1AM, LZ1BW, LZ1BZ, LZ1FO, LZ1II, LZ1SP, LZ1SS, LZ1UR, LZ1US, LZ1VS, LZ1WD, LZ1ZB, LZ1ZO. **OH2AA:** OH2BAI, OH2BEM, OH2DP, OH2FS, OH2KA, OH20A, OH2SB. **OH3AG:** Club. **OY6FRA:** OY2H, OY2J, OY3B, OY3H, OY4R, OY5NS, OY5Q, OY7M, OY8NR, OY9IM, OY9LV. **PE2EVO:** PA0AAC, PA0FW, PA0GRE, PA0IB, PA0JVM, PA0KGV, PA0KVN, PA0MS, PA0PAZ, PA0PFW, PA0RE. **PJ0CW:** K4BAI, PJ2VD, W1BIH, W2EQS, W2TA, W4BRB, W4GF, W4KFC, W4YWX, WB4GTS. **SK5AJ:** SM5AD, SM5CAK, SM5CBN, SM5CNO, SM5DIR. **UB5KAB:** UB5-073202, UB5-073218, UB5-0733, UB5-0735, UB5-0738, UT5YC. **W3EQA** & WA3DRC. **W3GM** & W3GHM, W3JSX, W3KV, W3LTU, W3NOH, WB2APG. **W3MSK** & K3EST, W3FYS, W3IN, W3PZW, W3ZKH, W6HOH, WA3GUI, WA3IAQ. **W3SS** & K3JLK, W3EAN, WA3JLT, **WA3LRO**, WA3LRN. **W3TV** & W3AOH, W3UHN, W3VN. **W4BVV** & K1ANV, K3GJD, K3NPV, K3OAE, K9OPF, W1BGD, W1NJL, W3BY, W6DOH. **W4KXV** & K4CAX, K4WUY, W4YZC, WB4KZT, WB4NDO. **W6VSS** & K6EVR, K6MQG, K6OPH, K6SEN, W6ICJ, W6QY, W6UED, W6VPH, WA6OHJ. **W7RM** & K7HTX, K7INE, K7JCA, K7JJL, K7VPF, W5000, W7EXM, W7YGN. **W0AIH** & K0ZXE, W0IYP, WA0DKA. **WA2ZAA:** K1ZVU, K2DGT, K2GL, K2KUR, K2UYG, K2TXC, W1GYE, W2GLM, W2IWC, W2NQ. **WA3ATX** & WA3HOM. **WA8LYF** & K8HLR, W8DOL, W8ROF, WA8GUF, WA8JUN, WA8OBG, WB8ALP. **XW8CR** & XW8CS.

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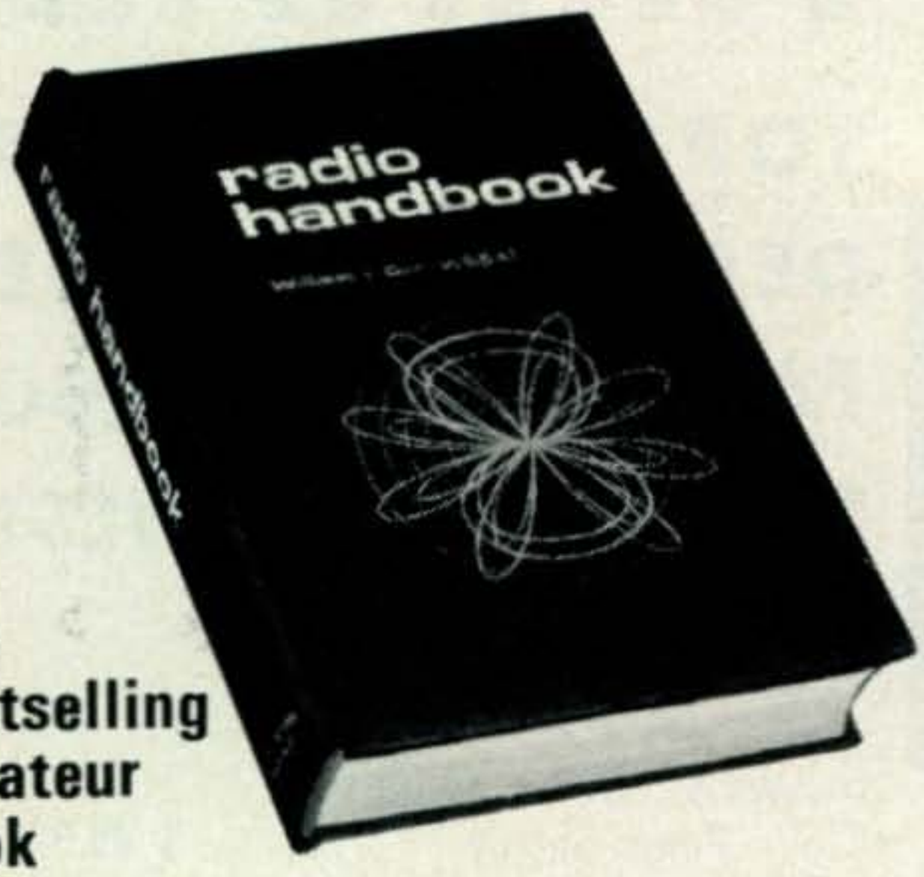

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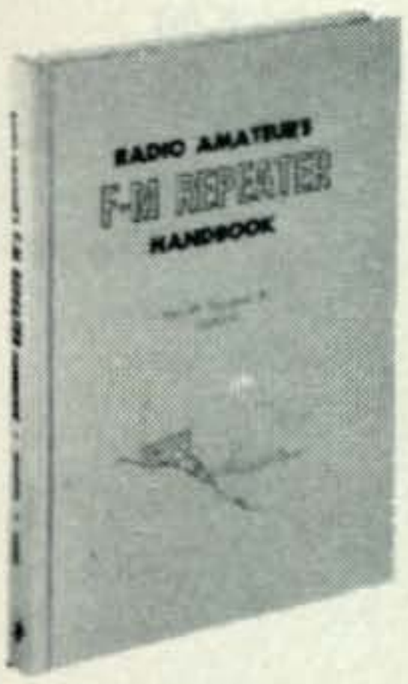

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CQ Reviews:
The Drake TC-6 Six-Meter Transmitting Converter

BY WILFRED M. SCHERER,* W2AEF

THE Drake TC-6 is a six-meter transmitting converter designed to be driven by a low-level 14 mc (nominal) s.s.b., a.m., c.w. or RTTY signal from a transmiter or transceiver such as the Drake T-4 series and TR-3/4 or similar units. The input power is rated at 300 watts p.e.p. for s.s.b. and a.m. It includes facilities for routing a receiving converter, such as the Drake SC-6,[1] to a receiver or transceiver along with the related antenna- and power-transfer functions.

Transmitting Setup

A block diagram for the setup used in the TC-6 is shown at fig. 1.

The 14 mc signal from the exciter is applied to the mixer where it is heterodyned with a 36 mc crystal-controlled signal from an external source which may be the h.f. oscillator of a 6-meter receiving converter that is used with a 14 mc i.f. The sum frequency at the mixer output thus produces a 50 mc signal which is applied to the driver for the power-output amplifier.

A sample of the p.a. output is fed back to the bias system to rovide an a.f. bias shift that reduces cross-over distortion and allows the p.a. idling current to be substantially reduced.

A portion of the p.a. output also is used to operate an amplified a.g.c. (a.l.c.) system for automatically controlling the gain of the exciter and thus maintain uniform operating levels and prevent overdrive.

Specific Details

An r.f. excitation signal of 0.25 v. is required. This is obtained from the driver of the exciter in which a slight modification is therefore necessary. Specific instructions are given in the manual for doing so with the Drake TR-4 series and the TR-3/4 gear (also available as a factory modification at a nominal charge), the basic principle of which may be applied to other gear. This involves feeding a connector (to be installed) from the 14 mc driver output circuit through a 2 mmf capacitor and a shielded cable. A 47-ohm load/matching resistor also is needed.

In the case of a transceiver where the tuned output circuit for the driver is also used on receive, a diode switch must be installed to prevent r.f. drive, on transmit, from being attenuated by the receiving inter-connecting cables.

The excitation signal is applied to the control grid of the 6EJ7 mixer through a 13.5-17.5 mc bandpass-coupling circuit. A 1K potentiometer between the exciter line and the coupling circuit serves as a drive-level control.

The oscillator-injector signal also is applied to the grid of the mixer. This is done through a transistorized buffer amplifier. A tuned circuit between the two stages provides impedance matching and the proper frequency response.

Normally, the heterodyning-oscillator signal is obtained from the receiving converter,

The Drake TC-6 six-meter transmitting converter.

*Technical Director, *CQ*.

[1]See "*CQ* Reviews The Drake Solid-State VHF Equipment," *CQ*, July 1968, page 46.

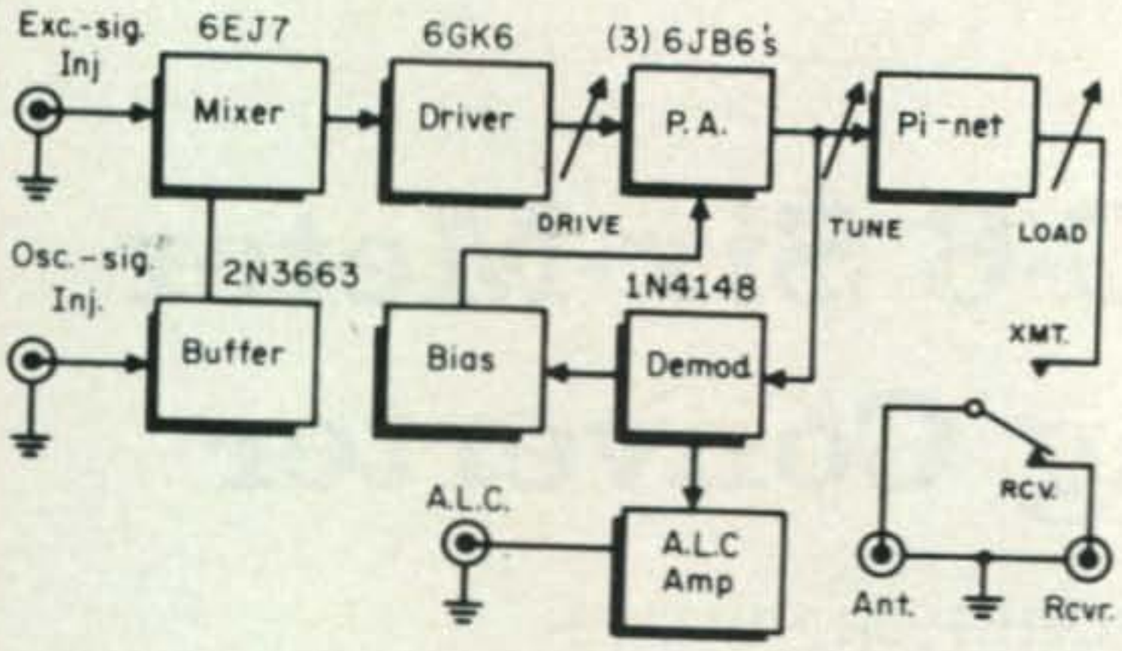


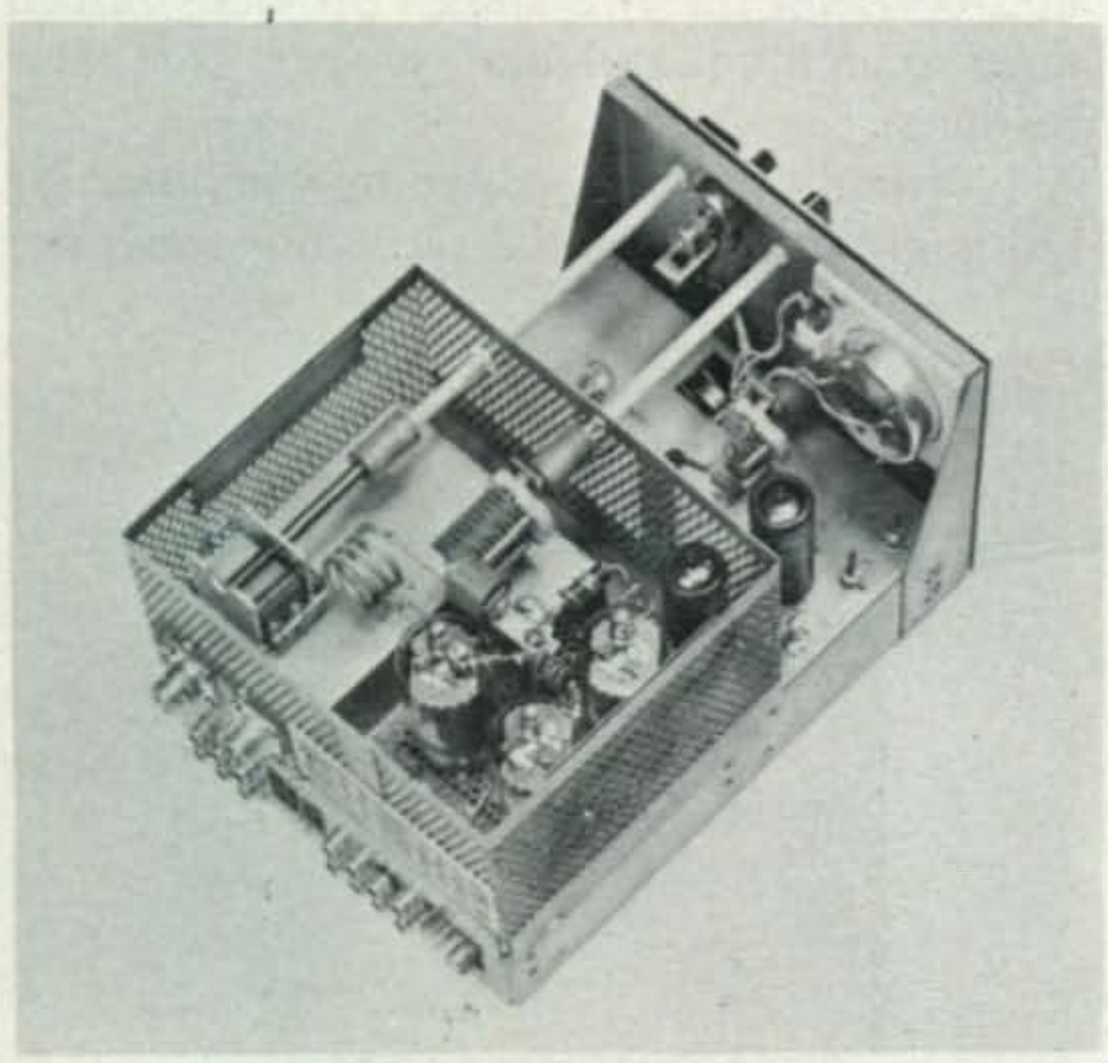
Fig. 1—Block diagram for the setup used in the TC-6. Details are given in the text.

system

for which the Drake SC-6 six-meter job is equipped with an oscillator-output jack (labelled INJ.). Other type converters would require such a provision to be made.

With an oscillator-injection signal of 36 and of 36.5 mc (as normally provided by the SC-6), a 6-meter band coverage of 50-51 mc will be obtained while using an exciter that is limited to a 14.0-14.5 mc range. Coverage of other segments between 49.5 and 54 mc will require other injector-oscillator crystals (xtal freq. equals low-frequency end of desired-band segment minus 14 mc). Where the exciter is capable of producing 13.5-17.5 mc output, no other changes in crystal frequencies would be required for the complete coverage noted above.

A two-section Pi-network filtering- and coupling-circuit between the mixer and driver provides a bandpass of 49.5-54 mc that minimizes spurious responses. Coupling between the driver and the p.a. is made with a single-section Pi-network whose loading capacitance is simply that presented by the input of the p.a. tubes, three 6JB6 TV-sweep type tubes connected in parallel.



Top view of the TC-6. The driver tube is located with the p.a. tubes in the perforated enclosure from which the cover has been removed. The p.a. tank components also may be seen.

A bandswitch sets up both the above coupling circuits for operation on any 500 kc segment of the band, in addition to which the driver output circuit may be peaked using a variable capacitor. The bandswitch sections, in effect, select taps on the associated inductance. There is one main inductor for each section with a small wire loop connected between each switch contact terminal. Each loop forms a part of the total inductance according to the switch position used. The setup effectively is equivalent to a tapped inductor. The method is shown at fig. 2.

The p.a. has a Pi-L output circuit with adjustable loading for matching to a 50-ohm line presenting an s.w.r. within 2:1. Both the p.a. and the driver are individually neutralized using a capacitance-bridge method.

A meter indicates p.a. cathode current. Relative power-output readings are obtained by depressing a spring-return button that switches the meter to the output of a pair of diodes which rectify a sample of the r.f.- output voltage. A.g.c. voltage, also obtained from a sample of the p.a. output, is amplified by a 12AV6 triode.

Envelope-Feedback System

A unique "envelope-feedback" system minimizes distortion at the p.a. This is accomplished by demodulating a sample of the r.f. output to produce a compensating voltage that alters the bias at an a.f. rate during certain portions of the modulating cycle, providing the required cross-over characteristic at the particular time.

The idling plate current may, therefore, be held to a low value with higher-than-normal fixed bias, until the feedback provides compensation with a lower bias at the required operating point during modulation. Excellent linearity is thereby ensured while at the same time the overall plate dissipation is maintained at a lower value than it would be if a higher fixed operating bias were employed as needed for proper linearity.

In this regard, it should be noted that where TV-sweep tubes are used, good cross-over characteristics and linearity usually requires a low operating bias which results in an idling current that is high enough to cause excessive plate disipation. The customary practice,

therefore, is to sacrifice optimum linearity by using the higher fixed bias in the interest of preserving tube life. This expedient, of course, is avoided with the feedback system used in the TC-6.

Operating Power

Power requirements for the TC-6 are: 12.6 v.a.c. or d.c. at 2.4 a.; 250 v.d.c. at 100 ma (max. ripple 0.25%); 650 v.d.c. at 300 ma average, 540 ma peak (max. ripple 1%); bias of −75 v.d.c. into 33K load. These potentials may be obtained from the exciter- or a separate-power supply. When used with the Drake 14 mc gear, the requirements will be met by the associated AC-4 or MS-4 power supplies for which the exciter units are equipped with the necessary power receptacles and plugs for the interconnecting cables.

In this respect, the p.a. of any exciter must be disabled when the transmitting converter is engaged. This is done by opening the screen voltage supply line for the p.a., which requires another exciter modification.

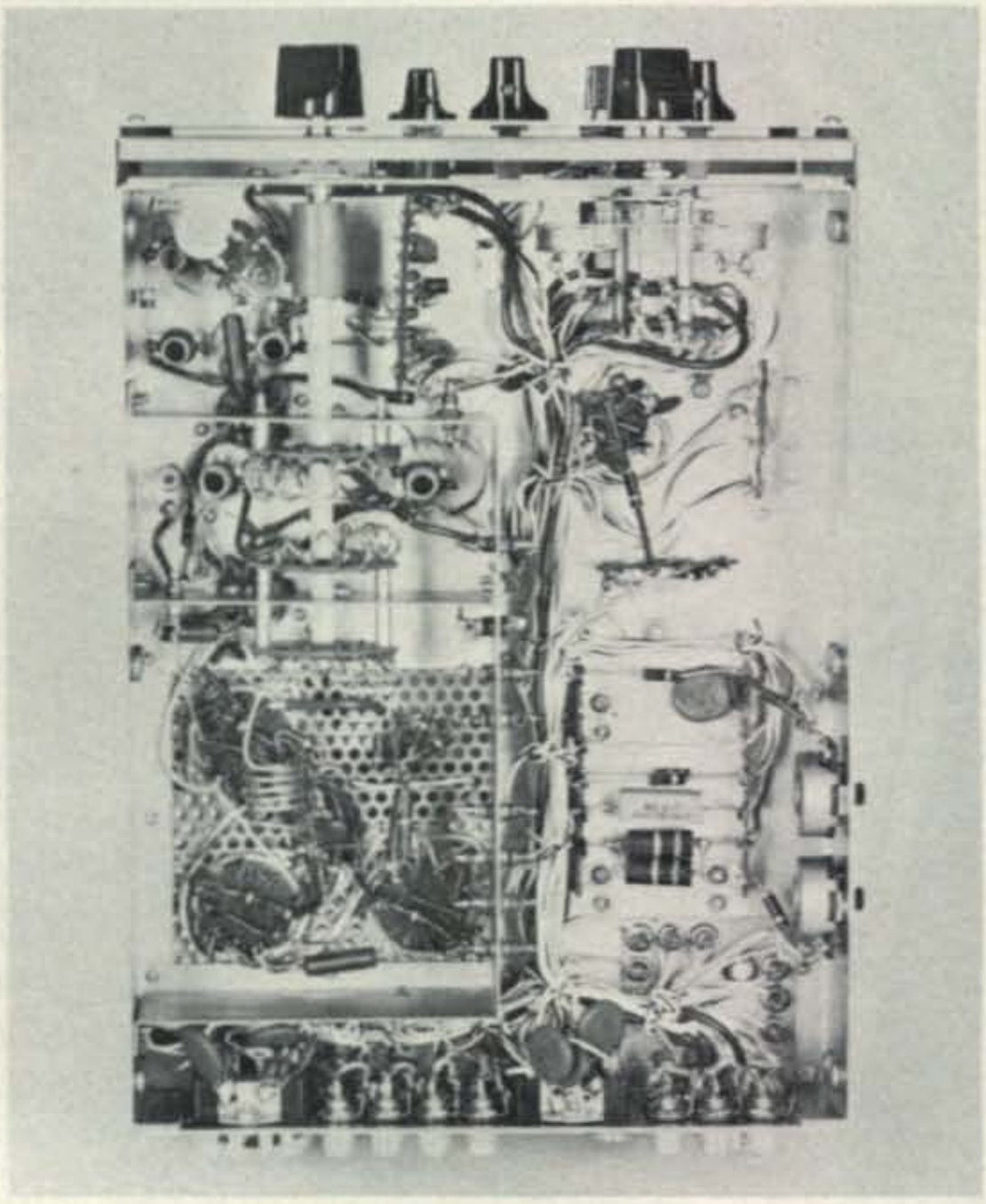
Two additional jacks must be installed on the exciter with one connected to the p.a. screens, the other to the screen-voltage supply. These are then interconnected to associated jacks on the TC-6. For normal h.f. operation with the exciter alone, the TC-6 function switch provides a bridge between the two jacks, thus connecting the screen-voltage supply to the screens of the exciter p.a. During v.h.f. operation with the TC-6, the switch removes the bridge, disabling the exciter p.a. It also then connects the screen-voltage supply to the screens of the TC-6 p.a., making this stage operative.

The function switch also sets up exciter-alone operation (on the h.f. bands) or provides 6-meter operation with the TC-6 along with the necessary re-routing of antenna, converter input and output, h.f. receiver input, relay-and power circuit transfers.

The various positions of the switch are for the following: OFF-H.F. ON (exciter only); V.H.F. RECEIVE (receiving converter with h.f. receiver or transceiver used as 14 mc variable i.f.); CALIBRATE (6-meter receiving setup using external calibrator, such as the Drake SCC-1); TRANSMITTER FILAMENTS (standby); TUNE (with TC-6); OPERATE.

Operation and Performance

In respect to performance, with a d.c. (key-down) input of 300 watts, the r.f. output was measured as 150 watts when the signal-ex-



Underside view of the TC-6.

citation and oscillator-injection levels, as previously specified, were employed. This matches the manufacturer's input rating for c.w. and RTTY. On s.s.b. with voice modulation the average p.e.p. input was about 25% higher, resulting in 200 watts p.e.p. output obtained when the Drake AC-4 power supply was used with the gear. This indicates the capability of the TC-6, although it is rated at only 300 watts p.e.p. input.

In other cases the ratio of the d.c. to p.e.p. power will depend on the regulation of the power supply used and on the power ratios of the exciter output under the different conditions.

On a.m., using the controlled-carrier

[*Continued on page 87*]

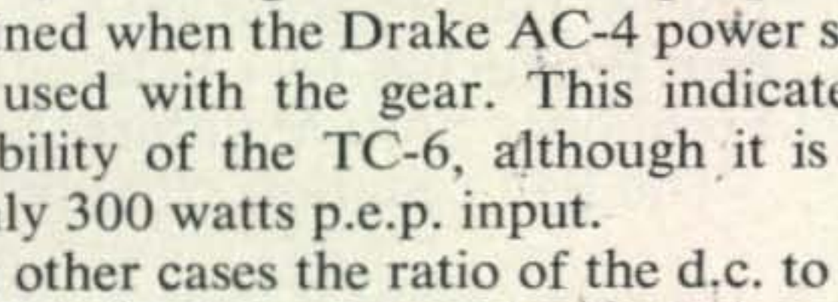


Fig. 2—Mixer and driver inductance-tapping system used in the TC-6. Wire loops serve as inductive elements between the switch contact terminals and are added or shorted out by the switch to provide the total inductance required in conjunction with the main inductor, L_1, for optimum operation on the desired band segment.

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DURWARD J. TUCKER, W5VU

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Constructing Low-Loss Coaxial Transmission Line

BY H. N. SANDFORD,* VK4ZT

The high cost of purchasing commercial rigid coaxial cable has prevented most u.h.f.ers from taking advantage of its superb low-loss properties. The author describes an easy-to-duplicate method for making your own rigid coax from inexpensive, readily available materials.

IT is convenient to use rigid coaxial cable to support feeds in parabolas used on 1296 mc and higher, but the difficulty and expense in obtaining suitable low loss coaxial cable prompted the investigation into methods of construction using locally available materials. It was found uneconomical to purchase short lengths of rigid coax as the cost of the associated connectors would be several times that of the cable alone. For example a 20 foot length of 7/8" diameter rigid coax is about $70.00 and fitted with flanges both ends $90.00. Flanged adaptors with type N connectors are about $27.00 each so the total cost of a 20 foot length with type N connectors would be about $144.00 or just over double that of a standard length of coax alone. These figures were taken from an American catalogue and of course are high quality components suitable for use to 3 Gc. As a matter of interest, the attenuation of this coax at 1300 mc is about 1.6 dB/100', rising to about 3 dB/100' at 3.3 Gc.

Outer Conductor	*I.D.*	*Inner Conductor O.D.*	*Zc*	*SWR (50Ω)*	*Approx. Cost/ft.*
3/4" × 20G	0.678"	1/4" × 20G	59.5	1.18	$0.70
3/4" × 20G	0.678"	5/16" × 20G	46.2	1.08	0.75
3/4" × 18G	0.654"	1/4" × 20G	55.8	1·15	0.83
3/4" × 16G	0.627"	1/4" × 20G	54.0	1.08	1.03

Copper Coax Construction

The first method of homebrewing rigid coax investigated employed copper pipe available from plumbing suppliers. At the time I could only obtain 3/4" O.D. × 20 gauge and 1/4" O.D. × 20 gauge tubing for the inner conductor. The theoretical impedances and cost (these will only be an indication due to fluctuations in copper prices) for a few combinations are as follows:

All of the above s.w.r.'s were acceptable for the project as the mismatch loss would be negligible. Various methods may be used to cope with the mismatches or the system could be designed around the nominal impedances. In any case, much of the cheaper flexible solid dielectric coax cable available is no better than this. Type N female connectors were fitted at each end. The cheapest method found was to use a type N female connector (UG-29 B/U, commonly referred to as a "bullet"), cutting the connector in half to provide a transition at each end of the coax. It also provides a convenient support for the inner conductor. See fig. 1.

Carefully cut the body of the connector in two places 1/8" either side of the center so as to remove 1/4" from the body. Withdraw the inner conductor and cut exactly in half. The Teflon insert may now be cut off flush with body so when the inner pin is refitted there will be 1/8μ protruding from each cut

*18 Loch Street, Toowoomba, 4350, Australia.

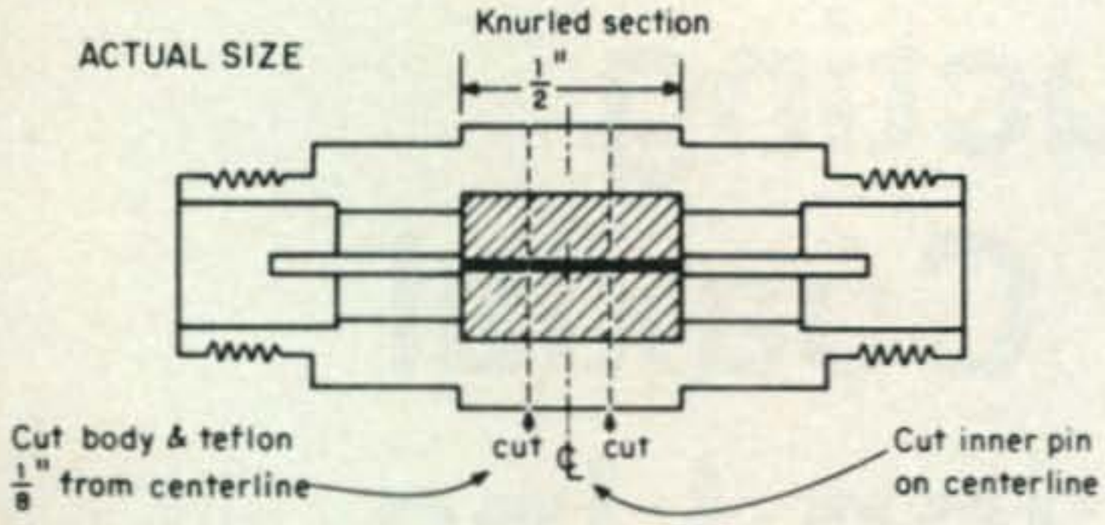

Fig. 1—Cross-section of a UG-29B/U Type N connector showing the cuts necessary to make two end fittings for rigid coax.

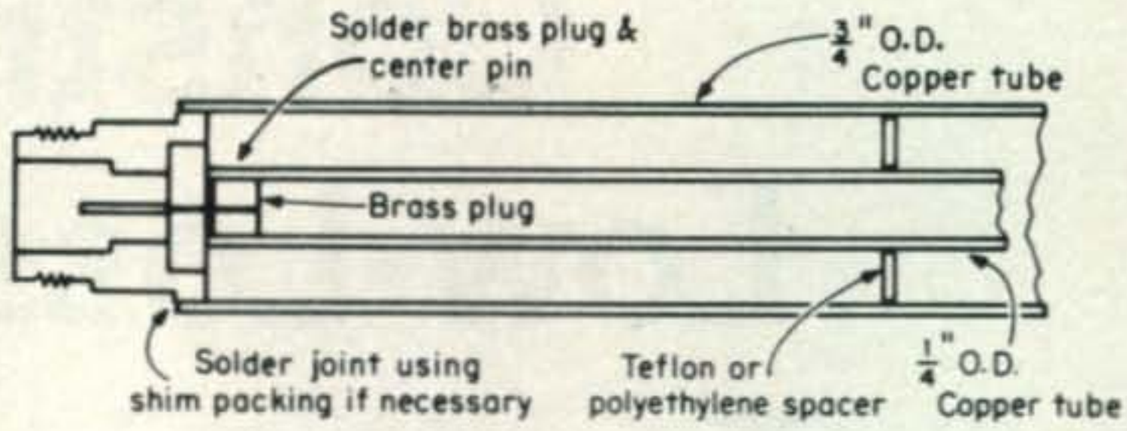

Fig. 2—Assembly of Type N connector section to homebrew rigid copper coax.

portion of the connector. If a lathe is available, the outer may be parted off.

Prepare the inner copper tubing conductor of the coax by cutting 1/4" shorter than the desired length of the outer 3/4" pipe. Plug the ends of the inner tube with a snug fitting piece of brass or the shoulders may be filed off a small brass nut. Solder the plug into the ends of the tube and drill out for a snug fit on the center pin of the connector. Teflon washers are fitted on the inner conductor at 3 to 5 foot intervals to support the inner conductor centrally. These may be cut from 1/16" Teflon sheet. The sheet is available from Bearing Suppliers and is very expensive but the small amount required should cost less than $1.00. Polystyrene or Polyethylene would also be suitable. Teflon or Polyethylene is best cut using a short piece of either tubing. With a pair of dividers lightly scribe two circles with diameters of the O.D. of the inner and the I.D. of the outer. File or turn about a 60° angle on the outer end of 3/4" tube to make a sharp edge on the inside circumference. With the 1/4" tube, run a 3/8" drill into the end until a sharp edge is produced on the outside circumference. Place the Teflon or polyethylene on a smooth hard piece of wood. The washer may now be cut with a sharp blow using the two tubes as cutters. Polystyrene will of course require drilling and cutting. Slide the spacers onto the inner conductor at the desired spacing. If care is taken, there will be a tight fit on the inner tubing. The outer edge of the spacers should now be filed down slightly so as to slide snugly inside the outer tube without binding.

The two pins should now be soldered into the ends of the inner conductor taking care to fit the Teflon spacer from the connector beforehand.

The inner surface of the outer tube should be tinned for approximately 1/4" in at each end. Solder the body portion with approximately 1/8" of the connector extending into one end of the outer tube. Depending on the gauge of the outer tube, it may be necessary to fit a 1/8" wide strip of shim brass between the body of the connector and the tube, before soldering. 16 gauge tube should provide a neat fit. Slide the inner conductor carefully into the outer conductor, taking care not to move the spacers. Push right home so the Teflon spacer and pin fit correctly into the end socket already fitted. The other connector body is finally soldered into position, completing the assembly of the coax. Use only sufficient heat to solder, and it is a wise precaution to tilt the end being soldered down slightly to prevent any solder running back into the coax. The complete assembly is shown in fig. 2.

Performance

The reflection coefficient of a 6 foot length of this coax was measured using a Hewlett-Packard 1415A Time Domain Reflectometer. The characteristic impedance was measured at 57.5 ohms which is slightly lower than calculated and may be due to tolerances of the tubing used. This gives an s.w.r. of 1.15. A copy of the TDR trace is shown in fig. 3.

The two pronounced dips are due to the capacitive reactance of the two Teflon spacers, but only amount to a reflection coefficient of approximately 2%. It is possible to compensate by cutting a groove in the inner conductor, but in view of the small reflection obtained, this was considered un-

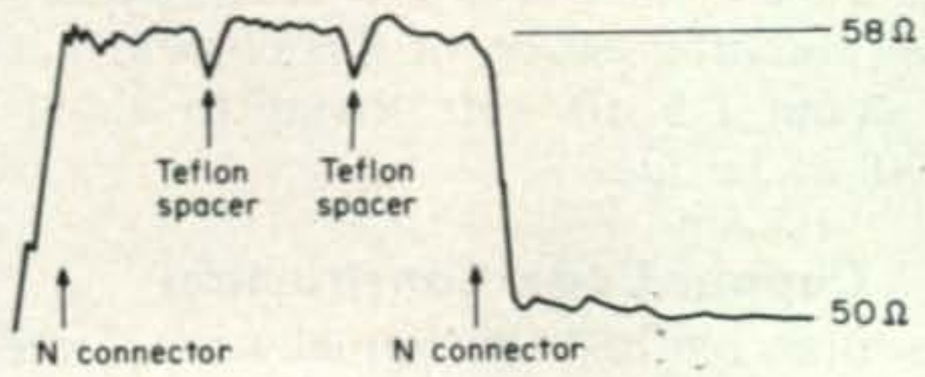

Fig. 3—Time Domain Reflectometer response of home-made copper coax line with Type N connectors at each end.

necessary. The irregularities in the line are no worse than those observed on a piece of good quality flexible coax. The TDR response extends to 2.3 Gc, so this method of construction is probably suitable for narrowband work to at least 3.3 Gc and possibly higher. Attempts to measure the loss were unsuccessful as this appeared to be less than 0.1 dB at 1296 mc.

Aluminum Coax Construction

Tom Norris, VK4NO used aluminum tubing and BNC connectors on a similar project. The outer tube consisted of 1" O.D. × 18G., and the inner 3/8" O.D. × 18G. Tapered sections were machined to match the coax dimensions to the BNC connectors. The calculated impedance of this line is 52.6 ohms and the measured impedance using the TDR was 52.8 ohms. The nominal dimensions of the tubing were within 0.001".

Slightly different techniques are required due to the connectors and materials used.

BNC Flanged Chassis Mounting Connector

Refer to fig 4. for details of this construction. A slight modification is required to one connector to allow for easier assembly. This involves removing the swaging that retains the Teflon and center pin.

The outer block is made of aluminum 1" long and turned to fit neatly in the outer tube. The inner hole is arranged to fit over the Teflon at the rear of the connector. This will depend on the particular connector used. The inside taper is linear from this hole that fits the connector to nothing at the inner diameter of the outside tube. The inner tapered section is made of brass and the starting diameter of the inner rear of the connector may be calculated from the normal formula;

$$Zc = 138 \log \frac{D}{d}$$

which for 50 ohm coax transposes to:

$$d = .4409 \times D,$$

where $D = I.D.$ of the outer conductor

$d = O.D.$ of the inner conductor

and Zc is the characteristic impedance.

Taper the inner section from this calculated value up to the O.D. of the aluminum conductor. A snug hole is bored to fit the BNC pin. The other end is turned to be a tight fit in the inner conductor. The brass section may be tinned to reduce the possibility of electrolytic action. If desired, the tapered section may be a heat shrink fit in the inner, or may be pinned. Assembly is straightforward.

Fit the tapered sections to the inner conductor after determining the correct length. Solder the pin and fit the Teflon from the modified connector to one end of the inner. Fit one of the outer tapered blocks into one end of outer tube. Slide the inner into the outer tube so the inner protrudes through the end block. Solder the modified connector to this end of the inner, then mount the connector flange with fixing screws tapped into the block. The other end block may now be fitted. Finally, the body of the remaining connector is screwed into place. If desired, both connectors may be modified to remove the inner pin and Teflon block for easier fitting.

BNC Threaded Chassis Mounting Connector

A suggested method of mounting is shown in fig. 5. The outer tapered aluminum block and the inner tapered brass section is of the same construction as detailed in the preceding section. Both connectors are modified by removing the swaged retaining section to allow removal of the center pin and Teflon block for ease of assembly. The connector may be mounted with an adaptor block tapped to take the connector (3/8" × 32 threads per inch). The normal mounting nut may be used

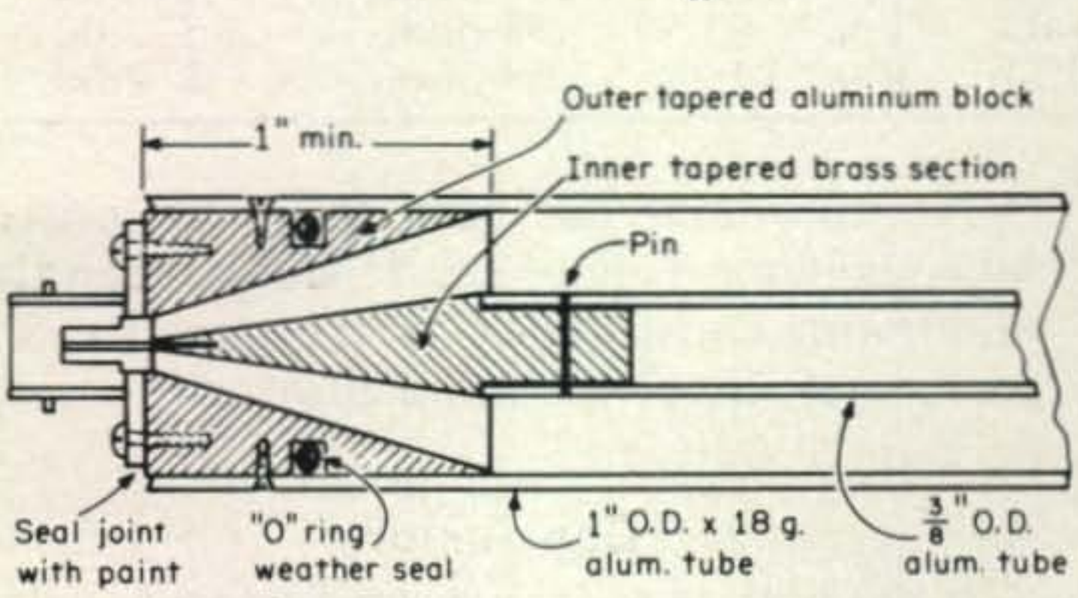

Fig. 4—Assembly of BNC flange mounting to aluminum coaxial line.

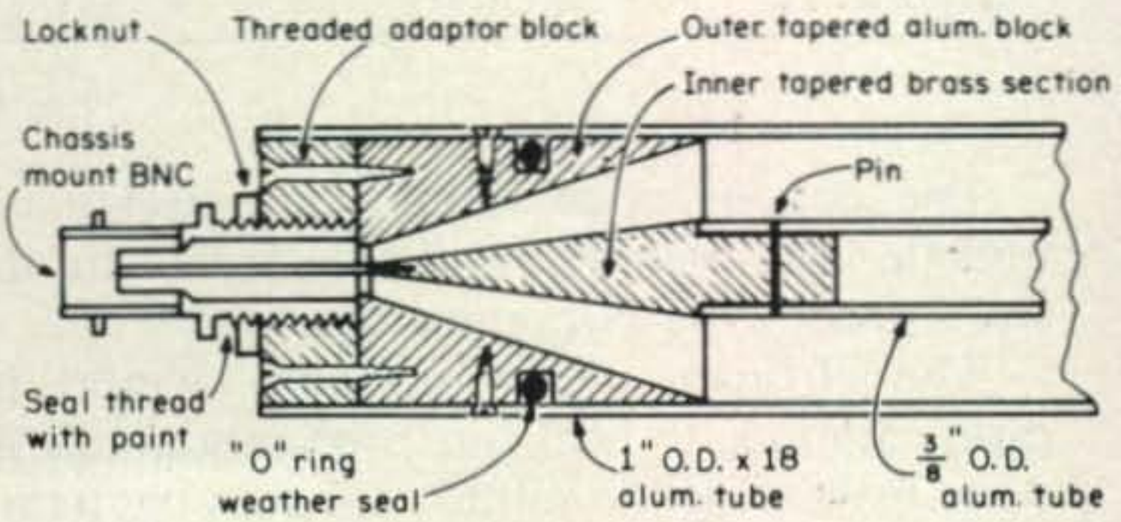

Fig. 5—A BNC threaded chassis mounting connector may also be used with aluminum coax as shown above.

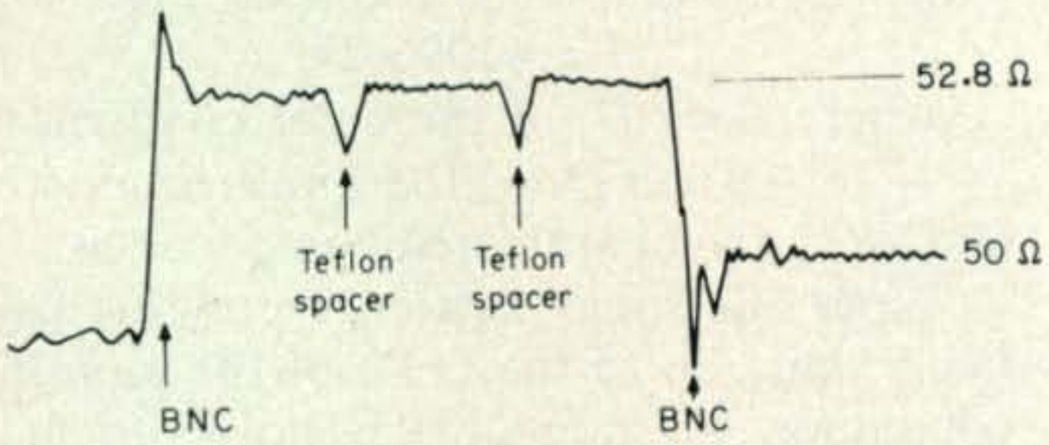

Fig. 6—Time Domain Reflectometer response of aluminum coax with BNC connectors.

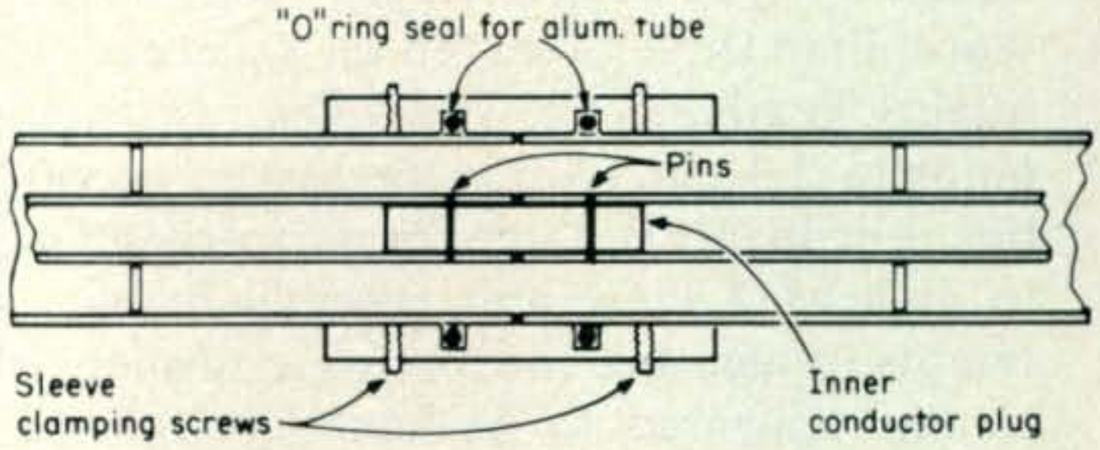

Fig. 7—Joint for extending sections of aluminum coax. For copper coax, the inner and outer conductors may be sweated together.

as a locking nut. The adaptor block is attached to the outer aluminum tapered block with tapered mounting screws. An alternative method would be to solder the mounting nut to a piece of, say, 16 gauge brass plate, and screw this to the outer aluminum tapered block—in effect, converting the connector to a flange mounting or, if desired, the connector body could be soldered directly to the plate. The cost of one foot of this coax is in the order of 34 cents.

Performance

A copy of the TDR trace of a 6 foot length of aluminum coax is shown in fig. 6. The Teflon spacers are evident and the larger transition steps at each end are caused by the BNC connectors which are not as good at these frequencies as the type N connectors. Some of the discontinuity, however, was introduced by the BNC to type N adaptors used at either end for measurement. In any case, the steps due to the connectors do not exceed 3 to 4%, and should be satisfactory for use to several Gc. The loss was too low to measure with methods available being less than 0.1 db. The measured impedance of 52.8 ohms gives an s.w.r. of 1.056.

Weatherproofing

The copper coax should be suitable for outside use, as it is completely sealed by the waterproof type N connectors.

The cheaper aluminum coax would be more difficult to seal but probably could be done by sealing the joints with suitable paint. A better method would be to fit O-rings in grooves around the outer tapered block as shown in figs. 4 and 5. It would only then be necessary to seal the connector to the block with paint.

Joining Long Lengths

It is a relatively simple matter to join 18 foot or 20 foot stock lengths of tube to produce long low loss runs. A snug fiting inner plug similar to the end of the inner tapered section can be used to join the inner conductor. The outer copper tube may be joined by sweating a tight fitting outer tube over the butt joint. The aluminum outer presents a more difficult problem, but could be joined using a fitting sleeve locked in place with lock screws tapped into the sleeve. An O-ring in a groove at each end of the sleeve could be used to provide weather proofing or possibly a smear of "Araldite" or similar adhesive at each end of the sleeve would be satisfactory. A more complex locking arrangement using a gland at each end could also be devised, but would require considerable machining.

Relative Costs

These are estimated for 18 foot lengths and provided only as a guide:

Material	*Outer*	*Inner*	*Cost/ ft.*	*Connector Cost*	*Zc*	*Total (18' lengths)*
Copper	3/4" × 20G.	1/4" × 20G.	$0.70	Type N $2.50	58 ohms	$16·00
Copper	3/4" × 16G·	1/4" × 20G.	1.03	Type N $2.50	54 ohms	$22.00
Aluminum	1" × 18G.	3/8" × 18G.	0.34	BNC $2.25	53 ohms	$ 9.00

An allowance has been made for miscellaneous items Teflon, etc. It will be seen that aluminum construction is the cheaper, unfortunately involving more effort.

Conclusion

It has been shown that satisfactory low loss rigid coaxial cable can be manufactured at

[*Continued on page 87*]

Snide
Some ~~Side~~ Remarks about Raytrack

There are some people who marvel that a short wave receiver can tune in stations thousands of miles away. You and I know that this is normal and natural. There are some people who believe that only a linear whose name matches that of their transceiver will perform appropriately. You and I know their thinking to be wrong. But perhaps this confining view is just as well -- for I doubt if Dan Eisenmann, for example, could make his Raytrack Horizon VI Amplifier the beautiful linear it is if greater customer pressure existed.

This six meter linear does not have a Raytrack transceiver to drive it with, it does not have a spurious input filter, it does not have automatic tuning, it does not have ALPL (Automatic Legal Power Limiting), and it wasn't designed to turn itself off in a microsecond if the antenna load wasn't connected to it. Worse, it does not have the latest zero drive tubes parallel connected to enable it to function at the mere thought of excitation. Dan wanted these features and more but we dealers did succeed in explaining that some of the six meter boys could tune an amplifier and read their meters correctly and that there were a few "technicians" who had been known to understand VSWR, and further if this new amplifier were made completely "idiot proof" that he did not have enough money to finance the deluge of orders that would result. Then we showed him he would have to borrow at the bank, and with interest the way it is today the bank would be taking in more than Raytrack. And, damn it, the boys in the shop would unionize (all three of them) and that too would mean more expense. Then if that wasn't enough the IRS would suddenly take notice and offer to carry their side of the wheelbarrow to the bank. And Dan, if that kept up for long, the next thing you'd realize is that our cousins in J A land would put their noses into the air and sniff a good thing, too. (Where would you be then, Mr. Frankenstein Eisenmann?)

And so reason prevailed. Raytrack did the proper thing, they concentrated on making an honest 2 kw six meter linear with real transmitting tubes that could be fed from anybody's Swan, Drake or Heath exciter and with simple connections -- only three of 'em -- so clearly labeled that even Johnny Newham could hook it up right the first time.

And they soldered every joint and put a lockwasher where a lockwasher was supposed to be and finished their unit by testing it on the air and into a dummy load with proper instruments -- and lo fellows, look what we got -- and don't say that the price is high 'cause it ain't!

Study the photo and the specs and if you have something to listen with, tune me in, that is presuming that my demonstrator has not been sold (the last time it lasted 1 1/2 hour --s' help me.)

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USING THE SLIDE RULE TO DETERMINE L-C CIRCUITS

BY LEE ZIPIN,* WA3GGH

VERY often, when designing or changing radio equipment, you will come upon the resonant frequency formula. This is not the easiest formula to use because you frequently have numbers with as many as nine zeros to the right of the decimal point to work with, which makes for a rather messy equation. With two simple settings on any inexpensive slide rule, those problems can easily be solved. I discovered this method while playing with my Lafayette six-inch rule.

The procedure is as follows: Find the capacitance in mmf on the *A* scale as shown in Table I, assuming the left "1" to be one mmf, the middle "1" to be ten mmf. (See fig. 1.) Then find the reciprocal of the inductance in μh. If you don't know what the reciprocal is, place the inductance, in μh, on the *D* scale, and the reciprocal will be opposite it on the D_1 scale.[1] Then put this number, the reciprocal, on the *B* scale opposite the capacitance. (If the original inductance value in μh is between one and ten, put the reciprocal on the left part of the *B* scale; if the inducance is from ten to one hundred μh, put the reciprocal on the right part of the scale. See Table II.) Remember, the capacitance is placed opposite the *reciprocal*, not the inductance.

Left Side	Right Side
1-10 mmf	10-100 mmf
100-1000 mmf	1000-10,000 mmf
.01-.1 mf	.1- mf

Table I—Locations of various capacitance values on the *A* scale of the sliderule.

Then locate the number five on the *D* scale, and read the answer in frequency opposite it on the *C* scale. If you find that the slide is too far in either direction for an answer to appear, find the left (or right) index (number "1") on the *B* scale and move the

[*Continued on page 87*]

Left Side	Right Side
1-10 μh	10-100 μh
100-1000 μh	1-10 mh
10-100 mh	100-1000 mh
1-10 h	10-100 h

Table II—Locations of the reciprocals of inductance values on the sliderule's *B* scale

*1013 Melrose Ave., Melrose Park, Pa. 19126.

[1]For a number, *X*, the reciprocal, $1/X$, can be found from the *D* and D_1 scales without adjusting the slide, with the use of only the cursor. For example 1/8=0.125 with the 8 fed into the *D* scale and the reciprocal read directly on the D_1 scale. The same calculation can be accomplished on the *C* and C_1 scales.

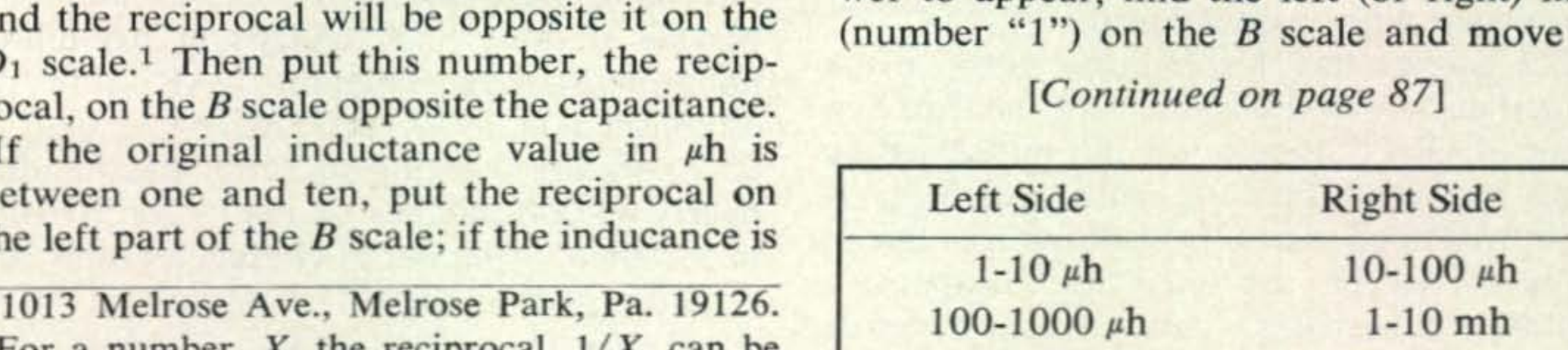


Fig. 1—Slide rule set-up for a problem of 8 mmf and a 2μh inductance produces an answer of 39.5 mc on the C scale opposite the *5* on the *D-1* scale.

BARRY TOURS VIET MARS STATIONS

BY DON DEDERA*

THIS past winter Sen. Barry Goldwater, K7UGA, made an inspection tour of Viet Nam. His official mission: to inspect the Military Affiliate Radio System (MARS) in Southeast Asia. Sen. Goldwater visited every Air Force MARS station in Vietnam, from the steaming Mekong Delta of the south, to the provinces adjacent to North Vietnam. He found the highest general and lowest "grunt" in agreement on MARS–it is a vital support for GI morale.

Of Barry's many dimensions, he takes greatest pleasure from amateur radio. He is the only jet pilot in the Senate, a best-selling author, an award-winning photographer. But his closest hobby remains radio.

"I built my first transmitter when I was 12," he said, "and I've been involved in radio in some way every day since." His cars, boat, Washington apartment and Phoenix home are loaded with two-way gear.

No sooner had his military cargo plane landed at Saigon, he sought out the Tan Son Nhut MARS station, a low hut buttressed by sand bags and bristling with antennae. A room was filled with GIs waiting turns to call home. MARS is the only fast, inexpensive contact Americans have with stateside families.

Putting protocol aside, Barry mingled with enlisted operators, many of whom are radio amateurs who voluntarily man MARS posts on off-duty hours. He talked their technical language, and he regaled them with a story:

"Couple years ago at my shack in Phoenix we got a call from Cam Ranh Bay. A boy by the name of Pat Nugent was calling his wife at Johnson City, Texas. Well, hell, we put the patch through."

Via K7UGA's station, President Johnson's son-in-law talked to his wife for 20 minutes.

"What'd Nugent say," a MARS operator wondered.

"Aw," said Barry "we told the boy to go ahead and say he loved her."

Since MARS, Vietnam, was activated in 1965, some 2 million telephone calls have crossed the Pacific by radio to be patched into land lines. One of the busiest mainland MARS stations is K7UGA's at his hilltop home in Arizona. Since his MARS link was established in 1967, the Goldwater club of 25 operators working in shifts has handled nearly 45,000 patches. A bonus for Arizona servicemen: telephone charges within the state are paid by the K7UGA club.

Of what value is MARS?

A young corporal said: "Usually we're rationed to one call a month. But that one

*4359 Loma Riviera Ct., San Diego, Ca. 92110.

At Phan Rang (in the Delta), Sen. Barry Goldwater, K7UGA, arrives for inspection of MARS facilities.

Barry checks his QSL posted on the bulletin board at the Bien Hoa MARS station.

makes the other 29 days go faster. It's knowing MARS is there when you need it."

A supply sergeant said: "I've been here six months. My wife wrote she was losing control over our 8-year-old boy. He's at the rebellious age, and he thought his Old Man had abandoned him. So I called home and talked to the boy. Next day, he went to school and walked up to the head of the class and made a speech about how he had just talked to his dad halfway around the world. Really shaped the kid up. And it didn't do the Old Man any harm, either.

A colonel said: "I called home last night. My wife's father had died. It was a time when I should have been at her side. In a way, thanks to MARS, I was."

Death, love, discipline–finances, lonliness, fear. The rawest of human concern has been relieved through MARS. Multiplied over the war Zone, these experiences are of immeasurable value to morale.

If one Goldwater experiment in Vietnam proves practical, GIs may soon have a visual link to the United States. At various MARS stations Barry demonstrated a slow-scan oscilloscope receiver for still photographs. Perfected, the scanner could make it possible for a MARS patron to observe a still picture from home, simultaneous with his call home. A test transmission from Goldwater's ham shack to Cam Ranh Bay was thought to be a historic first.

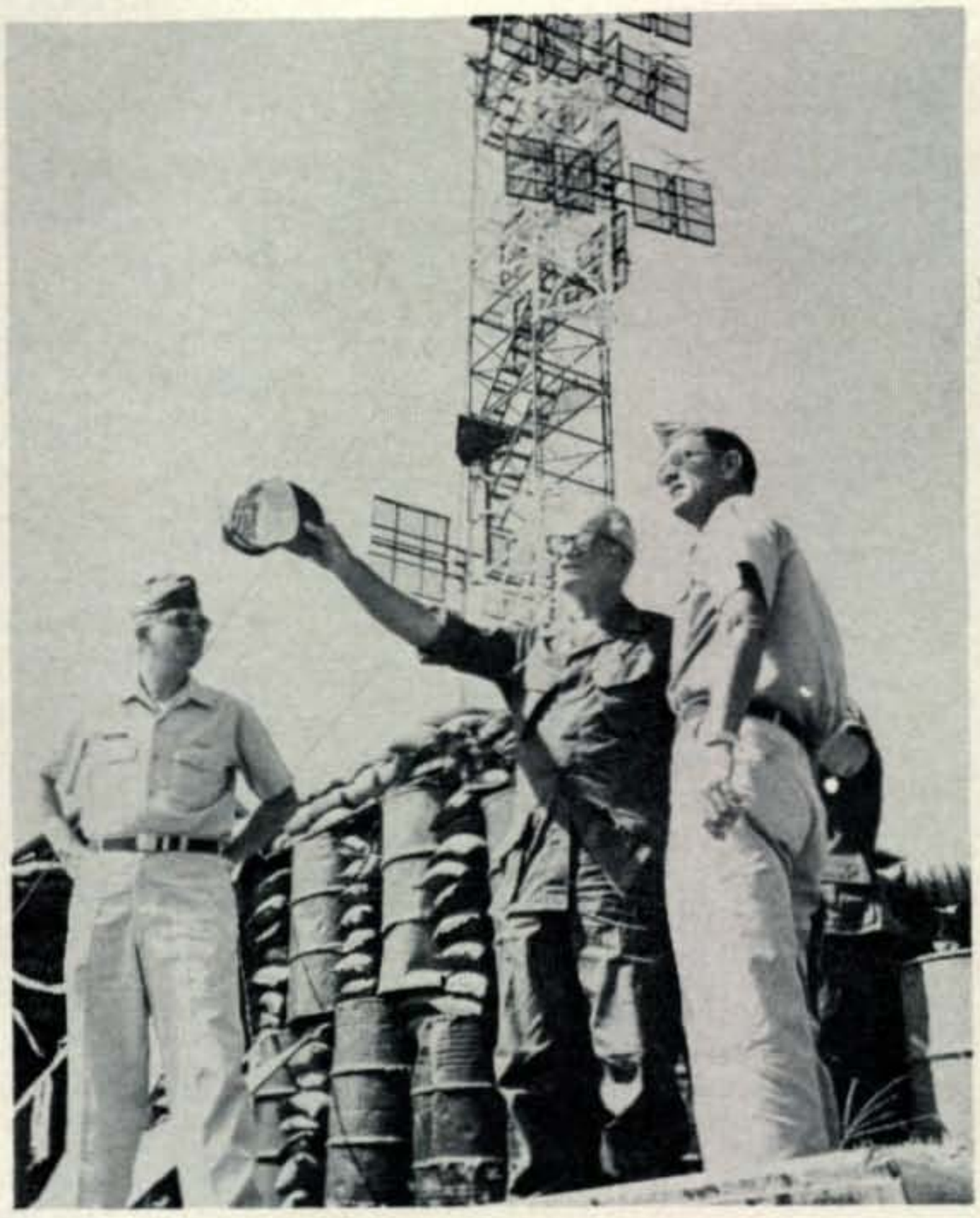
There were other adventures in the Goldwater tour. Armed convoys provided security to a few MARS stations, but in Saigon the senator traveled without a guard.

"I feel more secure here than I do in Washington," he said.

"Oh, yes," an aide replied. "We forgot you come from an unpacified government village."

The Senator survived one scary emergency landing (hydraulics failure), and at Ban Me Thuot and Pleiku in the Central Highlands, the war was close, noisy and perilous. At Monkey Mountain, far to the north, the MARS station was graduating from a windswept tent to a humble hut.

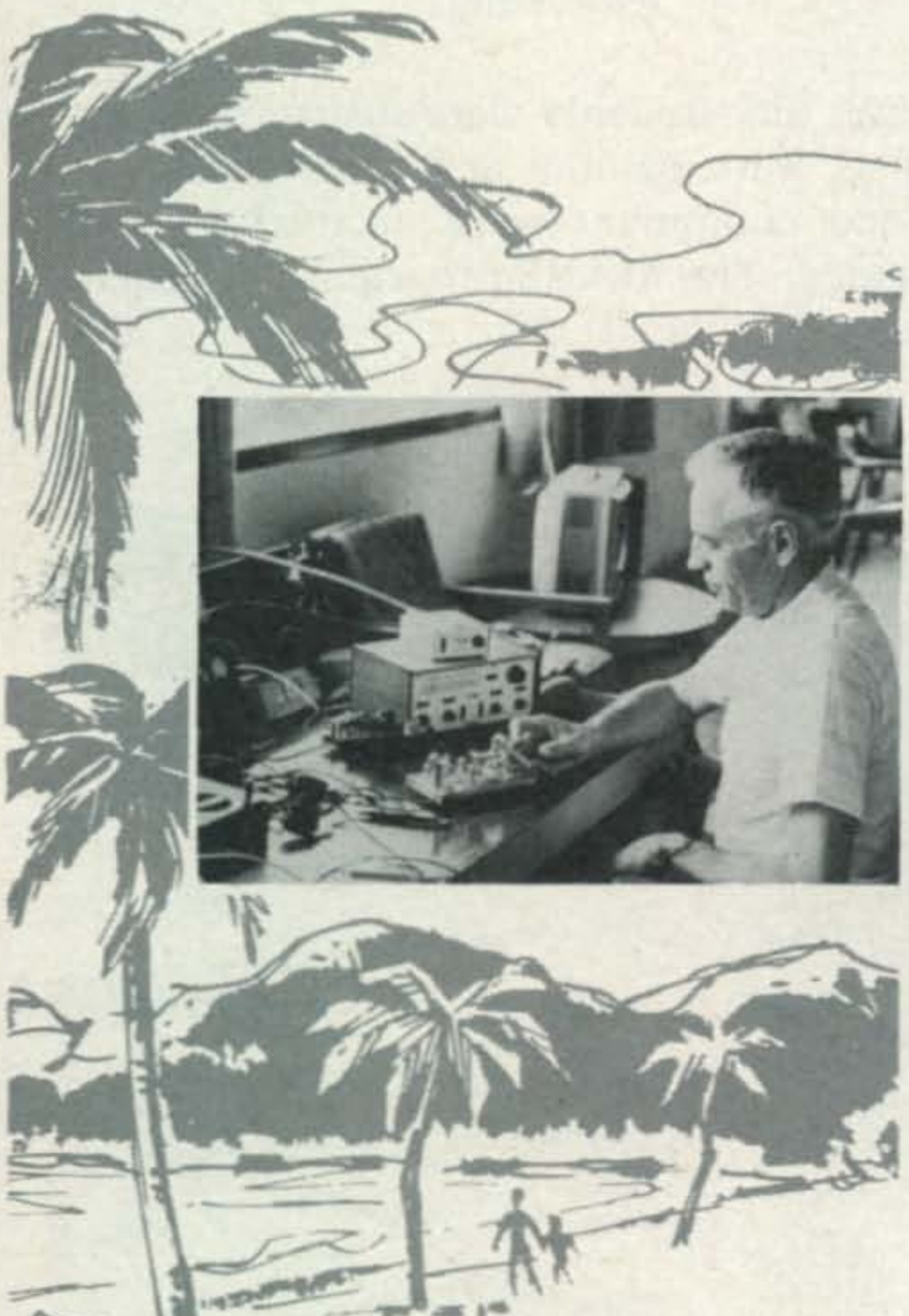
Controversial though the senator may be politically, his tour of MARS facilities was unanimously applauded by MARS personnel. Shortly after his visit, a master sergeant summed up Goldwater's influence: "Just the announcement of his pending trip escalated MARS priorities to No. 1. Work orders several years old suddenly were rushed through. Buildings were painted and renovated. Systems and equipment were cleaned up and overhauled. The MARS program will benefit for years to come." ■



Inspecting the base and antenna installation at Phan Rang.

After inspection Barry sits in at a MARS console.

he worked the world.



Mr. John H. Thompson, W1BIH/PJ9JT, recently packed his Ten-Tec Power-Mite PM 3A transceiver into a suitcase and headed for the Coral Cliff Hotel, Curacao (Netherlands Antilles). From there he worked the world.

"Final tally on the PM 3A results at PJ9JT are 261 QSOs on 14 MHz and 41 QSOs on 7 MHz for a total of 302. This includes 32 different countries in 5 continents. I operated only with the PM 3A on 7 and 14 Mc. CW. No contacts were set up first on high power, nor was any auxiliary receiver used. It was all done with the PM 3A. Of course I had a FB location and the JP9 call didn't hurt. Among the DX worked were five VKs, a ZL, VU and 4X4. Only Africa was missed and I did get a PJ? response from an EL. The batteries, a pair of 6V lantern batteries in series, lasted the entire operation and showed no signs of failing. Some comments from stations worked:

W8KIT: 'Congrats on that signal with real QRP'
WØ0PK: 'Unbelievable'
W5IUW: 'Ur really busting my ears'
W3KR: 'Boy, ur 5 watts FB here on my attic antenna'
W4KC: 'Did you say 5 watts?'
W2GA: 'Boy, ur rig doing FB'
W4YWX: 'Unbelievable — if I didn't know you I'd swear you're pulling my leg because ur hitting 20 DB'
K3CUI: 'Are you really running only 5 watts? FB'
OK1AOR: 'Sigs 589 FB'
K6IC: 'Your 5 watts sure good here'
UK2KAF: (ex UP2KNP): 'Ur low power sure doing FB'
K4ZA: 'Ur sig has real punch'

I did other hamming, making some 400 contacts on the other bands, both CW and SSB using high power equipment. Could have made many more QSOs in the same time using the high power rig but it wouldn't have been half the fun."

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MOTORIZING YOUR CRANK-UP TOWER

BY KATASHI NOSE,* KH6IJ

THE ability to lower a crank-up tower in the face of an impending storm makes for ease of mind, but the prospect of having to crank it back up again made me think twice about lowering the tower each time.

By actual count I have to turn the crank handle 275 times at an average torque of 12 pounds-foot (12 pounds on the end of a leverarm one foot long) to raise my 51-foot tower. This process usually requires at least two rest periods, a lot of work and is a hazardous operation at best.

A Motorized System

A motorized system would be an ideal replacement for the crank and should have the following desirable features:

(1) Adaptability to the present manual crank-up system with minimum effort.
(2) No more than two minutes to raise the tower to full height.
(3) A clutch system for fine control, preferably a slipping clutch for safety in case of jamming.
(4) Ability to watch the raising or lowering process *from a distance*, to insure that coax, direction cables, *etc.*, do not get entangled in the tower.
(5) A simple enough system such that "showing off" to visitors is not a chore.
(6) A simple buffer system that gives some semblance of protection to the beam in case the tower plummets.
(7) Manual crank-up system still available for emergency or supplementary use.
(8) The safety ratchet on the tower can be actuated from *a distance*.

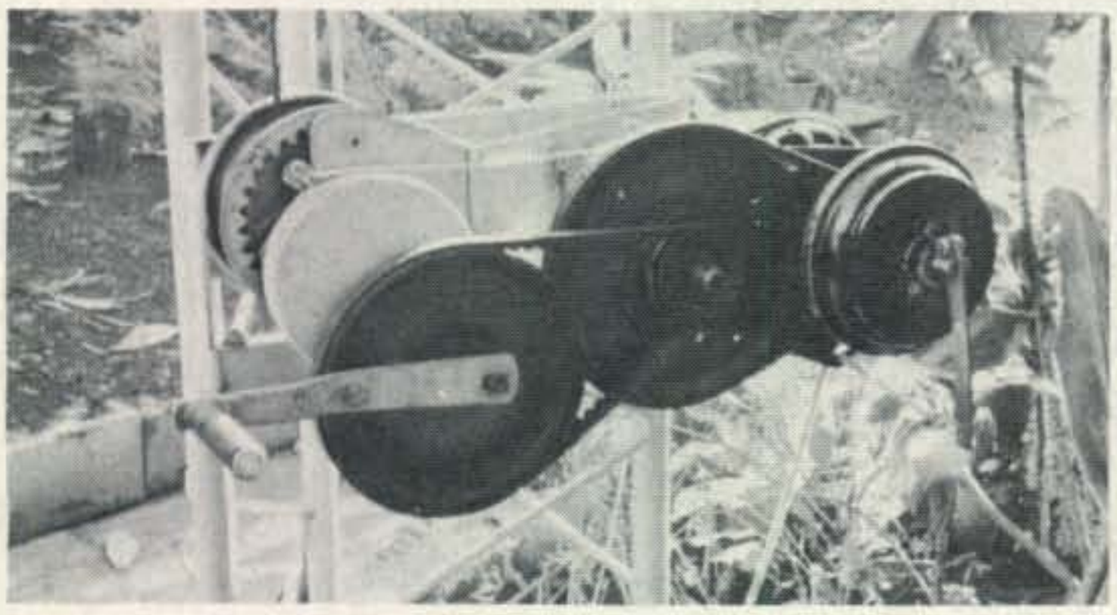
The popular inexpensive tower uses a boat winch, a dangerous type because there is no ratchet in the neutral (crank-down) position. Should the crank slip out of hand, a common occurence, the tower will plummet, most likely damage the tower and certainly the beam itself.

I know personally of several cases where the person's reflex made him try to stop the "windmilling" crank handle, with disasterous results.

However, the boat winch has a desirable feature in that the safety ratchet can be used for either clockwise or counter-clockwise rotation, a saving grace, as it turns out in this application.

A tour of the junk shops showed that a

*Dept. of Physics, The Mall 2565, Univ. of Hawaii, Honolulu, Hawaii, USA 96822.



A pulley driven motorized system using a fluid drive. Note that the manual crank handle is not attached to the original mounting center but can be attached anywhere on the drive wheel. Provision is made to position the idler wheel (center) for optimum belt tension.

The author demonstrates the simple operation of the motorized system. The operator holds two ropes (string). One for the clutch and the other for the safety ratchet. The operator can be at any distance from the tower.

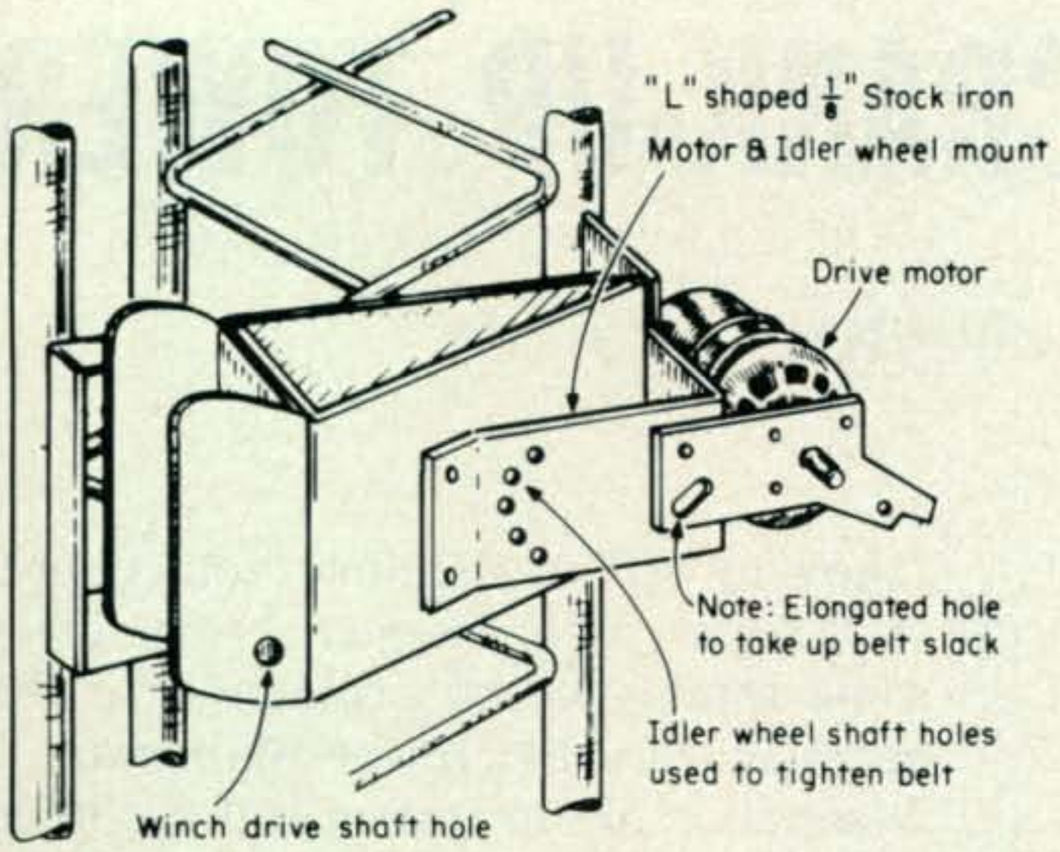


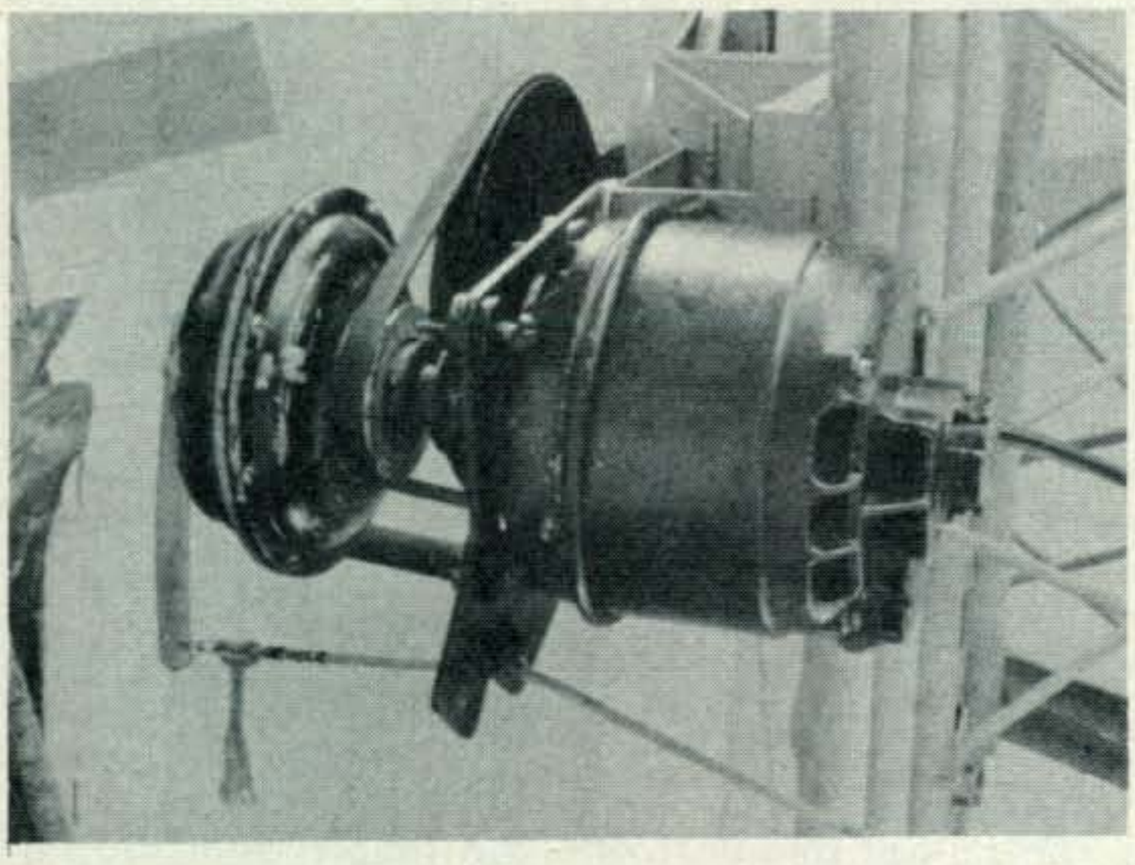
Fig. 1—The motor and idler wheel mounting configuration. Provision is made for belt tightening.

suitable worm gear winch costs about $65, but is still without feature (2). A reversing system of D.P.D.T. switches is required as well as a complete stop of the motor before reversal can take place.

Preliminary Testing

The author's tower is a three-section self supporting Tri-Ex Model W-51, extending to 51 feet, on which is a Hy-Gain TH6DX and a 6-meter beam. Crank-up torque varies with the height but an average of 12 foot pounds is necessary.

In the absence of a spring balance attached to a string on the crank handle, you may determine the torque necessary to raise the tower by hooking a bucket on the crank handle (positioned horizontally) and adding water until the handle just turns. Weigh the bucket on the bathroom scales.



Side view showing the fluid drive and motor with the rope attached to the clutch arm. The rope can be of any length and may even turn a corner.

If you need less than 20 foot pounds of torque, then you are within the discussion of this construction article. A quarter horsepower motor will just do it, but a 1/3 horsepower motor will just have power to spare and is recommended.

The Slipping Clutch System

The heart of this system is a *fluid drive* from a defunct washing machine. Some obsolete washing machines used a fluid drive to operate the spin drier. A fluid drive allows the motor to be rotating continuously in the *same direcion,* yet allows the tower to be cranked up by pulling on a string *from a distance* and allows the tower to be lowered by slacking up on the string–fingertip control–from full speed to zero, up or down.

When the fluid drive is actuated, two cups with vanes come together, and by shear mode of the fluid, torque is transmitted gradually, and if necessary, completely engaged mechanically, but should not be as will be discussed later.

When the fluid drive is released, the weight of the tower allows the drive to slip in the reverse direction, all the while the motor is rotating in the original direction.

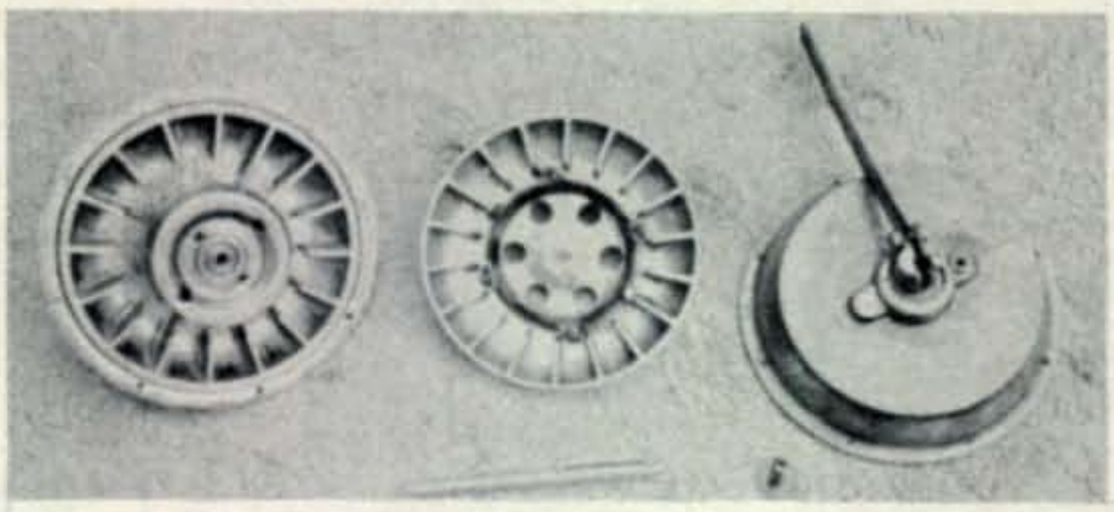
A particularly good clutch is found in the Hotpoint Model LP3C which is now over 15 years old, obsolete, and ought to be abundant in junk shops. A new fluid drive, part power motor, "V" belt, and 8″ pulley of this #WH3×5002, sells for $31.00, but I found a cheap source in a used washing machine repair shop at a reasonable price (below $5.00).

A similar clutch is made by Speed Queen, a division of McGraw Edison (part #A-23669) for $28.00 new, and apparently is a more recent model. Easy Washer Corporation also makes a fluid drive but I am not familiar with this make.

In addition to the fluid drive, if possible, get the complete system including 1/3 horseplication, not enough torque is transmitted model machine. The pulley has just the right diameter hole (5/8") for the boat winch crank and comes equipped with Allen head screw and no machining is necessary.

Change the Original Fluid in the Drive

The drive was designed to operate in a horizontal position, but in this vertical application, not enough torque is ransmitted if the original fluid (or refill) is used. Empty the original fluid completely through a drain hole at the top and replace with high visco-



The internal view and mechanism of the fluid drive. The vanes can be seen along the outside with the mechanical clutch in the center. Parts of the mechanical are not shown. A fountain pen is shown for size comparison.

sity motor oil (at least SAE40).

Do not depend on the mechanical clutch to transmit the torque, it will wear out rapidly and should only be used in an emergency. The fluid drive should do most if not all the work.

Test the effacy of the fluid drive by attempting to restrain it by hand (*carefully*) with the motor running. If you can barely hold it from rotating with the clutch engaged, then you are in the ball park, otherwise add more fluid or oil of higher viscosity.

A Word of Warning

The fluid drive from the Hotpoint LP3C is designed to turn in the *counterclockwise* direction. If you have the original motor and fluid drive you are in good shape, otherwise, ascertain the correct direction. If this is not done, the mechanical clutch becomes unscrewed and the fluid drive will come apart.

Be sure the motor is energized at all times when raising or lowering the tower. If the power fails, the motor will turn in the opposite direction, and if it picks up enough speed, the internal centrifugal clutch reversing switch prevents reversal. Reapplication of power under these conditions merely makes the motor continue in the wrong direction, thereby *aiding* the crank-down process in the *wrong direction*.

In one instance, the power cord accidently got unplugged. The tower cranked down from the fully extended position to the nested position in about 10 seconds, quite a jolt, were it not for the buffer system described later.

Proper Rotation of Motor

The crank-up rotation should be compatible with the rotation of the fluid drive. In my case the rotation was incompatible but

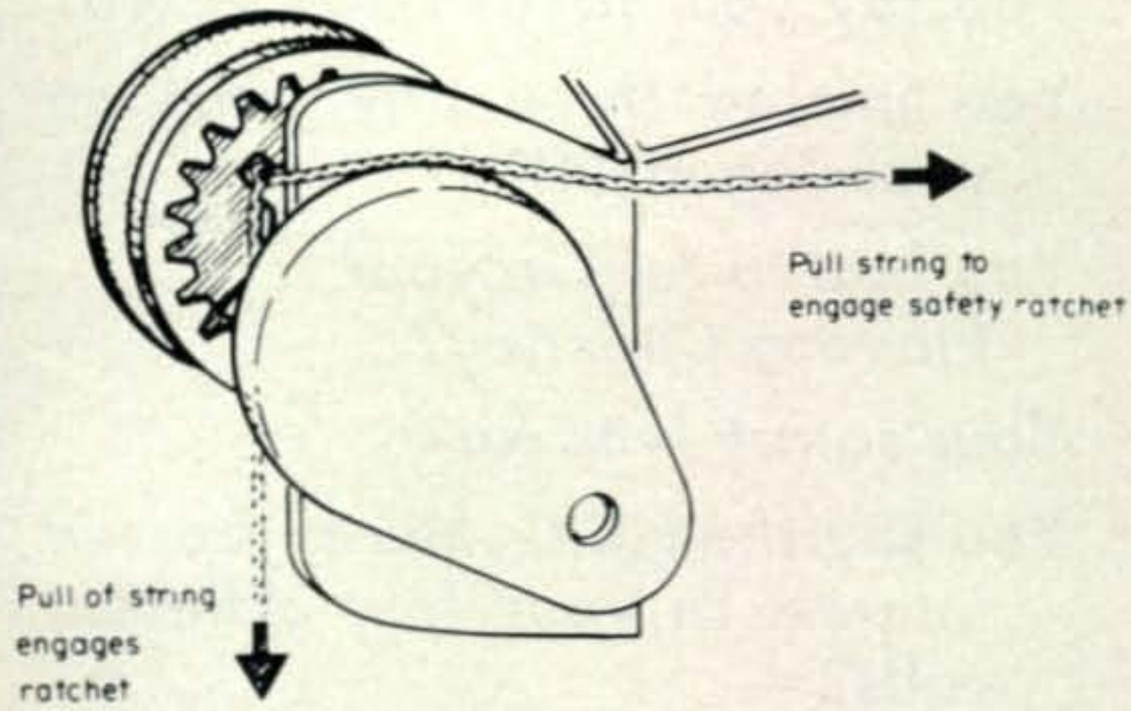


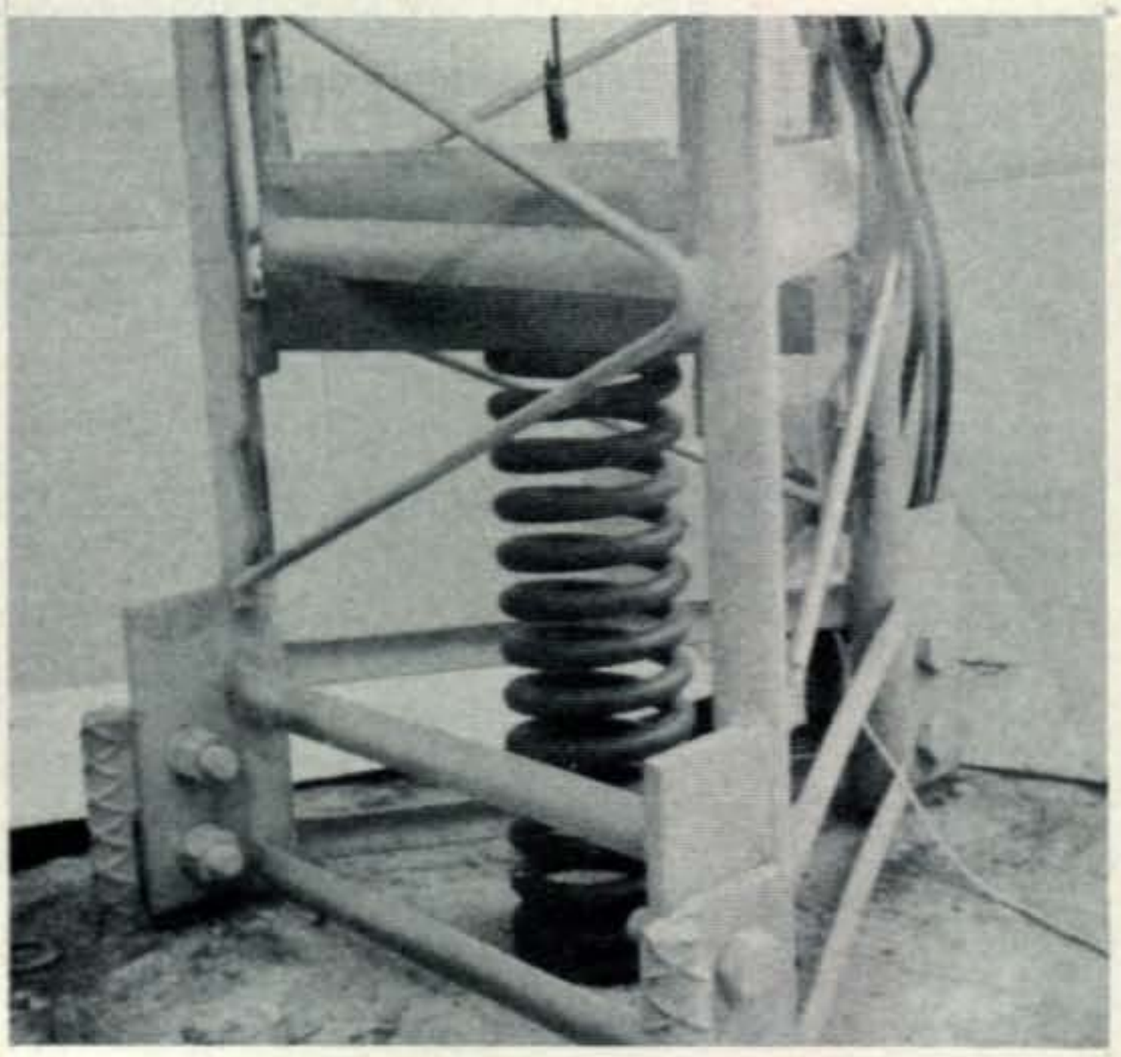
Fig. 2—A simple method of using string attached to the safety ratchet to actuate the safety stop. Strings are shown for either clockwise of counter-clockwise rotation. Use only one.

this was corrected merely by unwinding the cable from the drum and winding it up in the reverse direction. Fortunately, the common boat winch ratchet works either way, the center position being neutral, a saving grace in this application.

For those not familiar with small a.c. motors, the rotation can be changed by reversing the starting winding, or in case of split phase capacitive motors, by reconnecting the capacitor leads.

Don't overlook the possibility of using d.c. motors which seem to be abundant in surplus. When used in conjunction with silicon rectifiers they work better than their a.c. counterparts.

[*Continued on page 86*]



The simple buffer system consists of a stiff coil (truck type) spring and a piece of 2 × 4 lumber. In the event that the tower plummets, the shock is taken up by the spring.

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DX

BY JOHN A. ATTAWAY,* K4IIF

It doesn't feel like it right now, but autumn is just around the corner, and when it arrives the summer DX doldrums should be over.

For those of you anxious to build up your zone, prefix, and country scores in a hurry, the fall contest season offers you several notable opportunities. The quickest way to line up the ones you need and work them in short order is to get in a DX contest. Everything you need won't be there, particularly if you've worked all the easy ones, but there are always a number of moderately active stations on. DX-peditions to rare and semi-rare locations are frequently scheduled for contest weekends, particularly the *CQ* Worldwide DX Contests in October (phone) and November (c.w.).

Working them in the contests will take patience and know-how. When a fairly rare one comes on, say a VP2, 6Y5, YS1, etc., all the big guns will be working them. Sure they've all worked him previously for their individual standings, but everybody needs him again for the contest. Therefore don't expect to get the rarer ones immediately. If you try to butt heads with W4ETO, W6VSS, W3MSK, W4BVV, or other such super stations it will be a waste of effort. Bide your time, and after the big guns have scored and moved away you will get your turn.

It's not too early to be getting that antenna system ready and the entire station in top-flight working order for the contests. The season will be kicked off later this month with the German WAE (Worked All Europe) c.w. contest followed by the All Asian DX Contest. The WAE is the best time of the year to score rare Europe prefixes and countries, while the All Asian test produces rare prefixes and countries and some tough zones as well. See the CONTEST CALENDAR, elsewhere in this issue, for exact dates and complete details.

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

CQ SSB DX HONOR ROLL

W9ILW	320	ZS6LW	308	K2DX	297	PZ1AX	274
TI2HP	319	G8KS	307	W8BT	297	K9LUI	273
W2TP	318	W2ZX	305	K8IKB	296	W6PTS	272
WA2RAU	318	VE3ACD	305	W8EVZ	293	W6HKP	272
WA2IZS	317	W4OM	304	K8ONV	293	W8BVF	272
I1AMU	317	W4SSU	304	F2MO	292	G3NUG	270
W2RGV	316	PAØHBO	303	W2FXN	292	K9PPX	270
DL9OH	316	W6YMV	303	K1IXG	288	K4GXO	271
W3NKM	316	K0UKN	303	SM6CAS	286	G3WW	269
K6LGF	316	OK1AIM	302	W2LV	286	W9QLD	269
KP4CL	316	W2BXA	302	W6EUF	286	G2BVN	265
VK3AHO	315	W4IC	302	K8RTW	286	W2FXE	264
W4QCW	315	W6NJU	302	K9EXY	284	HP1JC	263
W6EL	315	VE2WY	302	W3KT	281	W2MJ	261
K6YRA	315	G3AWZ	301	W1LLF	280	W8ILC	255
WØBW	315	G3DO	301	W6UOU	280	CT1PK	254
W4NJF	314	G6TA	301	W3EWD	279	W6BAF	254
W4OPM	314	WA2EOQ	301	W4RLS	279	K6CAZ	254
WA8AJI	314	W3DJZ	301	K4OEI	279	PAØSNG	252
SM5SB	314	G3HDA	300	DL3RK	278	VE6TP	251
W5KC	311	K1SHN	300	DL1IN	276	W1AOL	250
G3FKM	310	W9JT	300	K4HYL	276		
XE1NE	308	5Z4ERR	298	W7DLR	276		

To remain on the Honor Roll, a station must update his country total at least annually.
6-3-70

De Extra

Plaudits for the League: At its May, 1970 meeting the ARRL Board took two very favorable and constructive actions regarding its DX program. One of these was the establishment of a permanent structure of advisory committees which, for the first time, will include a DX advisory committee. From our own experience with the *CQ* DX awards Advisory Committee we feel that this will be very beneficial in bringing DXCC administration closer to the grass roots DXer.

The second action was modification of the controversial rigid proof requirement for DX-peditions. In the future, documented proof will only be needed when complaints are filed alleging illegal operations. We suppose that these complaints might be expected to arise when amateurs of one country are operating in territory administered by another country. However, to be on the safe side we suggest that DX-peditioners save the necessary documents to "prove" their operation in case unexpected static does arise.

The S.S.B. DX Award Program

100 Countries

634.....WB2RLK
635.....CE3OE
636.....W9GHO
637.....W8PCA
638.....DK2UN
639.....W7FCD

200 Countries

201.....KH6BB
202.....WB2RLK
203.....VE7WJ

Rules and application blanks for the S.S.B. large, self-addressed, stamped envelope to Jerry Hagen, WA6GLD, 5031 Arroway Ave., DX Awards may be obtained by sending a Covina, Calif. 91723.

Left, Dale Strieter, W4DQS, being congratulated by K4IIF after the announcement of his election to the DX Hall of Fame. The occasion was the Annual Orlando Hamfest on May 23, 1970.

Unfortunately the Board permitted one negative action which would disturb us somewhat if it hadn't created the DX Advisory Committee. This was its quiet rejection of December Foster's 1969 motion that the General Manager implement the preparation of the countries list recognized and accepted by all IARU societies which issue DX awards. Mr. Foster's original motion was amended to state that the President and General Manager would study the feasibility of such a list. We were afraid this meant sweeping it under the rug, but we kept our fingers crossed. Unfortunately our fears were justified as this so-called 1-year study failed to involve K4DSN, who has studied the country list concept extensively, or any of the European DX leaders who have expressed concern over the conflicting lists now in existence. Frankly we haven't heard of anyone who was consulted during this study. Correspondence between this column and the General Manager elicited the comment that this idea had already been rejected in 1957.

In our opinion the situation is not exactly the same as it was in 1957, and a much better countries list is possible. We believe that a viable, interesting DX program is feasible without a list which includes many phoney, non-existent countries. Perhaps Mr. Foster's motion, of which this column heartily approved, was not the best way. However, since it never got a chance we don't really know. This would be a good item for consideration by the new ARRL DX Advisory Committee.

The WAZ Program

S.S.B. WAZ

788.....SVØWI
789.....UA3AVV
790.....UQ2KFG
791.....KL7MF
792.....OE5HGL
793.....K6MHD
794.....W6EBO
795.....W1HOO
796.....I1ZSQ
797.....VE7WJ
798.....WB6UDC
799.....DL7LJ
800.....DL6ME

C.W.—Phone WAZ

2911.....YV4AU
2912.....W8GOC
2913.....UA4LM
2914.....UA3DM
2915.....UT5FI
2916.....SM5ACQ
2917.....SM5DSF
2918.....SM5BCZ
2919.....SM3AGO
2920.....SM6CZU
2921.....SM7CGY
2922.....K2IEF
2923.....W3FU
2924.....K6AAW
2925.....OZ2X
2926.....HB9AT
2927.....SM7DBD
2928.....DJ4UF
2929.....DJ5NC
2930.....DL8KO
2931.....DL1JF

Phone WAZ

442.....DU1FH
443.....SM3DKO

Rule sheets and WAZ applications may be obtained by sending a large self-addressed, stamped envelope to DX Editor, Box 205, Winter Haven, Fl.

For the Man Who Has Everything—QRPp DX

If you're WAZ, have worked your 300 countries, and have made WPX with a long string of endorsements, maybe you need a new challenge. Believe me, after glancing through the *Milliwatt*, QRPp Journal devoted exclusively to the under 5 watts input gang, very low power could be it. This group is just getting off the ground, but here are a couple of their recent reports:

de K4DCD: 120 QSO's in 25 states plus OK2, HC1, and LU9 using 2 watts input.

de WA6GER: Prefer my 3 watt rig now and wish to sell the C.E. 20A I was using for high power work. (*The 20A is a 20 watt rig.*—EDITOR)

The top QRPp DXer of the U.S. may very well be Bob Rosier, K4OCE, of Greensboro, N.C. According to the April issue of the *Milliwatt* Bob made the following QSO's during 1969 on 20 meters:

Date	Time (GMT)	Call	Power Input (watts)	RST	Distance (miles)	Miles/w.
4/15	0150	AP5HQ	7	569	7000	1,000
3/9	0245	OD5LX	7	569	6000	855
8/22	0353	ZL2AFZ	.003	329	8000	2,680,000
5/25	0141	UL7KFE	7	569	6000	855
5/11	0311	TA2E	7	599	5000	715
4/15	1135	JA2BVL	4	559	16000L-P	4,000
7/17	0200	3V8NC	7	579	4500	690
4/27	0115	VU2LE	7	569	6000	855
4/7	2355	SU7IM	7	579	6000	855
4/16	1110	VQ8CPR	7	599	10000	1,425

Ye DX Editor doesn't pretend to be an

authority on QRP, but K4OCE's New Zealand QSO on March 22, 1969 using only 3 milliwatts must be some kind of record. If anyone can top it this column would like to hear from you. Incidently Bob uses "'OCE Minirigs" of his own design and construction. His antenna is a 4 element 20 meter quad at 38 feet. Next month's column will have a more complete story on his activities.

Anyone interested in subscribing to the *Milliwatt* should contact Mike Czuhajewski, WA8MCQ, Route 3, Paw Paw, Michigan 49079.

The following letter applies to you high power cats running 100 watts or more:

de K8EEG/0–"I have only one gripe with the QRO boys on 20 and 15 and it is this. They continue to jump on the ordinary DX like G2, OH3, and OK2 even though they have a bushel of QSLs from those spots. This is fine and in the interest of international good-will for sure, but the QRPp'r attempting to do some real DX by working OK or G with a few hundred mw it can get pretty discouraging to sit all evening with great anticipation and perfect conditions only to have an experienced KW and 4 element quad land on frequency time after time. I've been on the brink of replying to a QRZ directed at me by some DX station obviously aware that my 800 mw is in there, when one of the big boys blasts my chances. 800 mw's limits the chances for contacts severely so this is very frustrating. Therefore please suggest to the seasoned DXers that before they call a prefix they've worked numerous times, to please give a quick listen to see if some stateside station is calling with a very weak signal. I realize this is a hard procedure to follow as varying skip conditions often reduce a powerful signal to the noise level stateside, but it won't cost anyone anything. So much for my comments on the state of QRO *vs* QRP."

Amateur Radio in Czechoslovakia

This information was provided by Tibor, OK3BG. Many thanks, OM!

Czechoslovakia has almost 3000 amateur radio stations of which about 500 are club stations. They engaged in the usual h.f. and v.h.f. activities including contests, traffic, transmitter hunts and construction projects, most of which are organized and coordinated by the Central Radio Club in Prague.

Licenses: A Novice license can be obtained in Czechoslovakia at age 15 and remains in force until age 18 at which time an operator becomes eligible for a full license. The full license must be renewed every 3 years. Licensed foreign operators can operate existing OK stations as guests or may obtain a temporary license with an OK8 prefix.

Novices are permitted to use 10 watts input on 160 Meters (1.75-1.95 mc) and on the

Happy in anticipation of 5BDXCC #15, Gary Stilwell, W6NJU, relaxed at the Fresno DX Meeting Happy Hour. Gary had just got word that he was through with the long pursuit of the big award. He is a member of the CQ DX Awards Advisory Committee.

145-145.85 mc segment of 2 Meters. Full licenses are available in 3 classes designated A, B, and C. The Class A license allows 300 watts input on all bands with all types of emission while Class B allows 75 watts input on all bands with all types of emission. Class C operators may only use 25 watts and are restricted to 1.75-1.95 mc c.w., 3.52-3.60 mc c.w., 144.5-144.85 mc, 435-440 mc, and all over 1215 mc with all types of emission. In addition, special licenses can be obtained for up to 1 kilowatt input and for unusual types of emission. Class B and C licenses can be obtained directly, but eligibility for Class A requires 3 years of practice in Class B. Code speed requirements are 10 w.p.m. for Novice and Class C, 15 w.p.m. for Class B, and 20 w.p.m. for Class A.

Bands: The h.f. bands available to Czech operators are 1.75-1.95 mc (c.w. only), 3.50-3.80 mc (3.50-3.60 c.w. sub-band), 7.00-7.10 mc (7.00-7.04 c.w. sub-band), 14.00-14.35 mc (14.00-14.10 c.w. sub-band), 21.00-21.45 mc (21.00-21.15 c.w. sub-band), and 28.00-29.70 mc (28.00-28.20 c.w. sub-band). v.h.f. bands are 144-146, 430-440, 1215-1300, 2300-2450, 5650-5670, 10000-10500, and 21000-22000 mc with all types of emission including F3. Special sub-bands are designated for RTTY on the h.f. bands and on the 145 and 435 mc v.h.f. bands. Portable or mobile operation is allowed without special permission.

Call Sign Systems: Czechoslovakia has 2 prefixes assigned to amateur radio, OK and OL. A third prefix, OM, was in use during the 50th anniversary of independence in 1968. The 3 letters after the prefix are individual except that if the first letter after the numeral is either K, O, or R a club station is indicated. For example, OK1KAA would be a club sta-

The WPX Program

S.S.B. WPX

510.....YU1AG
511.....HK3WO
512.....W8MXO
513.....G3OLY
514.....WA9FWY
515.....ZS9L
516.....W9KAA
517.....SM7DMN
518.....SM7CGY
519.....UW3IN
520.....UB5WE
521.....WA5CBT
522.....K6GKU
523.....WAØETC
524.....DL3VX

C.W. WPX

1029.....OK3CGN
1030.....SM4CPW
1031.....SM5CMP
1032.....SM5UH
1033.....SM5BRS
1034.....SM7PD
1035.....OK3CIR

Mixed WPX

234.....CX9BT
235.....SM7CCU
236.....KØHUD

WPNX

19.....WN3MHF

VPX

23 (Phone).....SP9-649
24 (Mixed).....UA3-170-1

WPX Endorsements

S.S.B.: W4NJF–800, HP1JC–650, W3DJZ–600, F2MO–600, WA6TAX–450, WØYDB–400, W6AOI–400, OE3SAA–400, G3OLY–350, UB5WE–350, HK3WO–300, SM7DMN–300, K6SSN–250, WA9FWY–250, and DL3VX–250.

C.W.: W2AIW–800, W4NJF–800, VK3-AHQ–750, VO1AW–500, W2MLO–450, K4RDU–450, UA3KZO–350, and OK3CIR–350.

Mixed: W2FLD–550, W6EYY–550, and SM7CCU–450.

Phone: W3DJZ–650, F9MO–550, and W1-PCD–450.

Phone: W3DJZ–650, F9MO–550, and W1-PCD–450.

80 Meters: SP9-649, HK3WO, and UT5KDP.

40 Meters: YU1SF and DL3RK.

20 Meters: OK1MP and SP9-649.

15 Meters: SP9-649.

Asia: OK1MP and SP9-649.

Europe: HK3WO, OE5KML, W4WSF, SM7-DMN, SM5UH, SP9-649, and UA3-170-1.

North America: W4WSF and DL3RK.

Rules sheets and application forms for WPX, WPNX, and VPX may be obtained by sending a large self-addressed, stamped envelope to either the DX Editor, Box 205, Winter Haven, Fl., or to the WPX Manager, 5031 Arroway Ave., Covina, Calif. 91723.

tion. OK1 stations are in Bohemia, OK2 in Moravia, OK3 in Slovakia, OK4 on ships of the merchant marine, OK5 and OK6 are for special stations, OK7 is for non-amateur experimental stations on amateur bands, and OK8 is for stations of licensed foreign citizens.

OL prefixes indicate novice stations located as follows: OL1-Central Bohemia, OL2-South Bohemia, OL4-North Bohemia, OL5-East Bohemia, OL6-South Moravia, OL7-North Moravia, OL8-West Slovakia, OL9-Central Slovakia, and OLØ-East Slovakia.

Licensed amateurs in Czechoslovakia whether visitor or native must use their own call after the regular call when operating as a visitor in someone else's shack. The 2 calls are separated by a slant bar, for example, OK1AA/OK3XX or OK2BAA/SP1AA.

Contest Activity: Two international contests are arranged annually by Czechoslovak radio amateurs. These are the well-known OK DX Contest on the h.f. bands the 2nd Sunday of November and the Polni Den (Field Day) on v.h.f. the first weekend of July. In addition there are several national level contests and a few regional v.h.f. contests with international participation.

Certificates and Awards: The Central Radio Club issues certificates to licensed radio amateurs of any country who can submit evidence of 2-way contacts. Among these certificates are:

S6S–QSO's with at least 1 station in each of the 6 continents since Jan. 1, 1950. Contacts must be all c.w. or all phone (a.m., f.m., s.s.b., etc.). Endorsement stickers will be issued to the basic certificate for contacts all on a single band.

P75P–QSO with at least 1 fixed station in each of the 75 geographical broadcasting zones defined by the ITU in Geneva in 1959. Contacts must have occured since Jan. 1, 1960, and there are 3 classes of award: 3rd class–50 zones, 2nd class–60 zones, 1st class–70 zones. The minimum received report is 337 on c.w. or 33 on phone.

WKD 100 OK–QSO with at least 100 different OK stations since Jan. 1, 1954. Endorsement stickers are available for every 100 additional stations confirmed up to 500.

OK SSB Award–Two-way s.s.b. QSO's with different Czechoslovak stations since Jan. 1, 1969. Applicants outside Europe must work 25 stations while European applicants must work 50 stations.

There is also a v.h.f. award called VKV 100 OK, and an s.w.l. award called P 100 OK. The former ZMT, ZMT 24, P-ZMT and P-ZMT 24 certificates were cancelled as of Dec. 31, 1968.

All the certificates are issued free of charge to members of clubs and associations who grant reciprocal privileges to Czech amateurs.

The fee for all others is P 75 P–10 IRC'c and other awards 5 IRC's. Endorsement stickers require 1 IRC. Any altered or forged confirmations will result in disqualification of the applicant.

Applications should be sent to Central Radio Club Award's Manager, P.O. Box 69, Praha 1, Czechoslovakia. QSL cards must be sent with the application unless confirmed by a national level amateur radio society or club. If not stated otherwise all amateur bands and types of emission may be used.

QSL Bureau: The Central Radio Club, P.O. Box 69, Praha 1, Czechoslovakia functions as QSL Bureau for all OK amateurs.

QSL Information

The following would like to volunteer their services as QSL Manager for a DX station: D. G. Larison, W7HKI, Traveler's Lodge, Edmonds, Wa. 98020.

AX9XI–Via W2CTN.
BY1PK–To Box 427, Peking, China (If any U.S. operator receives a QSL from this station please notify the *CQ* DX Department.)
C31CR–c/o WB2NXL.
C31CT–Via WB9HYS.
CR6GO, CR6BX, CR6CA, CR6DA, CR6IK, and CR6FY–c/o Box 10408, Luanda, Angola.
CT2AK–To VE7BWG.
EA6AR–c/o DL7FT.
EL2AT–Via W4NJF.
EL2CB–To W2CTN.
EP2ER–c/o R.I.I.–IRALCO, P.O. Box 1577, Richmond, Va. 23213.
ET3DS–Via VE3DLC.
ET3USA–To W4SYX.
FB8WW–c/o F5QE.
FB8YY–Via F9MS.
FHØVP–To W2MZV.
FK8BG/P–c/o W5IXQ.
FM7WQ–Via W4OPM.
FO8CA–F2RS.
FPØLK–co WB2RLK.
HBØLL–Via WA4WAO.
HBØXJB–c/o K4CFS, 507 Atlanta Ave., Pensacola, Fl. 32507.
HC8GS–To HK3WO.
HS3ACV–c/o W8BVS.
HS6ADE–Via KØBHM, 10809 Johnson Dr., Shawnee, Kansas 66203.
GM3CSM–W/K/VE QSL to WB9BGS, 1029 E. 3rd. Ave., Monmouth, Ill. 61462.
JX5CI–Via W2CTN.
JY1–P.O. Box 1055, Amman, Jordan.
KC6CT–To W9VW.
KG4DS–c/o VE3BYN.
KM6DQ/KH6–P.O. Box 100, FPO, San Francisco, Ca. 96114.
KX6FJ–P.O. Box 189, Lynn, Mass. 01903.
LX2CQ–Via DK1YK.
MP4BHW–To WB4HIT.
OJØDX–c/o OH2BH.
OX3FD–Via WB8ABN.
TJ1AW–To K4ZCP.
PZ1AV–c/o W2CTN.

"Luk" Hinze, I1HL, of the Trieste DX Association. Luk has been an active DXer since 1957 and has worked over 4,000 US stations out of 10,000 total QSO's. He holds the WPX and WAZ awards.

TR8AG–Via CR6GO, Box 10408, Luanda, Angola.
TT8AF–c/o W4SPX.
VP5TH–Via WA5GFS.
VR1L–To W6NJU.
VR1O–c/o G3NRA.
VR4EZ–Via W2CTN.
VS5PH–To DL3RK.
WN3NLP/1TI–Don Trayes, Box 377, FPO, New York, N.Y. 09523.
XQ3ZN–c/o CE3ZN, P.O. Box 10308, Santiago, Chile.
YB1AAK–Via K9EYZ.
YB9AAJ–To W7VRO.
YK1AA & YK1AM–P.O. Box 35, Damascus, Syria.
ZD8AB–c/o W8BMS.
ZK1AJ–Via KH6CLU.
ZM3PO/C–To ZL2AFZ.
3AØFE–Via K4CFS.
6Y5UIR–c/o 6Y5RA, Red Cross Bldg., 76 Arnold Rd., Kingston 5, Jamaica.
8P6AZ–Via VE3DLC.
8R1U–To VE3DLC.
9A1AIJ (1963-64 operation)–c/o Luciano Fusari, I1FLN, Via Cavalcanti 35, 50133 FLORENCE, Italy.
9J2WS–Via W4LF.
9L1RP–To GW3AX.
9N1MM–c/o W3KVQ.
9Q5DG–Via W6KTE.

A number of Turkish addresses were sent by W5QPX. As these are rather difficult to obtain they will be reproduced in full:

TA1–Europe

TA1HY–Halit Yetkin, P.O. Box 23, Bakirkoy, Istanbul.
TA1IB–Ismail Bayer, Via TRAC QSL Bureau, Box 699, Karakoy, Istanbul or to W4GHV.
TA1KT–Kamuran Topakoglu, Piyerloti Cad, Cinar Sok. No.: 58/6 Beyazit, Istanbul.
TA1NC–Nuri Citakoglu, Gedikpasa, Emin Sinan Camli Sol. No.: 247, Beyazit, Istanbul.
TA1RT–Reyhan Topakoglu, QSL via TA1KT.
TA1SY–Serpil Yetkin, QSL via TA1HY.
TAØA–TRAC Istanbul Club Station, Box 699, Karakoy, Istanbul.

TA2–Asia

TA2AE–Ali Ertenu, P.O. Box 122, Karakoy, Istanbul.
TA2QR–Engin Ertekin, P.O. Box 589, Karakoy, Istanbul.

73, John, K4IIF.

Contest Calendar

BY FRANK ANZALONE,* W1WY

Calendar of Events

Aug.	1-2	Romanian Contest
Aug.	1-2	Maryland/DC QSO Party
Aug.	1-2	Illinois QSO Party
Aug.	1-2	TWO and QSO Party
Aug.	8-9	DARC WAE C.W. Contest
Aug.	8-9	Ohio QSO Party
Aug.	15-16	New Jersey QSO Party
Aug.	22-23	All Asian C.W. Contest
Aug.	22-24	Ten Meter Band Contest
Aug.	29-31	South Carolina QSO Party
Sept.	12-13	DARC WAE Phone Contest
Sept.	12-14	FOUR Land QSO Party
Sept.	12-14	Washington State QSO Party
Sept.	19-21	VE/W Contest
Sept.	23-25	YL "Howdy Days."
Oct.	3-5	Massachusetts QSO Party
Oct.	3-5	California QSO Party
Oct.	3-4	VK/ZL/Oceania DX Phone
Oct.	10-11	VK/ZL Oceania DX C.W.
Oct.	10-11	RSGB 28 mc Phone Contest
Oct.	16-18	RTTY Plaque Sweepstakes
Oct.	17-18	Boy Scouts Jamboree
Oct.	17-18	WADM C.W. Contest
Oct.	21-22	YL C.W. Anniv. Party
Oct.	**24-25**	**CQ WW DX Phone Contest**
Oct.	24-25	RSGB 7 mc C.W. Contest
Nov.	4-5	YL Phone Anniv. Party
Nov.	7-8	RSGB 7 mc Phone Contest
Nov.	8	Czechoslovakian Contest
Nov.	**28-29**	**CQ WW DX C.W. Contest**

Ohio QSO Party

1900 GMT Aug. 8 to 0300 GMT Aug. 9
1500 GMT Aug. 9 to 2300 GMT Aug. 9

The same station may be worked on each band and mode for contact credit and Ohio stations may work other Ohio stations.

Exchange: QSO nr., RS/RST and QTH. County for Ohio, ARRL section for others.

Scoring: Contacts made on 10 thru 80 count 1 point, but 2 points if on 160 or frequencies above 50 mc. Ohio stations multiply total QSO points by the total ARRL sections worked, others use Ohio counties for their multiplier. (max. of 88) Portable stations in Ohio are given a bonus multiplier of 1.5 if they operate from one of the rare counties.

Frequencies: 1805, 3575, 3975, 7075, 7275, 14075, 14285, 21075, 21375, 28075, 28575, 50.15 and 145.10. Try phone on even GMT hours and c.w. on odd hours, 160 at 0200 on the 9th.

Awards: Certificates to the winners in each ARRL section and Ohio county. (min. of 10 contacts) Also 1st, 2nd and 3rd place awards to the top stations in Ohio and out-of-state.

Logs must be received by Sept. 8th by: Ohio QSO Party, Att: Robert Dixon W8ERD, 311 East Kelso Road, Columbus, Ohio 43202. Include a s.a.s.e. if results are desired.

Ten Meter Band Contest

Starts: 1300 GMT Saturday, August 22
Ends: 0100 GMT Monday, August 24

The West Valley A.R.C. of Woodland Hills, Calif. has organized this one to encourage activity and mark the seasonal opening of the 10 meter band.

All contacts must be made on 10, phone or c.w., cross-mode contacts are valid and each station may be worked only once.

Exchange: Only necessary to exchange signal reports. Therefore contacts made in the All Asian contest on the same week-end are valid.

Scoring: Add points as follows, 1 for each station, 1 for each state, 1 for each country, 1 for each WVARC member contacted and 3 for each continent worked. No multiplier, just add points as contacted.

Use the ARRL county list. WVARC members will identify themselves. W/K stations should include their state in their report.

Include a summary sheet showing the scoring and other information. Log forms are available from the WVARC for a s.a.s.e.

Mailing deadline is Sept. 24th: WVARC Contest Committee, c/o John Musselman WB6UHF, 22213 Burbank Blvd., Woodland Hills, Calif. 91364.

South Carolina QSO Party

Starts: 2000 GMT Saturday, August 29
Ends: 0500 GMT Monday, August 31

This is the 4th QSO party sponsored by the Low Country A.R.C. of N. Charleston, S.C. The same station may be worked on each band and mode for contact points.

Exchange: QSO nr., RS/RST and QTH. County for S.C. stations; state, province or country for all others.

Scoring: One point per QSO, S.C. use state, provinces and countries; out-of-state stations use S.C. counties. (Max. of 46)

Frequencies: 1810, 3580, 7060, 14070, 21070, 28060 for c.w. and 3915, 7260, 14290, 21380, 28600 for s.s.b. Novices 3725, 7175, 21110.

*14 Sherwood Road, Stamford, Conn. 06905.

Awards: Certificates to the first place winners in each state, VE province and country, and the first 3 winners in So. Carolina.

Mailing deadline is Sept. 15th to: Low Country A.R.C. Att: Contest Chairman, P.O. Box 5026, North Charleston, S.C. 29406.

Four Land QSO Party

Starts: 1800 GMT Saturday, September 12
Ends: 0200 GMT Monday, September 14

This is a new one organized by the 4th District Chapter #79 of the CHC International, to make the many counties in the eight 4th District states available for the county hunters.

The same station may be worked on each band and mode fixed, and again if operated portable or mobile. Fourth District stations may work other in district stations.

Exchange: QSO nr., RS/RST and QTH. County and state for 4th Dist. stations; state, province or country, plus county for others.

Scoring: *For 4th District:* Total QSOs × states × countries × continents. *All others:* Total QSOs × 4th Dist. states × 4th Dist. counties. State and counties count once only.

Frequencies: C.W.–3575, 7060, 14075, 210-90 28090. Phone–3940, 7260, 14343, 21360. 28600. Novice–7150, 21100.

Awards: Certificates to top scorers in each state, VE province, country and continent; 2nd and 3rd place awards when warranted. Also county awards to 4th District states and special awards to Novices and s.w.l.s.

Mailing deadline is Oct. 31st to: CHC Chapter #79, Att: Bob Knapp, W4OMW, Rt. 7, Box 187, Greenville, N.C. 27834.

Washington State QSO Party

Starts: 2000 GMT Saturday, September 12
Ends: 0200 GMT Monday, September 14

The fifth annual Washington State QSO Party sponsored by the Boeing Employees' A.R.S. will be held on the final week-end of the Washington State Radio Week.

All bands and modes may be used and the same station may be worked on each band and mode for contact points. Wash. may work other in-state stations for QSO points.

Exchange: QSO nr., RS/RST and QTH. County for Wash.; state, province or country for others.

Scoring: Wash. stations score one point for each contact, all others two points for each Wash. QSO. The multiplier for Wash. is states, VE provinces and countries; others total Wash. counties worked. (max. of 39)

Frequencies: C.W. 3560, 7060, 14060, 210-60, 28100. Phone–3960, 7260, 14290, 21390, 28600. Novices–3735, 7175, 21204.

Awards: Certificates to the highest scoring stations in each state, VE province, country and Wash. county. The Five Bears certificate is available to stations working five club members, during or after the party. Work club station K7NWS and a gold seal sticker will be attached to either certificate.

Mailing deadline is Oct. 19th to: Boeing Employees' A.R.S., Att: Willis Propst K7RSB, 18415 38th Avenue South, Seattle, Wash. 98188.

VE/W Contest

Starts: 2300 GMT Saturday, September 19
Ends: 0200 GMT Monday, September 21

The Montreal A.R.C. has made some notable changes in this year's contest. 1. The dates are a week earlier than usual. 2. The multiplier is now the sum from each band. 3. Dupe check sheets are required for logs with 200 or more contacts. 4. Log sheets are now available from the M.A.R.C.

Only 20 hours of operating time are allowed during the 27 hour contest period. The minimum off period is 15 minutes, and on and off times must be indicated on the log.

Its the VE/VOs working the W/Ks in the "General" portions of the US bands. Phone and c.w. are considered different contests and must be scored separately. There are two classifications, single and multi-operator.

Exchange: QSO nr., RS/RST and QTH. ARRL sections for W/Ks; geographical areas for the VE/VOs. (Provinces, plus Newfld., Lab., Yukon and N.W.T. Total of 13)

Scoring: Each completed QSO is 2 points. W/Ks use sum of VE sections from each band for their multiplier. (13 for each band) VE/VOs will use ARRL sections.

Awards: Certificates to the highest scoring station, both phone and c.w., in each section. (min. of 25 QSOs) Awards to multi-operator stations will only be issued when there are at least 3 entries per section. And two Trophies, to the highest scoring Canadian and U.S. stations.

Summary and check sheets are a *must*, as is a signed declaration that all rules and regulations have been observed.

Log sheets are available if you send a large s.a.s.e. or IRCs to address below.

Mailing deadline for logs is October 31st to: M.A.R.C. Contest Committee, 262 Braebrook Ave., Pointe Claire, Quebec, Canada.

CQ World Wide DX Contest

Phone–Oct. 24-25 **C.W.**–Nov. 28-29
Starts: 0000 GMT Saturday
Ends: 2400 GMT Sunday

Rules are the same as previous years and will be given in detail next month. Following is a brief run-down for the benefit of our friends in remote areas.

1. All bands may be used, 1.8 thru 28 mc.
2. Exchange, RS/RST plus your Zone.
3. QSO point value: (a) 3 points between stations on different continents. (b) 1 point between stations on the continent but in different coun-

[*Continued on page 84*]

Propagation

BY GEORGE JACOBS,* W3ASK

THE plateau in the present sunspot cycle continues. The Swiss Federal Solar Observatory, the official keeper of sunspot data, reports a monthly mean sunspot number of 131 for May, 1970. This results in a smoothed sunspot number, from which the sunspot cycle is derived, of 105 centered on November, 1969. This is approximately the same level of solar activity that has existed since April, 1969.

On the assumption that the cycle will begin to decline again, a smoothed sunspot number of 90 is predicted for September, 1970.

September is usually a month of changing propagation conditions on the high frequency amateur bands. During the month an increasing number of DX openings are expected during the daylight hours on 10, 15 and 20 meters, although these bands will close somewhat earlier than during the midsummer months. Improved nighttime DX propagation conditions are also forecast for 40, 80 and 160 meters, with considerably lower static levels and with the bands remaining open somewhat longer than during the past few months.

Beginning about mid-September and continuing through early October, there is generally a very noticeable improvement in h.f. propagation conditions on long openings between the northern and southern hemispheres. This should result in more frequent openings between the USA and such areas as South America, South Africa, Australia, South Asia, etc., on all bands between 10 and 40 meters, with some openings possible on 80 and 160 meters as well!

V.H.F. Ionospheric Openings

Trans-equatorial, or TE-scatter openings are expected to peak during September, and 6 meter openings between the USA and South America should be possible during most nights of the month. While TE propagation favors the southern half of the United States, during September openings should be possible from most areas of the country. The optimum time for TE openings on 6 meters is between 8 and 11 P.M., local standard time at the path mid-point.

*11307 Clara Street, Silver Spring, Md. 20902.

LAST MINUTE FORECAST

September, 1970

	Forecast Rating & Quality			
Days	(4)	(3)	(2)	(1)
Above Normal: Sept. 5, 9, 13, 22, 24, 29.			B-C	C
Normal: Sept. 2-4, 6, 8, 10-12, 18, 20-21, 23, 25, 27-28, 30.	A-B	B-C	C-D	D-E
Below Normal: Sept. 1, 7, 14, 17, 19, 26.	C	D	D	E
Disturbed: Sept. 15-16.	D	E	E	E

HOW TO USE THESE CHARTS

The following is an explanation of the symbols shown above, and instructions for the use of the *CQ* propagation predictions:

1—Enter Propagation Charts on following pages under appropriate band and distance or geographical area columns. Read predicted times of band openings at intersection of both columns.

2—Following each predicted time of band opening is a forecast rating which indicates the relative number of days the band is expected to open during each month of the forecast period. The higher the rating, the more frequent the opening, as follows: (4) band open more than 22 days each month; (3) between 14 and 22 days; (2) between 8 and 13 days; (1) less than 7 days.

On the "Short-Skip" Chart where two numerals are shown within a single set of parenthesis, the first applies to the shorter distance for which the forecast is made, and the second to the greater distance. Note the forecast rating for later use.

3—With the forecast rating noted above, start with the numbers in parenthese at the top of the "Last Minute Forecast" appearing above. Read down the table for a day-to-day forecast of propagation conditions in terms of Above Normal (WWV rating higher than 6); Normal (WWV rating 5-6); Below Normal (WWV rating 4); Disturbed (WWV rating less than 4). The letter symbols (A-E) describe reception conditions (signal quality, noise and fading levels) expected for each day of the month and have the following meaning: (A—excellent opening with strong, steady signals; B—good opening, moderately strong signals, little fading and noise; C—fair opening, signals fluctuating between moderately strong and weak; D—poor opening, signals generally weak and considerable fading and noise; E—poor opening, or none at all.

4—This month's DX Propogation Charts are based upon a transmitter power of 250 watts c.w.; 500 watts s.s.b., or 1000 watts d.s.b., into a dipole antenna a quarter-wave above ground on 160 and 80 meters a half-wave above ground on 40 and 20 meters, and a wave-length above ground on 15 and 10 meters. For each 10 db gain above these reference levels, reception quality shown in the "Last Minute Forecast" will improve by one level; for each 10 db loss, reception will become poorer by one level.

5—Local Standard Time for these predictions is based on the 24-hour system.

6—The Eastern USA Chart can be used in the 1, 2, 3, 4, 8, KP4, KG4 and KV4 amateur call areas; The Central USA Chart in the 5, 9, and 0 areas, and the Western USA Chart in the 6 and 7 areas. The Charts are valid from September through October 1970 and are prepared from basic propagation data published monthly by the Institute For Telecommunication Sciences And Aeronomy of the U.S. Dept. of Commerece, Boulder, Colorado.

Solar activity may still be high enough this September to permit at least an occassional F-layer 6 meter opening between the USA and Central and South America, and perhaps also to South Africa and Australasia. The hours between noon and sundown local time should be optimum for F-layer DX openings, especially after the middle of the month.

Although the summertime sporadic-E propagation season usually comes to an end during September, some 6 meter short-skip openings are still likely to occur over distances ranging between approximately 1000 and 1300 miles. Some v.h.f. ionospheric openings may also result from an increased level of auroral activity expected during September. Check the "Last Minute Forecast" at the beginning of this column for periods that are forecast to be disturbed or below normal, as these are the days on which auroral type openings are likely to occur during the month.

Not much meteor activity is expected during September. No major meteor showers will occur, and few, if any significant meteor-scatter openings are likely to be possible.

September's Propagation Charts

Because of the marked changes in propagation conditions expected during September, this month's column contains both DX and Short-Skip Propagation Charts. The Short-Skip Charts are valid for both September and October, while the DX Charts are valid from September 15 to October 15.

CQ DX Contest Special

This year's *CQ* Worldwide DX contest will be held on the following dates:

Oct. 24-25 Phone section
Nov. 28-29 C.w. section

As has been the practice for the past 19 years, next month's Propagation column will be devoted to a special, comprehensive forecast which will include both contest sections.

September 15-October 15, 1970

Time Zone: EST (24-Hour Time)

EASTERN USA TO:

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

*Predicted times of 80 meter openings. Openings on 160 meters are also likely to occur during those times when 80 meter openings are shown for a forecast rating of (2), or higher.

Australia	09-11 (1) 15-16 (1) 16-18 (2) 18-20 (1)	07-08 (1) 08-09 (2) 09-11 (3) 11-13 (2) 13-16 (1) 16-19 (2) 19-21 (1)	06-08 (2) 08-10 (3) 10-12 (2) 12-15 (1) 15-17 (2) 17-20 (1) 20-22 (2) 22-01 (3) 01-03 (2) 03-06 (1)	02-04 (1) 04-06 (2) 06-07 (1) 04-06 (1)*
Northern & Central South America	07-08 (1) 08-09 (2) 09-13 (4) 13-16 (3) 16-18 (2) 18-19 (1)	05-06 (1) 06-07 (2) 07-10 (4) 10-12 (3) 12-17 (4) 17-19 (3) 19-20 (2) 20-21 (1)	02-04 (2) 04-06 (3) 06-09 (4) 09-14 (2) 14-16 (3) 16-22 (4) 22-02 (3)	18-19 (1) 19-20 (2) 20-03 (4) 03-05 (3) 05-06 (2) 06-07 (1) 20-22 (1)* 22-03 (2)* 03-05 (1)*
Brazil, Argentina, Chile & Uruguay	07-08 (1) 08-11 (2) 11-13 (1) 13-14 (2) 14-15 (3) 15-17 (4) 17-18 (2) 18-19 (1)	06-07 (1) 07-10 (2) 10-13 (1) 13-15 (2) 15-16 (3) 16-19 (4) 19-21 (3) 21-22 (2) 22-00 (1)	09-15 (1) 15-17 (2) 17-19 (3) 19-00 (4) 00-03 (3) 03-05 (2) 05-07 (3) 07-09 (2)	20-23 (1) 23-04 (2) 04-06 (1) 00-05 (1)*
McMurdo Sound, Antarctica	16-18 (1) 21-22 (1)	11-14 (1) 14-17 (2) 17-20 (3) 20-21 (2) 03-07 (1) 07-09 (2) 09-10 (1)	15-17 (1) 17-21 (2) 21-00 (3) 00-03 (2)	22-00 (1) 00-04 (2) 04-06 (1) 03-05 (1)*

Time Zones: CST & MST (24-Hour Time)

CENTRAL USA TO:

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

Time Zone: PST (24-Hour Time)

WESTERN USA TO:

	10 Meters	*15 Meters*	*20 Meters*	*40/80 Meters*
Western Europe & North Africa	08-11 (1)	07-08 (1) 08-12 (2) 12-14 (1) 21-23 (1)	05-06 (1) 06-09 (2) 09-11 (1) 11-13 (2) 13-16 (3) 16-18 (2) 18-20 (1) 22-00 (1)	19-20 (1) 20-22 (2) 22-23 (1) 20-22 (1)*

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

CQ Short-Skip Propagation Chart
September and October, 1970

Local Standard Time At Path Mid-Point
(24-Hour Time System)

Distance From Transmitter (Miles)

Band (Meters) / 50-250	*50-250*	*250-750*	*750-1300*	*1300-2300*
10	*Nil*	09-14 (1)	07-09 (1)	07-08 (1-2)
			09-11 (1-2) 11-13 (1-3) 13-14 (1-4) 14-16 (0-3) 16-18 (0-2) 18-21 (0-1)	08-09 (1-3) 09-13 (3-4) 13-14 (4) 14-16 (3) 16-17 (2-3) 17-18 (2) 18-19 (1-2) 19-21 (1)
15	*Nil*	07-09 (0-1) 09-13 (0-2) 13-14 (0-3) 14-16 (0-2) 16-21 (0-1)	07-09 (1-2) 09-13 (2-4) 13-14 (3-4) 14-16 (2-4) 16-19 (1-3) 19-21 (1-2) 21-07 (0-1)	07-08 (2) 08-09 (2-3) 09-16 (4) 16-19 (3) 19-21 (2-3) 21-22 (1-2) 22-00 (1) 00-07 (1-0)
20	11-13 (0-1) 13-16 (0-2) 16-21 (0-1)	07-09 (0-3) 09-11 (0-4) 11-16 (2-4) 16-21 (1-3) 21-02 (0-2) 02-07 (0-1)	07-09 (3-4) 09-16 (4) 16-21 (3-4) 21-00 (2-3) 00-02 (2) 02-07 (1)	07-09 (4) 09-15 (4-3) 15-21 (4) 21-23 (3-4) 23-00 (3) 00-02 (2) 02-07 (1-2)
40	07-09 (2-3) 09-18 (4) 18-20 (3-4) 20-22 (2) 22-05 (1) 05-07 (1-2)	07-09 (3-4) 09-11 (4-3) 11-15 (4-2) 15-17 (4-3) 17-20 (4) 20-22 (2-4) 22-00 (1-4) 00-05 (1-3) 05-07 (2-3)	07-09 (4-2) 09-11 (3-1) 11-15 (2-1) 15-17 (3-2) 17-20 (4-3) 20-00 (4) 00-06 (3-4) 06-07 (3)	07-09 (2-1) 09-15 (1-0) 15-17 (2-1) 17-19 (3-2) 19-20 (3) 20-06 (4) 06-07 (3)
80	06-11 (4) 11-18 (4-3) 18-23 (4) 23-06 (3-4)	06-08 (4-2) 08-11 (4-1) 11-16 (3-1) 16-18 (3-2) 18-06 (4)	06-08 (2-1) 08-16 (1-0) 16-18 (2-1) 18-21 (4-2) 21-03 (4) 03-05 (4-3) 05-06 (4-2)	06-08 (1) 08-16 (0) 16-18 (1) 18-21 (2) 21-03 (4-3) 03-05 (3-2) 05-06 (2-1)
160	16-18 (1-0) 18-20 (2-1) 20-05 (4) 05-07 (3-2) 07-09 (2-1) 09-11 (1-0)	17-19 (1-0) 19-20 (1) 20-02 (4-3) 02-05 (3-2) 05-07 (2-1) 07-09 (1-0)	19-20 (1-0) 20-22 (3-1) 22-02 (3) 02-05 (2-1) 05-07 (1)	20-22 (1-0) 22-02 (3-2) 02-05 (1) 05-07 (1-0)

[*Continued on page 88*]

THE awards PROGRAM

BY ED HOPPER,* W2GT

THE July "Story of The Month" about Mike Lintner, WA3HGV after this data on Awards issued.

April was sure a *BIG* month for those qualifying for All 3079 Counties as you will note under the Special Honor Roll—7 new ones.

Ernest Jurusik, W8DCH played it cool and suddenly applied for All 3079 Counties, which also gave him 3000 Mixed, 2500 All Phone, 2000 All A3A, 1500 and 1000 All 7 mc A3A.

Carl Reed, WØKZZ acquired All 3079 Counties and USA-CA-3000.

Duane Harris, K2PFC (actually #1 USA-CA Award holder, having received #1-A, September 18, 1961) took time out from teaching, mobiling and issuing awards to apply for All 3079; 3000; 2500; 2000; and 1500.

Floyd Markham, K7WQJ, also took time out from mobiling and issuing awards to do the necessary paper work for All 3079 and 3000.

Cleo Mahoney, WAØSHE (wonder how she got such a beautiful call?) was able to keep up with most of her other activities like mobiling, helping the blind children, hold down her regular job, keep house, issue 303 Awards, act as QSL manager for W6JHV and K8DCR and still snag USA-CA-Awards 2500 and 2000 All A3A, 1500 and 1000 All 14 mc A3A and 500 All 3.9 A3A and All 14 mc A3A.

Joe Lindley, WA3FED qualified for USA-CA-2500 Award All A3A, just before going Maritime Mobile for a couple of months in European waters.

Chuck, WA8ASV won a 2000 award All A3A and 1500 and 1000 endorsed All 14 mc A3A Mobiles.

Ted Midlam, K7SQD/W7DSJ did it the hard way and was sent a USA-CA-2000 Award endorsed All A-1.

A USA-CA-500 Award endorsed All A-1 went to Boris Goransson, SM7TV. Mixed USA-CA-500 Awards were issued to: Ernest Guimares, WA1BFD; Paul Valentino, K4-FPF; Bill Winnegar, W6CLM; and Tore Stefferud, LA8LG.

Michael A. Lintner, WA3HGV

Although born in New York City, a move was soon made to Plainfield, N.J. and again in a short time a move was made to Arlington, Virginia where Mike grew up, completely ignorant of amateur radio.

Mike, WA3HGV and Jr. Op. #1.

*103 Whittman St., Rochelle Park, N.J. 07662.

FLASH

New Special Honor Roll
All 3079 Counties!

#25—Arne E. Kangas, W8DCD 4-6-70. (See story/foto *CQ* Jan. '69)
#26—Ernest Jurusik, W8DCH 4-6-70.
#27—Carl W. Reed, WØKZZ 4-6-70. (See story/foto March 1967)
#28—Duane H. Harris, K2PFC 4-9-70. (See story/foto *CQ* April 69)
#29—"Willie" Longwell, WA7IRD 4-9-70
#30—Dr. J. Blasi, W5ROP 4-14-70.
#31—Floyd A. Markham, K7WQJ 4-27-70.

A B.S. in Chemistry was obtained from M.I.T. (W1MX) but still no amateur radio emerged. It was not until August 1966 while at the University of Illinois and on his last five months of his Ph. D. (Organic Chemistry) that Mike's Father-in-law (now WA9SVZ) finally got him interested enough to become WN9TFK in late September 1966 and on December 9 (3 days before his Ph. D. Oral final examination) Mike went to Chicago and became WA3HGV.

A move was made to Delaware in late December 1966 and it was soon obvious that Delaware was in great demand for WAS. Seven months later the Army called him and he became WA3HGV/4 at Fort Lee and then WA3HGV/1 in Massachusetts.

Being a member of the YLISSB, Mike occasionally would run across the Independent County Hunter Net, but the bug never bit.

With the advent of incentive licensing, an Advanced license was obtained in March 1968 and as a celebration gift, an HW-32A and d.c. supply were obtained, and then he discovered County Hunting and really dove in and a check soon showed 450 confirmed counties.

At that time the antenna was a dipole that barely got out of the window and was only 7 feet above the ground. With that poor antenna, much help was given by so very many, that space does not permit listing them, but thanks go to all!

With the HW-32A, Mike started giving as well as receiving new counties and was soon giving out counties all over New England as well as all along the East coast and then some trips through Illinois and Indiana.

Then a better antenna at the home location made a big difference plus operation on 15, 20, 40 and 75. Of course some other necessary ingredients are: available time, patience, skill and a sympathetic/interested family.

An Extra license was obtained in December 1968 and celebration gifts included a TH3MK3, CDR 44 and an EZ Way tower, future ideas include a big linear.

Our records show that Mike waited until December 3, 1969 before applying and received 500 award #758; 1000 #185; 1500 #124; 2000 #88 all endorsed All 14 mc A3A and USA-CA-2500-#62 endorsed Mixed. On January 15, 1970 he qualified for USA-CA-3000-#37 All 14 mc A3A. On January 30, 1970 he topped it all with #21 All 3079 Counties endorsed All 14 mc A3A, having only Bertha, WA4BMC beat him for the first all one mode, one band All 3079.

Mike has nearly 400 different certificates but thinks our County Hunter Award tops them all and he would like to see a color foto of it on the cover of *CQ* so *ALL* could admire it.

Awards

The Idaho Counties Award: This Award is made available to all amateurs through the courtesy of the Gem State Amateur Radio Club and the Idaho Department of Commerce and Developement. Issued to any amateur submitting proof of two way communication with stations, Fixed or Mobile, within the boundries of each of designated number of Idaho Counties on or after January 1, 1969. No AOMB allowed. The GCR award rule with complete log data applies. This must be witnessed by two duly licensed amateurs or a notary public. The certificate is awarded in three classes:

Class A—44 for U.S., 38 all others including KL & KH.
Class B—30 and 24.
Class C—15 and 10.

Cliff Corne Jr., K9EAB Memorial Award

Fee: $1.00 handling charge (or 10 IRCs for DX stations), additional seals for s.a.s.e. Apply to Gem State A.R.C. Awards Chairman, Abe Daniels, WA7EGL, 4310 Franklin Road, Boise, Idaho 83705. (Thanks Abe for all your efforts).

The Cliff Corne Jr. K9EAB, Memorial Award: This award is issued in memory of Cliff Corne, Jr., K9EAB, who was the first amateur radio operator to reach the top by working other amateur radio stations in all 3079 counties of the U.S.A. It is awarded for working holders of *CQ* magazines USA-CA 3079 All Counties award. For current listings of USA-CA 3079 holders read THE AWARDS PROGRAM column by Ed Hopper, W2GT, in *CQ* Magazine. The award is given in the following classes:

Basic award—10 contacts
Class C—15 contacts (Blue Seal)
Class B—20 contacts (Red Seal)
Class A—25 contacts (Gold Seal)
Class AA—50 contacts (2nd Gold Seal)

Rules: 1. Only contacts after the date the USA-CA 3079 All Counties award was issued to the holder, will be considered.

2. Submit a list showing stations worked, date and award number.

3. The list must be certified by two amateur radio operators (any class of license), a club official, or by a notary public stating that the cards have been checked and the listing is correct. Stations may submit QSL cards in lieu of the above, but must include sufficient postage for return shipment of the cards.

4. The award is available to all licensed amateur radio stations (s.w.l.s on a heard basis) throughout the world.

5. The award will be issued free of charge to USA-CA-3079 All Counties holders upon receipt of information *i.e.* award number and date awarded, by letter to the Awards Custodian. Free to B/P. Basic award 50¢ or 5 IRCs. Seals for s.a.s.e or 1 IRC. (IRCs accepted only from DX stations.). Endorsements: All one mode, band, or mixed—on the basic award only. Awards Custodian: Donald W. Schmidt, WAØJRZ, 220 N. Lincoln, Hillsboro, Kansas 67063.

Notes

What a pleasure, on the night of 1 May, to meet at the Leonia, N.J. home of Win, WA2QNW: Jack, WA2AMM; Dick, W2BLM; Gary, W2EQK; Bill, WB2FVO; Bob, WB2GLI; Ron, WA2HWD; Jerry, W2KXL; Bob, W2OST; Marv, WB2SJQ; Roger, WB2WZE; and of course Win, WA2QNW. Geo, W1EQ and Frank, WA1CXE had hoped to get there, but they had not arrived when I had to leave for another meeting.

Again thanks to Henry "Gep" Gepke, Jr., WA7HFG, this time for sending a POD 26 to LA3XG.

Also thanks to Tom, JA1HNO for sending the *new Awards Manual* of *CQ Ham Radio* of Japan which apparently was compiled by my friends JA1EL and JA1ELL. And I must thank "Gun", JA1BMI/W2 who brought me a copy of the May issue of *CQ Ham Radio* of Japan which had fotos of yours truly and some members of the NJDXA taken at their Christmas Party in early December, which had been attended by JA1EL, a non-ham friend from Japan, and Gun, JA1BMI/W2.

Some interesting statistics sent in by Doc., W5ROP. During 1969 W4NXD/W5ROP and WA5WWW/K7ZJP made four mobile trips using K7ZJP/M. Covering 8100 miles, they gave out 146 counties in Texas; 46 in Arkansas; 36 in Oklahoma; 9 in Mississippi; 7 in Louisiana and one in New Mexico. No wonder Doc can not afford a linear-Hi!

How was your month? 73, Ed., W2GT.

USA-CA HONOR ROLL

3000

W8DCH	43
WØKZZ	44
K2PFC	45
K7WQJ	46

2500

W8DCH	71
WAØSHE	72
K2PFC	73
WA3FED	74

2000

W8DCH	102
WA8ASV	103
K7SQD/W7DSJ	104
WAØSHE	105
K2PFC	106

1500

W8DCH	134
WA8ASV	135
WAØSHE	136
K2PFC	137

1000

W8DCH	200
WA8ASV	201
WAØSHE	202

500

K4FPF	780
SM7TV	781
WA1BFD	782
WAØSHE	783
LA8LG	784
W6CLM	785

The Idaho Counties Award

Order your USA-CA Record Book today.

Q AND A

BY WILFRED M. SCHERER,*
W2AEF

Product Detector Installation

One of the most asked questions is in connection with installation of a product detector in such-and-such a receiver. To avoid the need for consuming valuable time in working out specific details for each particular case, in the future we'll have to leave the job up to the individual to figure out for himself.

In order to make it easier for this to be done, this month's Q & A Column will be devoted to providing "how-to-do-it" guide lines for rigging up a product detector in almost any of the receivers not so equipped.[1]

Before proceding with the work, it is suggested that all of the following text be read. This will orient your thinking and planning in relation to the various situations and alternatives.

Two different basic product-detector circuits will be involved. These are shown at figs. 1B and 2B. It is possible, of course, to use other types including solid-state ones, but the ones suggested here are those usually most easily adaptable to existing older receivers.

The setup shown at fig. 1B should be used if the receiver b.f.o. is an electron-coupled job using a pentode or tetrode as shown at fig. 1A. The modification can then be made by removing the b.f.o. tube and substituting a pentagrid converter tube to be used as a combination b.f.o. and product detector.

If the original b.f.o. tube is an octal type, such as a 6J7 or 6SJ7 as often found, a 6SA7 may be substituted in the new setup. If the old b.f.o. tube is a 7-pin miniature type, such as a 6BA6, a 6BE6 may be used instead for the product detector/b.f.o. In either case, a socket change will then not be required, but some rewiring at the socket will be needed.

The setup shown at fig. 2B should be used if the receiver b.f.o. is a Hartley or Colpitts type as shown at fig. 2A. The b.f.o. may be left intact and an additional 9-pin miniature socket be installed for employment of the 12AT7 dual triode used for the product detector.

The extra socket should be installed at a convenient location, preferably near the b.f.o., the a.m. detector or the last i.f. transformer. If space is not available on the chassis deck, the socket may be installed on a bracket or on a small Minibox mounted on the inside wall of the chassis.

Wiring

During the wiring procedure, several special points must be located and connected as follows, using shielded leads as indicated at the diagram:

First, locate the b.f.o. injection-signal capacitor connected between the b.f.o. and the a.m. detector or the high-side of the secondary or primary of the last i.f. transformer, whichever may be the case. In some instances, the b.f.o. injection may be found made to the INPUT of the last i.f. stage. The capacitor usually is a 2-10 mmf mica one or it may be a "gimmick" type made of two insulated leads twisted together. The capacitor should be removed from the circuit, but the point at which it was connected to the b.f.o. should be remembered if the circuit at fig. 2B is to be used.

Next, find the i.f. output point which may be located at the high-end of the secondary of the last i.f. transformer or at the plate of the diode a.m. detector. Connect this point to the signal-input coupling capacitor for the product detector to be used. Do not otherwise alter the i.f. circuit. If the i.f. output (to a.m. detector input) is obtained from a tap on the i.f. transformer secondary, the product-detector input may be connected to the tap or preferably at the high-end of the transformer winding.

The coupling capacitor should be located between the i.f. take-off point and the shielded lead to the product detector, in order to minimize i.f. detuning by the lead capacitance.

Now, locate the input to the a.f. gain control (high-end of the control). This usually

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*Technical Director, *CQ*.

[1]Reference also should be made to the following articles: "More on Updated Improvements for the 51-J Receivers," *CQ*, December, 1968, page 64; "Product Detector and AGC for the Knight R-100A Receiver," *CQ*, July, 1969, page 60.

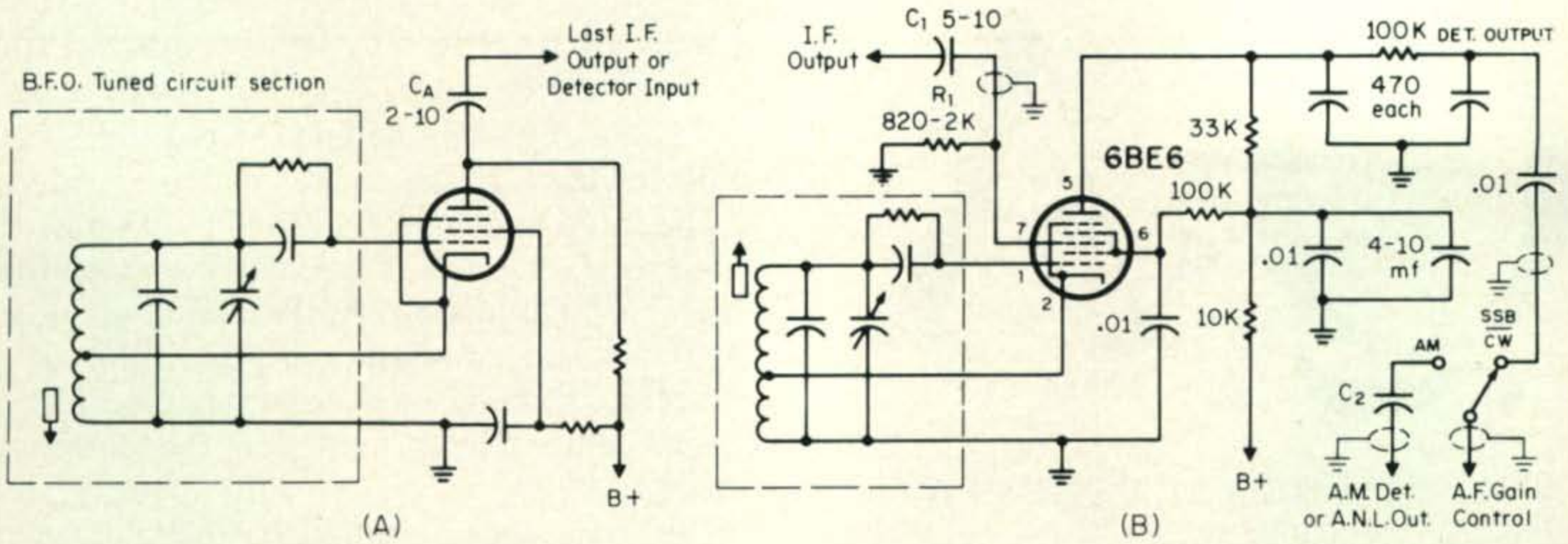


Fig. 1—(A) Electron-coupled b.f.o. often found in older receivers. C_A is the b.f.o.-injection capacitor. Components in dashed-line area usually are in a shielded can. (B). Product detector/b.f.o. to be used with receiver normally employing b.f.o. shown at (A). See text for optimizing value of R_1, C_1. C_2 may be the normal a.f.-coupling capacitor already installed in receiver. Tube-pin numbers are for a 6BE6.

will be found connected through a coupling capacitor to the a.m. detector output or to a noise-limiter output. Break the circuit at this point and connect the input of the a.f. gain to the arm of a s.p.d.t. switch as shown at fig. 1B or 2B.

Then connect the contact for the a.m. position of the switch to the detector or noise-limiter output from which the original circuit was broken. The switch contact for the s.s.b./c.w. position should then be connected to the product-detector output.

If the setup of fig. 2B is to be used, the b.f.o. input-coupling capacitor for the product detector should be connected to the b.f.o. point from which the original b.f.o.-injection capacitor was earlier removed.

If the setup of fig. 1B is to be used, the tube socket will have to be rewired accordingly. This will involve switching the grid and cathode leads from the tuned-circuit section of the b.f.o. (including the grid leak or coupling capacitors). In many cases these parts are located in a shield can with only the necessary leads at hand.

Since the a.v.c. (a.g.c.) systems of the older receivers usually have a fast-release time constant, a slow-release time should be provided when the product detector is used, particularly for s.s.b. signals. This will avoid undesirable "pumping" or other adverse effects on such signals. A slow release of 1-2 seconds is about right and may be obtained by adding a 0.1-0.5 mf capacitor across the a.v.c. line.

There are several other factors in the a.v.c. systems that may affect the overall release time, so the exact value for the added capacitor will have to be determined by experiment conducted primarily with listening tests under operating conditions.

The capacitor may be switched in automatically when the product detector is to be used. On many older sets an operating switch has a MANUAL position which in some cases disables the a.v.c. line when the b.f.o. is turned on. This is done in order to prevent the b.f.o. signal from clamping the a.v.c. which reduces the gain of the receiver. It also is done to allow the r.f. gain control to be used for avoiding overload on strong c.w. signals.

Unless the b.f.o. signal leaks into the i.f. system, it will have no effect on the a.v.c. when the product detector is engaged, so provision for manual-gain operation is not mandatory, in which case the manual position at the switch may be rewired to permit the a.v.c. to still function and the slow-release capacitor to be automatically added for s.s.b. work. Where this is not possible, the capacitor may be permanently installed on the a.v.c. line, particularly if the receiver is to be used mostly for s.s.b.

The b.f.o. may be turned on and off by whatever method was originally used. If space is available, individual switches need not be installed for the various needs, but instead, a multi-section or a ganged-switch setup, as shown at fig. 3, may be incorporated to select all the different functions, that is: a.m. with b.f.o. off, a.m.-detector output and normal a.v.c. release; or s.s.b./c.w. with b.f.o. on, product-detector output and slow a.v.c. release. Some operators, however, prefer an

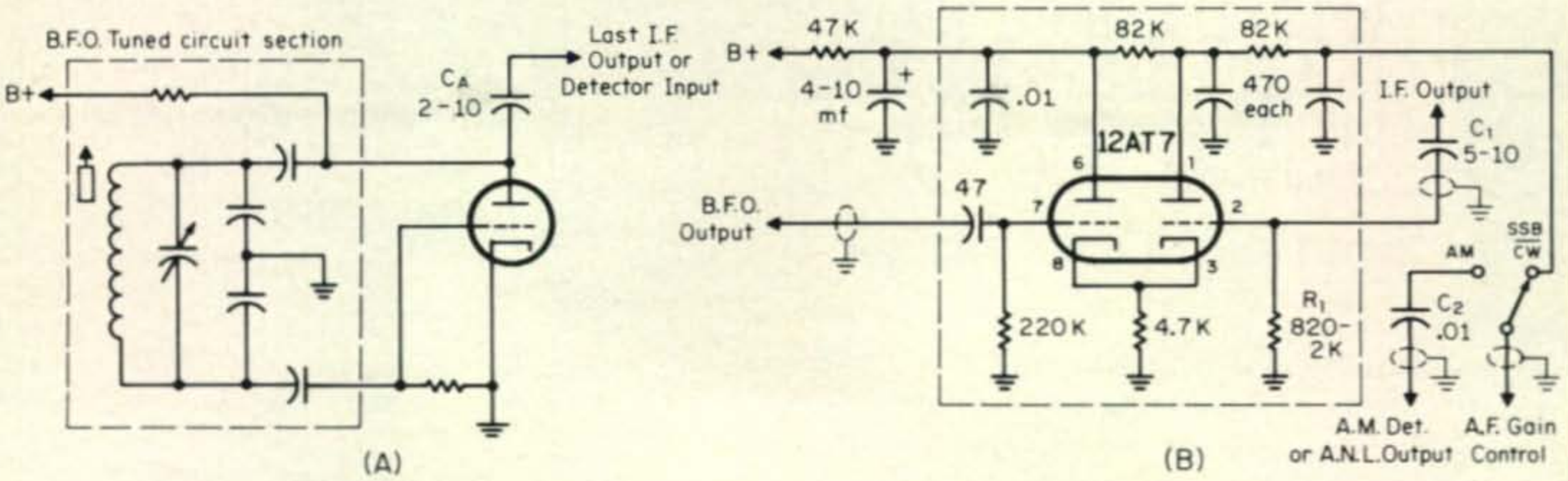


Fig. 2—(A). Triode b.f.o. with Colpitts type circuit. Hartely type is similar, but with the inductor tapped instead of use of split capacitors. See fig. 1A re C_A which might be found connected to tube grid instead. (B). Product detector to be used with receiver normally employing triode b.f.o. such as at (A). See fig. 1B re R_1, C_1, C_2.

individual a.v.c. switch for selecting a slow or fast release at will with any mode of reception.

Adjustments

After the product-detector installation has been made, set the receiver up for a.m. operation and repeak the last i.f. transformer for maximum signal or background noise.

After this, switch over to product-detector operation and set the b.f.o. control at its center or normal position marked for zero beat. Remove the antenna from the receiver or tune the set to where there is no signal. Then realign the b.f.o. by whatever means is normally provided (such as the inductor core or trimmer capacitor), until the background noise assumes the lowest-pitch sound. Swinging the b.f.o. control either side of center should then equally raise the background-noise pitch.

The final adjustment involves C_1 and R_1. These components form a voltage-dividing network that attenuates the i.f. signal input to the product detector. The maximum allowable i.f. voltage here for true product-detection without distortion usually is about 0.1v., depending on the b.f.o.-injection level actually applied.

Proper operation of the detector will be indicated by an audio output that sounds like Mortimer Snerd or Donald Duck as the receiver is tuned across the frequency of an a.m. signal when the product detector is in use. Natural-sounding a.f. output of the a.m. modulation should be detected in the background *only* when the signal is tuned to zero beat.

Another test is to observe the a.f. output with an oscilloscope while the receiver is tuned to a strong unmodulated signal for a beat note of 100-150 c.p.s. Proper operation is indicated by a clean sinewave observed on the c.r.t. screen.

In either case, where proper operation is not indicated, reduce the size of C_1 or R_1 (preferably R_1) as far as possible, consistent with obtaining adequate a.f. output from the receiver.

In cases where product-detector installation and operation has not been successfully concluded using the about procedures, only then we deem it fitting to answer queries related thereto; and provided, that such queries be accompanied by a schematic diagram of the receiver, indicating the points of installation along with symptoms of any difficulties involved.

Next month we'll return to the regular run of specific questions and answers. Good luck and vy 73, Bill, W2AEF.

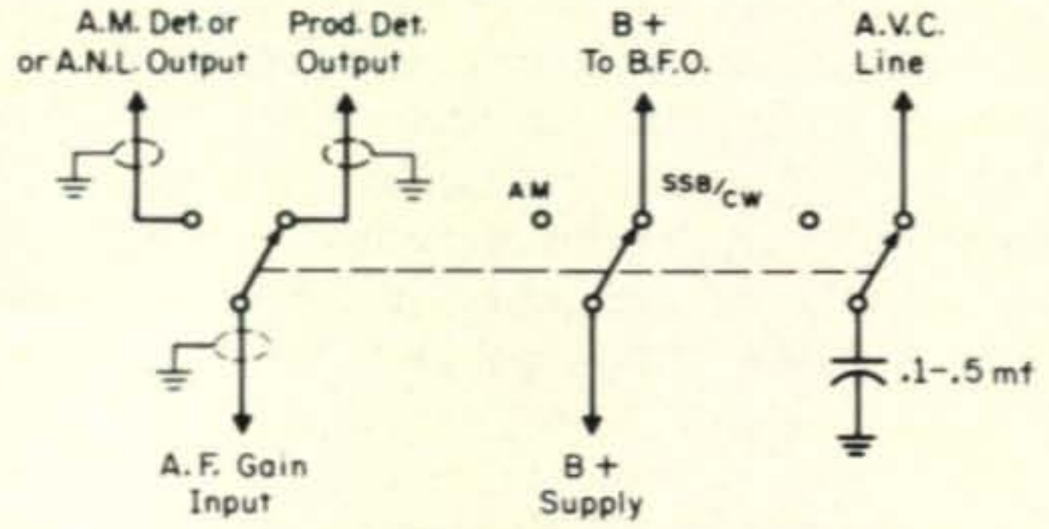


Fig. 3—Ganged-switch arrangement for simultaneuosly setting up all functions with a.m. and product detectors.

SURPLUS sidelights

BY GORDON ELIOT WHITE*

Two months ago I mentioned here that the Alden Company was making available used facsimile recorders on the market at prices which some rich amateurs or laboratories might find interesting. This month I have some data on surplus Alden transmitters for facsimile work. None of the units so far made available will be turning up in your local junk shop for a while, in fact the surplus prices are downright expensive now, but they may be coming down in the future. As-is equipment may be cheaper than the listed prices right now, but Alden can't publish lower prices without endangering their regular commercial sales of new gear.

A typical Alden transmitter (called a "scanner" by the company) is shown in fig. 1. This is the model 9165, and is being taken out of service after from two to eight years' use.

Other models available are the 9255, 9208, and 9207. Prices range from $1,000 to $5,-200. (I said they weren't cheap.)

The 9165 is the standard scanner, offering in various models speeds of from 60 to 240 r.p.m. with a feed rate of 96 lines per inch. A dual-mode 9165KTL has a turret lens to allow direct enlargements of small copy or fine print. The other models offer different format sizes, including direct transmission from microfilm with the 9207A. All the units will send on standard 3 kilocycle bandwidth phone data lines.

There is one bargain in the lot: Older 9165D models can be bought at a rock-bottom $1,000 in working order, on a first come first served basis. (pay cash with your order and get a three percent discount)

One nice touch in the Alden scanners is that they will handle copy up to sixty inches in width by an unlimited width, though they scan generally, only an 18 inch segment per pass.

Fig. 1—The Alden 9165 facsimile transmitter called the continuous flat copy scanner.

Regulated Power Supplies

Meanwhile, back in the local surplus store, there are some real, real bargains these days. One of the items which has been most heavily affected by the solid-state revolution in elecronics is the regulated power supply. As a result of technological obsolescence, rack-mount, tube-type regulated supplies of widely varying parameters are now flooding the market. Beautiful power supplies which cost several hundred dollars half a dozen years ago can be had in surplus for from $10 to $40. Scrap dealers are beginning to find that the market is so overloaded with power supplies that they can get more for the copper than they can for the units from surplus retailers. Obviously for amateurs and ex-

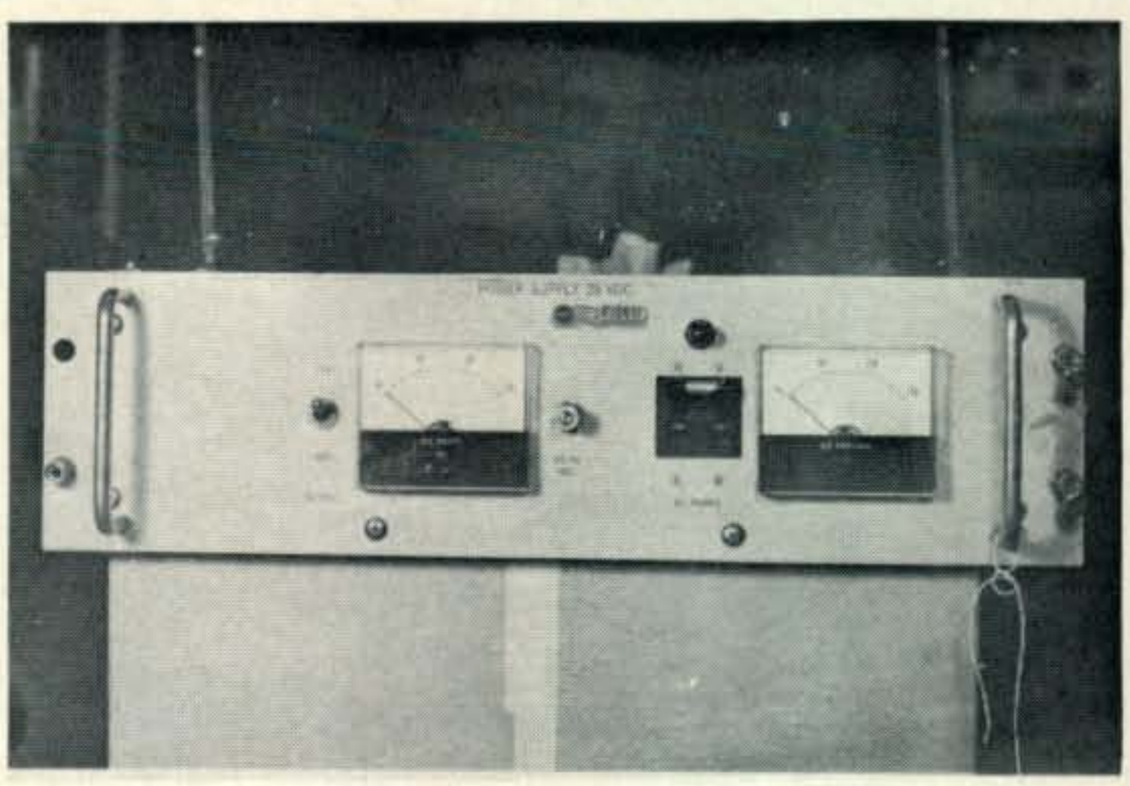
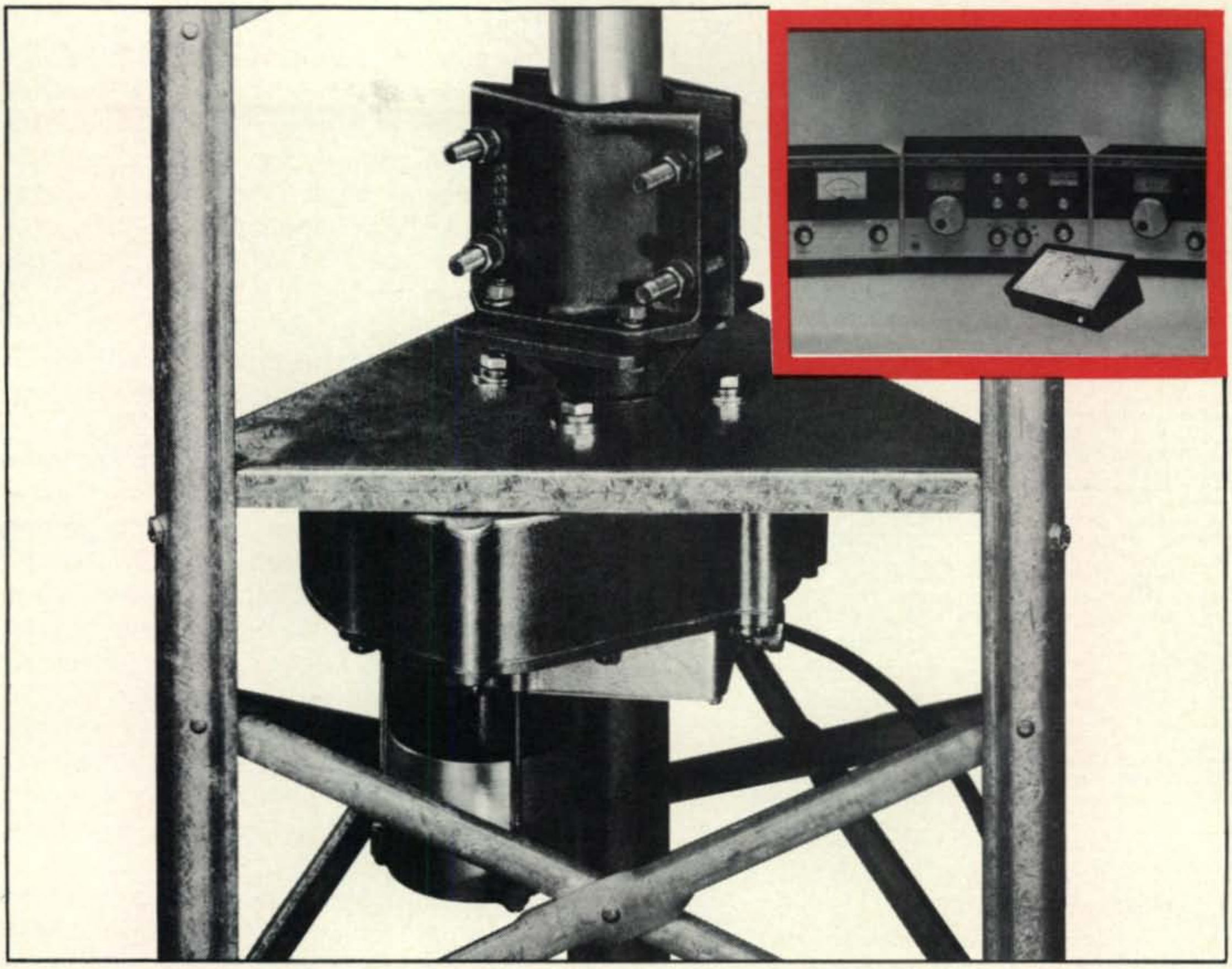


Fig. 2—T typical surplus regulated power supply.

*5716 N. King's Hgwy., Alexandria, Vir. 22303.



HY-GAIN'S NEW 400 ROTO-BRAKE

Handles Large Beams And Stacked Arrays With Ease!

Up to 10 times the mechanical and braking capability of any rotator on the market!

The ROTO-BRAKE delivers over 4,000 IN/LBS of starting and rotating torque. Brake slips at 5,000 IN/LBS to prevent damage to parts. Motor and gear train are protected by husky cast aluminum housing.

Handsome control unit features sweep pointer over choice of great circle map or compass rose. Select desired position and capacitor-start rotator (operating off 110VAC 60 cycle power source through five-conductor cable) moves until null seeking circuit brings into position. No blind spots. As a matter of fact, rotator will move 380°, giving you a generous overlap. And, if antenna should move during severe environmental conditions, it will automatically return to original position when control is activated. All circuitry is highly reliable—no troublesome selsyns used.

Heavy duty mast clamp takes up to 3" O.D. mast. Mounts to standard tower plate with minimum of 10" tower leg spacing. Mounting kits available for poles and small towers; universal tower mount available for towers without a plate.

There's just nothing like the ROTO-BRAKE for performance. Buy one from the best distributor under the sun—the one who stocks Hy-Gain.

Model No. 400 Suggested Retail Price $189.95.

HY-GAIN ELECTRONICS CORPORATION

P.O. Box 5407-FH, Lincoln, Nebraska 68505

perimenters the situation is ripe to pick up some bargains.

It is clearly cheaper to buy, at today's prices, a good regulated power supply, than to buy a new transformer and the necessary parts to build a supply for, say, a home-brew single sideband high transmitter, or linear amplifier. In linear applications where high voltages are required, some of them not necessarily regulated, it is simple enough to short out enough of the regulation to allow a boost in the voltage, while often at the same time deriving a light regulated output for low-current bias applications.

Some very classy 24 volt d.c. supplies have been around. Fig. 2 is one, displaying voltage and current meters, and capable to putting out 30 amperes. That kind of power would run a lot of surplus 24 volt equipment. Note the circuit-breaker switches on both sides of the a.c. input, the pilot light and the voltage adjustment control on the front panel. This goodie came from the National Aeronautics and Space Administration's Goddard Space-flight Center, one of a whole batch of NASA goodies now showing up on the surplus market.

NASA material, once centered at the Cape, is now being sold in Texas, Florida, Mary-land, and elsewhere around the country, as the space program phases from older proj-ects into newer ones.

But power supplies of great attractiveness to amateurs, are being dumped all over the country. Look for them. They are hardly a glamour item, but they are very good bar-gains today.

I have seen these units in dozens of sur-plus stores, but in the Washington, D.C. area, there are representative units on sale at Sasco Electronics, and Ritco Electronics.

This is my month to catch up on several items. I want to mention that OSCAR VI is now in the planning stage, and the AMSAT crew is trying to generate interest in building of as many ground stations for the repeater satellite as possible, before launch, expected in mid or late 1971.

The planned uplink frequency is to be 145.9 mc, with the satellite replying on 432.1 mc. Transmissions both ways will be f.m., using four channels each way, approximately 50 kc wide. In the satellite, a single front end will be relatively broadbanded, with the splitting done after the first mixer, into separate i.f. channels. One of the four will be coded for Command telemetry, with three

channels available for communications relaying. If everything goes according to plan, OSCAR VI will be an amateur COMSAT station, capable of handling a high volume of message traffic over an extremely wide area, putting stations in contact anywhere in the world that both can get line-of-sight to the bird. The power may not be in the KW range, but you can't beat that antenna elevation!

Where surplus comes in, is of course on on the ground. Standard f.m. mobile equipment ought to be highly suitable for uplink transmission at 145.9 mc. AMSAT president Perry Klein thinks it should be possible to use the same 2-meter f.m. rig for mobile repeater use, and for the satellite, with minimal retuning. At worst, a crystal change might be necessary, but Perry wants to look into a two or more channel setup to allow a quick switch from terrestrial to celestial operations.

For receiving the 432.1 mc transmissions from the satellite, again, standard high-band f.m. gear ought to serve very well. Where 432 mc receivers are not to be found, converters might be useful to put the 432.1 mc signals into the 2-meter range of f.m. mobile gear.

I throw this out as a challenge of the surplus hounds who read *CQ:* come up with workable applications of surplus f.m. sets as satellite terminals. Other problems facing the OSCAR VI crew include antennas for 145.9 and 432.1 mc bands, construction of elevation/azimuth antenna mounts, and other ground station hardware, preferable something that can be built out of standard hardware store parts.

Incidentally, the data-ling for telemetry, is to be coded in BAUDOT (RTTY) code, so that it can be printed out via audio frequency shift keying on a standard teleprinter. A clock is planned to identify each data "frame" so that it may readily be identified by "satellite time" without laborious data coding.

I will be working on the use of surplus in OSCAR VI applications, and I hereby solicit any ideas that readers may care to offer. You may adress suggestions to me, or to Bill Tynan, W3KMG, 13620 Cole Fair Drive, Silver Spring, Maryland, the AMSAT coordinator for ground operations. ■

Contest Calendar [*from page 69*]

tries. (c) Contacts between stations in the same country are permitted for Zone and/or Country multiplier but have NO QSO point value. (d) *This is for North American stations only:* Con-

tacts between stations within the North American (WAC) boundries count 2 points.

5. Final score: (a) Single band, Zones plus Countries multiplied by QSO points. (b) All band, sum of Zones plus sum of Countries multiplied by the total QSO points.

6· Competition: Three divisions. (a) Single operator, single band or all band. (b) Multi-operator, single transmitter. (c) Multi-operator, multi transmitter. Multi-operator stations are judged on all band operation *only*.

7. Definition of a multi-operator station: Single transmitter, only one transmitter and *one* signal permitted within the same time period. Multi transmitter, several transmitters may be active, but *only* one signal per band is permitted.

8. Use a separate log sheet for each band, 40 contacts to the page. Indicate the zone and country *only* the first time it is worked on each band.

Official rules including a list of 12 or more Trophies donated by prominate hams and clubs all over the world will appear in next month's issue· These rules as well as official log forms and summary sheets are available from *CQ*. Include a large s.a.s.e. or IRCs to cover your request. NOW is the time to make your request, not the week before the contest. Our address: CQ World Wide DX Contest, 14 Vanderventer Ave., Port Washington, L.I· N.Y. 11050.

"YL Howdy Days"

Starts: 1800 GMT Wednesday, September 23
Ends: 1800 GMT Friday, September 25

This is a YL activity only, OMs keep out. Scores will be based on contacts with licensed women operators only. All bands and modes may be used, cross-band and net contacts do not count.

Score 2 points for each YLRL member worked and 1 point for each non-member. Only one contact with the same station permitted. There is no multiplier.

The top scoring YLRL member will receive her choice of a YLRL pin, charm or stationary. The highest non-member will receive a year's membership in the YLRL·

Logs go to: Audrey Beyer, K5PFF, 6202 Reed Road, Houston, Texas 77017 and must be received before October 14th.

Summary

I must again emphasize that material must be received 3 full months before the date of the activity to give it proper coverage.

Material for the Ohio QSO party was not received in time for the July CALENDAR.

And the White Sands Silver Anniversary QSO Party held on July 9th was much to late to make the July issue. If you worked K5WSP during the Party send your QSL to Box 254, White Sands Missile Range, New Mexico 88002 for a colorful card made especially for the occasion.

Material for the October CALENDAR must be received no later than August 9th.

73 for now, Frank, W1WY

Motorize your tower [*from page 61*]

The Gear Train

The standard 1725 r.p.m. (approximately 30 r.p.s.) motor must be belted down to about 2 or 3 r.p.s. for application to the winch handle.

A step-down ratio of about 15 is needed. An idler wheel of approximately 4:1 or 5:1 plus an 8″ or 10″ pulley attached to the manual handle will suffice. Note in the drawings that the idler wheel spindle can be positioned for maximum tightening of the "V" belt.

Operating the Crank-up System

Attach a string to the clutch lever and extend it as much as you wish, even around the corner of he house if necessary. If you find that you are pulling hard enough to engage the mechanical clutch, evidenced by a grinding sound, then there is not enough torque transmission. You must add more oil of higher viscosity.

If too much oil is used, you may have to assist the cranking down process with the manual crank. However, there is considerable leeway and this difficulty is mentioned only in passing.

Manual Operation of the System

Manual operation is unimpaired since the motor is disengaged with the clutch released. If anything, the slight dray of the fluid drive provides a flywheel effect and is a safety feature, and additionally, feels smoother than the handle only system.

Simple Safety Measures

Figure 2 show a simple string system, which enables one to engage the safety ratchet by pulling on a string, thus locking the tower.

In practice, the operator holds two strings, one to control the clutch, and the other to engage the safety ratchet if necessary. Unless the cable breaks or the pulley shears, there is enough drag in the system to prevent plummeting.

A simple "last resort" buffer system is shown in the photo. This is simply a tough coiled spring about 15″ long ($3.00 from junk) probably from a truck, which is placed at the base with a piece of 2″ x 4″ of exactly the right length to fit across the triangular cross section of the inner sections.

The impact of a plummeting tower is considerable, so the spring should be a tough one. You should not be able to compress the spring by standing on it. ■

Rigid Coax [*from page 52*]

relatively low cost. While the initial cost of the copper coax is higher, only hand tools are required in the construction and is suitable for all weather use. The aluminum coax construction is cheaper and lighter, but more complex, requiring the use of a small lathe and is also more difficult to weatherproof. It has also been demonstrated, that measured values agree closely with calculated values thus allowing the designer to proceed with confidence, especially when measuring equipment is not available. ■

Slide Rule LC [*from page 55*]

slide until the opposite index is where the original was. You will have to determine whether the answer is kc or mc, but this will come from experience.

Summary

Set the *reciprocal* of inductance on *B* scale opposite the *capacitance* on the *A* scale. The answer will be found on *C* scale opposite *5* on *D* scale.

If *no* answer appears opposite 5 on D scale, do one of the following, whichever fits the situation:

Use 4 time capacitance on *A* scale and multiply answer by 2.

Use 1/4 times capacitance on *A* scale and *divide* answer by 2.

It sounds very complicated, but after a little practice you will be able to get answers in no time. ■

CQ Reviews: Drake TC-6 [*from page 47*]

screen-modulation system provided by the Drake exciters, the p.e.p. input was close to 300 watts as per the rating.

The average distortion products of the TC-6 itself fell within the rating of 35 db below p.e.p. for odd-order products. As pointed out in other reviews, the degree of distortion in an amplifier also is dependent on that produced by the exciting signal.

Since TVI often is dependent on location and existing TV-signal conditions, no binding report can be given in this regard, except to point out that the TC-6 has been designed to minimize spurious radiation and mixer products, the latter being diminished by low exciter- and injection-signal levels. In addition, the bandpass-coupling and p.a.-output networks serve as low-pass filters for attenuation above 54 mc. Should difficulties be encountered, the manufacturer recommends the installation of the Drake TV-1000 LP Filter. Where TVI may be due to front-end overload of the TV receiver, a recommended remedy is installation of the Drake TV-300 HP Filter to be made at the TV set.

Packaging

The TC-6 employs the same type of construction as used in other Drake gear, for which it is styled to match. The size is 5½" × 7⅝" × 11⅝" (H.W.D.) and it weight 9 lbs.

The TC-6 Transmitting Converter is priced at $250, complete with all interconnecting cables and with modification parts for use with the Drake T-4 series of transmitters. A modification kit for the TR-3/4 transceivers is priced at $6.50. The manufacturer is R. L. Drake Company, 540 Richard Street, Miamisburg Ohio 45342.

—W2AEF

Contest Results [*from page 35*]

Club of Czechoslovakia, Werner Stiehm, DJ8SW of the Rhein-Ruhr club, Tomasz Jokiel, SP5GH of the PZK organization and Klaus Voight, DM2ATL who makes sure the DM entries are in order.

Now finally I can say, that's it for this one. With I am sure a sigh of relief from the rest of the gang, Andy Malashuk W1GYE, Bob Entwistle W1MDO, Freddie Caposella W2-IWC and Joan down at *CQ*. Bernie Welch now W8IMZ could not help us on this one, the Air Force decided to transfer him to Ohio just when we needed him. Just got to have more help, in the next one.

73 for now, Frank, W1WY

M.S. Data Generators [*from page 20*]

Programmers

These are the part of the system which control the code being sent and select the various positive lines for the codes. They use circuits already described and fit into the system as in fig. 13.

Part II will deal with these programmers in detail as it is these which vary to produce the different coded message sent for a CQ call or meteor scatter QSO. The oscillator, divide by 10s, decoders and code selection diodes remain basically the same for each type of generator, while the programmer is designed to control the output either automatically or with some manual assistance.

[To be continued]

Propagation [*from page 73*]

HAWAII

Openings Given in Hawaiian Standard Time†

To:	*10 Meters*	*15 Meters*	*20 Meters*	*40/80 Meters*
Eastern USA	07-09 (1) 09-12 (2) 12-14 (3) 14-16 (2) 16-17 (1)	05-06 (1) 06-08 (2) 08-12 (1) 12-16 (2) 16-17 (3) 17-18 (2) 18-20 (1)	11-14 (1) 14-16 (2) 16-18 (3) 18-20 (4) 20-22 (3) 22-04 (2) 04-06 (3) 06-07 (2) 07-08 (1)	18-20 (1) 20-23 (2) 23-00 (3) 00-01 (2) 01-02 (1) 20-22 (1)* 22-00 (2)* 00-01 (1)*
Central USA	07-09 (1) 09-11 (2) 11-14 (3) 14-16 (2) 16-17 (1)	05-06 (1) 06-08 (2) 08-10 (1) 10-12 (2) 12-14 (3) 14-16 (4) 16-17 (3) 17-19 (2) 19-21 (1)	09-14 (1) 14-16 (2) 16-18 (3) 18-22 (4) 22-00 (3) 00-04 (2) 04-06 (3) 06-09 (2)	18-20 (1) 20-22 (2) 22-01 (3) 01-03 (2) 03-04 (1) 21-22 (1)* 22-00 (2)* 00-02 (1)*
Western USA	07-09 (1) 09-11 (2) 11-14 (4) 14-16 (3) 16-18 (2) 18-19 (1)	06-08 (1) 08-09 (2) 09-14 (3) 14-17 (4) 17-19 (3) 19-21 (2) 21-23 (1)	10-15 (2) 15-17 (3) 17-22 (4) 22-00 (3) 00-02 (2) 02-04 (1) 04-06 (2) 06-08 (4) 08-10 (3)	18-19 (1) 19-20 (2) 20-02 (4) 02-04 (3) 04-05 (2) 05-06 (1) 21-22 (1)* 22-23 (2)* 23-02 (3)* 02-03 (2)* 03-04 (1)*

ALASKA

Openings Given in GMT‡

To:	*10 Meters*	*15 Meters*	*20 Meters*	*40/80 Meters*
Eastern USA	18-20 (1) 20-23 (2) 23-00 (1)	16-18 (1) 18-22 (2) 22-01 (3) 01-02 (2) 02-03 (1)	14-16 (1) 21-23 (1) 23-00 (2) 00-02 (3) 02-03 (2) 03-04 (1)	08-12 (1)
Central USA	19-21 (1) 21-00 (2) 00-02 (1)	17-19 (1) 19-22 (2) 22-00 (3) 00-02 (4) 02-03 (2) 03-04 (1)	15-17 (1) 21-23 (1) 23-00 (2) 00-04 (3) 04-05 (2) 05-07 (1)	08-14 (1)
Western USA	20-22 (1) 22-00 (2) 00-02 (3) 02-03 (2) 03-04 (1)	18-21 (1) 21-23 (2) 23-02 (4) 02-03 (3) 03-05 (2) 05-06 (1)	16-18 (1) 18-20 (3) 20-00 (2) 00-02 (3) 02-04 (4) 04-05 (3) 05-06 (2) 06-10 (1)	08-11 (1) 11-14 (2) 14-16 (1) 11-14 (1)*

†Hawaiin Standard Time is 5 hours *behind* EST; 4 hours *behind* CST; 3 hours *behind* MST; 2 hours *behind* PST and 10 hours *behind* GMT or Z Time. For example, when it is Noon in Honolulu, it is 17 or 5 P.M. in NYC, EST.

‡To convert to Local Standard Time in Alaska, *subtract* 8 hours in the Pacific Standard Time Zone; 9 hours in the Yukon Zone and 10 hours in the Alaskan Standard Time Zone, from the GMT times shown in the Chart. GMT is 5 hours *ahead* of EST; 6 hours *ahead* of CST; 7 hours *ahead* of MST and 8 hours *ahead* of PST. For example, when it is 18 GMT it is 13 or 1 P.M. EST in NYC.

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

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- Traps precisely tuned electrically for optimum performance across the band.
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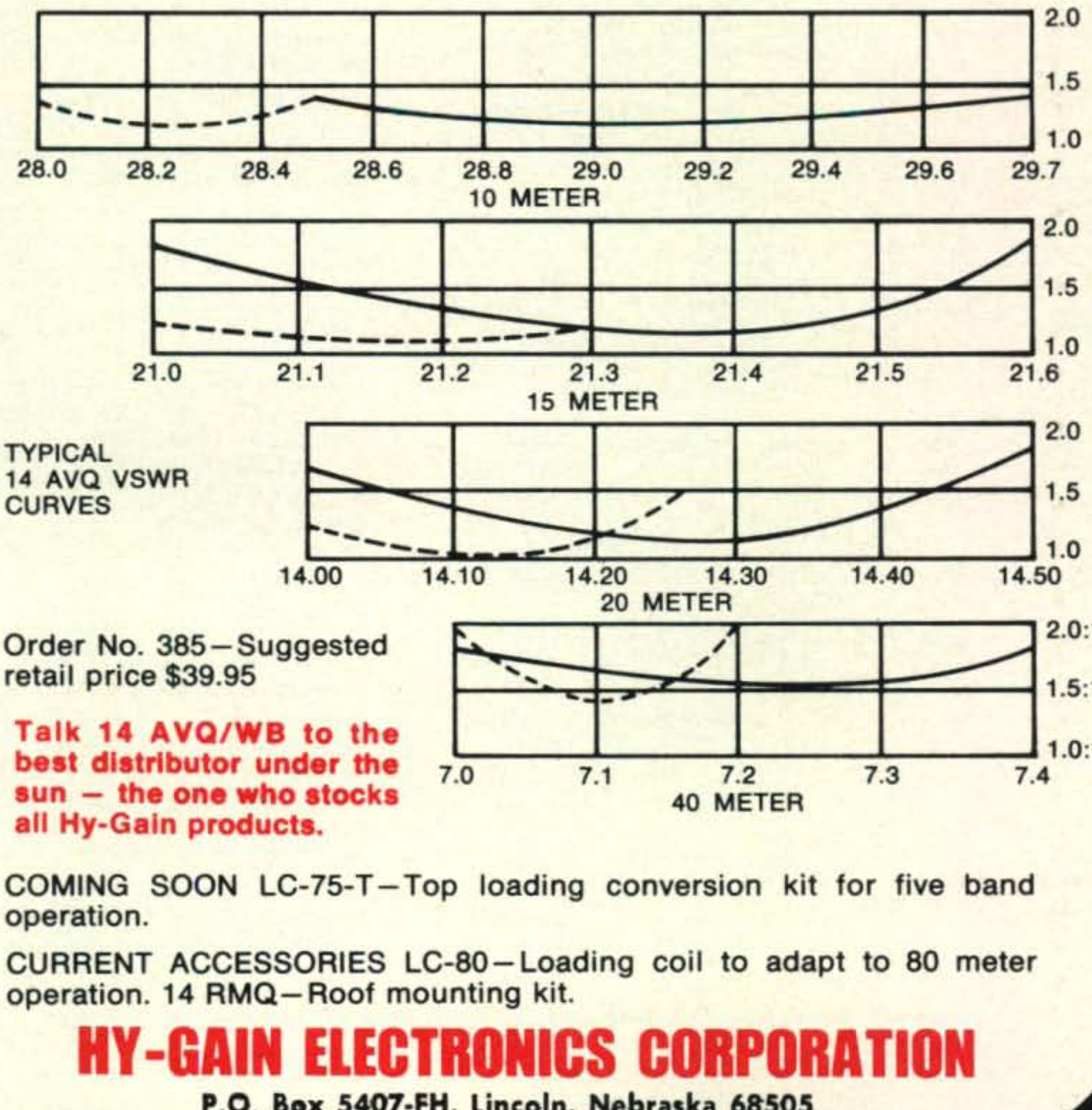
- Full circumference clamps of aluminum; no dissimilar metals; no damage to tubing.
- Exclusive DC ground feature to drain off precipitation static.
- Nominal 52 ohms at resonance feed for lowest SWR.
- Mechanical parts precision cut and deburred for professional fit.
- All aluminum brackets for years of service with no corrosion.
- For better matching sealed SO 239 connector.
- Can be ground or roof mounted.



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CURRENT ACCESSORIES LC-80—Loading coil to adapt to 80 meter operation. 14 RMQ—Roof mounting kit.

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Direct All Correspondence & Copy to: **CQ Ham Shop, 14 Vanderventer Ave., Port Washington, L.I., N.Y. 11050.**

SELL: Marauder HX-10, $200. Warrior HX-10, $175., Drake 2B w/2BQ combo, $195; teletype model 19 w/K6IBE TU-D term. Unit (no shipping) $200; HW-22, HP-13 & Hustler Ant., $115. SASE complete list. Will ship postpaid. WA8QBJ.

XFMRS: 6.3V-10A, $2.50; 1320V-200 mils., $4.50: 720V-200 mil, 5v-2A, 6.3V-4A, $4.50. Other ham items cheap. E. Tischler, 58 Carey Avenue, Wilkes-Barre, Pennsylvania. 18702.

CLEANING OUT: Large accumulation of Electronics Books, Magazines & gear. Want bound vol. QST, CQ, 73, Ham Radio. Lists SASE. W4API, Box 4095, Arlington, Va. 22204.

SELL: HT37, $125.00, HT41 KW Linear, $100.00, Original owner excellent condition. Ken Sypal, W9FFV, 172 Brandon, Glen Ellyn, Ill. 60137. Tel: (312) 469-6189.

FOR SALE: Xfmr 2 ea 220 pr; 750-0-750 V at .7A, $5.00 each. 1 ea 1170-585-0-585-1170v500w, 110-220 pr, $5. 1-860 tube $12.50 pullout. Xfmrs 60 cy. FOB. J. D. DeShong, 11847 East 16th, Tulsa, Oklahoma. 74128.

NEW 4-65A, $7.00; 814, $4.00; 4X150, $8.00; SFP7A, $12.00; 10UP14B, $15.00; used 813 $6.50; 4E27A, $4.00; 1 Heath Keyer, new, $32.00; W5SYB, 5000 Idall, Amarillo, Texas. 79109.

WANTED: Ham Radio Magazine. ISSUES: Apr., June, July, Sep., Oct., Nov., Dec., 1968. A. Barry, W4GHV, 538 East Samford Avenue, Auburn, Alabama. 36830.

WANTED: Old Crosley X or XJ battery radio and 1924, 1925 or 1926 list of U. S. Broadcast stations. W7KE, 1109 S 2, Hamilton, Montana. 59840.

TRADE BEAUTIFUL BRUTE 3-1000ZH.B. Linear for L4B-2K-Mark II Linear etc. F. E. Coble, 251 Collier Avenue, Nashville, Tenn. 37211.

TRANSFORMERS REWOUND. Jess Price, W4CLJ, 411 Gunby Avenue, Orlando, Florida. 32801. Phone: (305) 425-7251.

REAL BARGAIN: "Viking Invader-200" Mint Condition, $185.00. E. M. Riley, Jr., WB4LAB, Greenhow-Repiton House, Williamsburg, Virginia. 23185.

SB-300 FOR SALE in exc. condx. WANT: SB-100, 101, 102 or HW-100. Coit, 13905 Bethpage La., Wheaton, maryland. 20906.

WANTED: Collins Mechanical Filters for 75A4. K0BHM, Gary Yantis, 10809 Johnson Drive, Shawnee, Kansas. 66203.

FOR SALE: Swann DC Power Supply 14-117 in real good condition, $75.00 prepaid. Want Hy-Gain or Mosley Vertical Antenna, 10 thru 40 mtrs. R. Dorough, W5DPN, 117 Pecan Street, Terrell, Texas. 75160.

WANTED: To buy good SSB Receiver in good condition, also HQ-140 or NC-183D series receivers. R. Dorough, W5DPN, 117 Pecan Street, Terrell, Texas. 75160.

SAROC, January 7-10, 1971, FLAMINGO HOTEL Convention Center, Las Vegas, Nevada by Southern Nevada ARC, Inc. Boulder City, Nevada.

FOR SALE: Two SX-62A's in GOOD CONDITION. One needs new BFO Can. Both for $79.95 PPD or $45.00 each. Harold Straud, 2517 S. Vernon Amarillo, Texas. 79022.

SELL: 80 feet triangular tower 15 inch sides, angle iron corners 20 foot lengths, Heavy Duty. Reasonable. K3WIU, Waymart, Penna. 18472.

S-2OR .5-44 MHz RCVR, $30. SCR-522 2MTR RCVR/TRANS $20. Teletype Corp. Loop Sply, $8. UHF cavity, $5. New 6HF5, $6/Pr. W9TKR, 505 South Elmwood, Waukegan, Ill. 60085.

WANTED: AC probe for Hickok VTVM mod. 110-B circa 1944. WA9GYF, 348 West Main, Reedsburg, Wisconsin. 53959.

PAIR of 250TL's and Lafayette Slide Rule. Sell or Preferably Trade. Want Johnson Matchbox without SWR. WN4OVR, Star Route 1, Northport, Alabama. 35476.

WANTED: Model 28 Teletype complete, or parts to build up my station. Ed Wagner, 6307 East Gate Road, Monona, Wis. 53716.

WANTED: Manual or Schematic for Morrow 5BR-2 Converter. K4NIJ, 324 Cumberland, Huntsville, Alabama. 35803.

WANTED: Any Schematics and info. on D-TEX Metal 'Treasure' Detectors. Joe Wegner, Jr., P. O. Box 262, Glendale, California. 91209.

FOR SALE: Radio Handbook by W6SAI, Editors and Engineers 17th Edition ; $5.00 plus postage W4GHV, 538 E. Samford Avenue, Auburn, Alabama. 36830.

WANTED: Radio Electronics Magazines, 64 thru 70; Pay $1.00 per year. Write J. Wegner, POB 262, Glendale, California. 91209.

SELL - SWAP: Beautiful Six-Meter Swan 250 and Swan 210 VFO. Make offer. WA3HMQ, 301 Blacksmith Road, Camphill, Pennsylvania. 17011.

FOR SALE: Hallicrafters HT-32A mint, original owner. $195.00; Volt Ohmest WV98A RCA $40; W3HQO, (215) 788-6364.

TRI-STATE COLLEGE ALUMNI NET MEETS 1st Saturday of month on 14.340 plus/minus 5 at 11:00 AM Eastern. NCS W9BF or W2FGL.

WANTED TO BUY OR BORROW to make a copy, manual for General Electric Dist. Co. of N. Y., model 200 Signal Generator. A.M. "Gus" Goings, WA4CPL, Box 1195, Tavares, Fla. 32778.

SELL: Hammarlund HQ-140X receiver, $80; Heath Twoer, $30. Both good condition. WA2HGJ, Highland Park, N. J. 08904. TEL: (201) 572-2980.

WANTED: Bud L.F.601 Low pass filter, Remote control for Swantenna, cabinet for B & W LPA-1. W6OHB, Box 194A, Mariposa, Calif. 95338.

WANTED: 16" Turntable and tone arm. Please give price wanted for either or both in first letter. W8QEJ, Ed Callahan, 3437 Auburn Road, Pontiac, Michigan. 48057.

FOR SALE: Gonset G-50, 10 months old, latest production Run, Complete, $235.00 M.O. or cert. check. Jim Gysan, 53 Lothrop Street, Beverly, Massachusetts. 01915.

HAM TRANSFORMERS REWOUND, Jess Price, W4CLJ. 411 Gunby Avenue, Orlando, Fl. 32801.

HAM CALL LICENSE PLATES WANTED from KL7, KP4 & KZ5 to complete my one-from-each-country collection. A. Herridge, G3IDG, 96 George Street, Basingstoke, Hants, England.

HRO-60 coil No. AB, covering the 15 meter band in good or better condition & untampered with. If I find it doesn't work satisfactorily, I reserve the right to return it for full refund. Send a statement with your price to Blake Tucker, 6112 Beachway Drive, Falls Church, Va. 22041.

HEATHKIT HR-20 receiver in very good condition. Needs p/s. Shipped collect. Money order or certified check. John Scheurer, 17202 Englewood Circle, Huntington Beach, California. 92647.

WANTED: Power Transformer Number 30026 for EICO Model Number 720 transmitter for (Boy's Club, K9YHB)-Write c/o Henry Wroblewski, 3747 South Harvey Avenue, Berwyn, Ill. 60402.

CANADIANS: Complete amateur equipment service by fully-equipped lic'd technician, kits wired-serviced. Bob Fransen, VE6TW, 227 Cottonwood, Sherwood Park, Alberta, Canada.

SELL: All parts for McCoy Silver Sentinel 9 MC single signal sideband generator, plus crystals for 5 band mixer stage. First $30.00 takes all. W0PHY, L. A. Stapp, 2903 Ash, Hays, Kansas. 67601.

SALE: 14 element, Telrex, spiral ray 2 meter beam PLUS Vertical with radials for 2 motors. $12.00. Come and get it! W2ASI, 15 Kensington Oval, New Rochelle, New York. 10805. (914) NE 3-7077.

TOUCHTONE DIAL equivalent from Denmark. Ten button, convertible to all twelve with data included. State Color: beige or black, limited number green. 12VDC required for oscillator operation. $16.00 postpaid USA. J. O'Brien, WA6UGY, 6606-5th Street, Rio Linda, Ca. 95673.

NAME PLATES: 3 lines engraved - any color, $1.10; 3 or more, $1.00 each. Mark Levy, 191 Napoleon, Columbus, Ohio. 43213.

POSTAL CHESS: American Postal Chess League, Box 1022, Greeley, Colorado. 80631.

FOR SALE: Galaxy III transceiver, complete with A.C. Supply and Deluxe Console. Mint condition, $250. Duane Stephens, 8615 Southwestern Blvd., Apt. 119, Dallas, Tx. 75206. Phone: 214-369-1476.

The FRRL Hamfest will be held at Phillips Park in Aurora, Illinois, on August 23. Free coffee and donuts will be served from 9:00 to 10:00 A.M. Talk-in frequencies: 145.35, 146.94, 3.94 Mcs. Advance tickets $1.00, $1.50 at the gate. For further information, contact: Tom Rogers, WA9WBV, Box 323, Oswego, Illinois. 60543.

COLLINS SC-101 Station Controller (Deluxe unit for KWS-1/75A4), Mint, Complete - Wiring Duct, Remote Relay Box, Manual, $200; 500 CPS filter for 75A4, $45.00. W4PLM, Fred Hufft, 2310 NW 38th Avenue, Fort Lauderdale, Florida. 33311.

WANTED: RANGER, 75A1 and HQ129X. State price and condition; also 1800 to 1850 Ft. 243. SALE: Westinghouse one-tube WD11-1921 receiver. National 183D new, $200.00; Viking I, extra finals, $75.00; DX100, $40.00. W2GN5, 37 Vista Drive, Little Silver, New Jersey. 07739.

QSLS. Second to none. Same Day Service. Samples 25 cents. Ray, K7HLR, Box 331, Clearfield, Utah. 84015.

HQ170AC Built-in 25 KC IC Calibrator, new set tubes, clean as whistle; but needs so aligning, Best offer over $160.00. HX50, also very clean, but also needs aligning. Best offer over $160.00. W9LAX, 1114 Amsterdam Avenue, Madison, Wisconsin. 53716.

GET YOUR FIRST! Memorize, study: "1970 Tests-Answers" for FCC First and Second Class License, plus "Self-Study Ability Test," Proven $5.00. COMMAND, Box 26348-H, San Francisco, California. 94126.

SELL: Heath DX-60B. Never used. In perfect condition. First check over $70. Postpaid. H. Martin, 786 Radar Square, Box 1, Minot, N. D. 58701.

RUBBER ADDRESS STAMPS, $2.00. Signature, $3.50. Free catalog. Jackson's, Box 443-F, Franklin Park, Illinois. 60131.

FOR SALE OR SWAP: Laboratory Test Equipment-Garage-full! Hewlett Packard U.H.F. Signal Generators, $25.00 each; Oscilloscope-storage type, 5" screen-similar to Tecktronix, $250.00, etc. Stereo equipment- Casette Recorder/Playback units- Car and Home types. Cameras, etc. Send for list. Murray Marcus, 11 Eldridge Street, East Northport, New York. 11731.

WANTED: QST before 1920 and Amateur Radio-Teletype Publications. Orville Magoon, 1941 Oakdell Drive, Menlo Park, California. 94025.

CINCY STAG HAMFEST: The 33rd Annual Stag Hamfest will be held September 27, 1970 at Stricker's Grove, Compton Road, Mt. Healthy, Cincinnati, Ohio. Door prizes each hour, raffle, lots of food, flea, and win prize. $5.00 cost covers everything. For further information, contact Mr. John Bruning, W8DSR, 6307 Fairhurst Avenue, Cincinnati, Ohio. 45213.

NOVICES: Need help for general ticket? Complete recorded audio-visual theory instruction. Easy, no electronic background necessary. Write for free information. Amateur License, Box 6015, Norfolk, Virginia. 23508.

NOVICE CRYSTALS: 4—15M, $1.38; 80M, $1.83. Free flyer. Nat Stinnette Electronics, Umatilla, Florida. 32784.

FOR SALE: HQ180AC, $225.00; Knight T-150A, $75; Knight KG635 WB Scope, new factory wired, $150.00. Mercury 200 Tube Tester, Almost new, $90. FOB, Hoshal, Box 191, Aberdeen, Md. 21001.

TOY TRAINS WANTED: I want to swap or buy those electric trains you no longer use; any age or condition. Swap 75A2, SX42, HP400D, G50, more Send full description, asking price and SASE. K4-EIH, Box 1028, Springfield, Va. 22151.

WORLD RADIO'S Used gear has trial-terms-guarantee! HX30 (6M-SSB), $199.95; RX1, $149.95; Swan TV2, $199.95; 350, $279.95; DuoBander 84, $104.95; T4X, $299.95; HQ110C, $139.95; HQ170C, $179.95; NC300, $139.95; Galaxy 5mk3, $279.95; SB33, $189.95; SB34, $249.95; GD104 (mic-stand) $19.95. Free "blue-book" list for more. 3415 West Broadway, Council Bluffs, Iowa. 51501.

WARREN AMATEUR RADIO ASSOCIATION (W.A.R.A.). 13th Annual Hamfest, Sunday, August 16, 1970 at New Location. New Trumbull County Fairgrounds, 2 miles noth state Route 305, on Bazetta Road just west of Mosquito Creek Reservoir. Registration begins at 1000 hrs. Mobil talk-ins on 3940 KHz and 145.3 MHz.

SB-34 PTT Mic, Cal, Mobile Mount (never used), SB2LA Linear, 14AVQ 80-10M Vertical, Drake W-4 Wattmeter, all less than a year old. Clegg 22'er 2 Meter Transceiver, PTT Mic, 4 xtals, 4-1000A, air socket, 5KV bridge rectifier. Best Cash offer. Ike Lee, W4EXP, 2811 Robinette Drive, Orange Park, Fla. 32073. A/C 904 264 4363.

SELL: Pacemaker, $150.00; Courier Linear, $125; Matchbox Johnson-250, $50.00. Eddie Goon, 1066 Westbrook, Perrysburg, Ohio. 43551.

TRADE: 12VDC to 110 AC inverter 100 watts new, Sencore PS127 Oscilloscope used perfect, Sencore TR39 in circuit transistor checker new, Calarad Variac 0--150 volts new, B & K TV analyst for color & BW all slides used perfect, Pilot FM tuner amplifier 602MA works perfectly, but needs 19 kc for multiplex. Will swap for all band transceiver, consider linear or cash. Ozzie Levin, W5RK, 4103 Avenue S, Galveston, Tex. 77550.

FOR SALE: Model 19 Teletype, $100.00; HT32-B, $225.00; SB-200, $200.00; 30L-1, $400.00; M/V of the SX-73, $125.00; All in good shape. S. W. Henderson, K4NJY, P. O. Box 236, Camp Hill, Alabama. 36850.

USED ASTATIC888 Microphone less stand, $22.50. Used RCA Junior Velocity Factory reconditioned, $25.00 less stand. Both units plus postage. Roache, W1KUP, Canterbury, Conn. 06331.

MANUALS: TS-323/UR, SP-600 JX, $5.50 ea., R-390A/URR, BC-639A, OS-8C/U, $6.50 each; R-388/URR, $7.50. W3IHD, 4905 Roanne Drive, Washington, D. C. 20021.

HOT as a firecracker! That's the upcoming ARRL Hudson Division Convention, Hilton Motor Inn, Tarrytown, New York, October 17-18 are the happy days. So spend your July 4th weekend anticipating exhibits, lectures, contests, gabfests, New York sightseeing, fun. It's a blast! Write Larry Strasser, K2UMM, 3591 Bainbridge Avenue, Bronx, New York. 10467. He'll fire off the info to you.

TEKTRONIX 315D scope (lab: to 10 Khz.) $100, Hewlett-Packard 200CD audio Oscillator (5hz-600 khz) $50. TS 382D/U audio oscillator (20hz-200 khz) $50. All calibrated, good condition. Freight collect. Martin Gary, 807 Westham Parkway, Richmond, Virginia.

1000 piv at 1.5 amp epoxy diodes, includes disc bypass capacitors and bridging resistors, 10 for $3.95 or 100 for $30.00 postpaid U.S.A. East Coast Electronics, Dept. C., 123 St. Boniface Road, Cheektowaga, New York. 14225.

BUILD: Transformers, inductors, coils yourself. Save to 80%. Plans - Kits. Free estimates and information. Magnetic Circuits, Dept. A, 386 Deborah Ct., Upland, California. 91786.

REI can train you for the First Class Radio Telephone License in only (5) five weeks. Approved for Veterans training. REI has schools in Sarasota, Florida; Glendale, California; Fredericksburg, Virginia; and Kansas City, Missouri. For free brochure, write REI, 1336 Main Street, Sarasota, Florida. 33577 or call: (813) 955-6922.

FOR SALE: One brass base UV 200 tubes, $5; One open brass base 201A, $2.00; two VT2 tubes, $5.00 each; two WE 215A tubes, (Peanut) $5.00 each; UX 199 tubes fil OK, $1.00 ea; 201A, tubes fil OK, $1.00 each. All FOB, Douglas, 2254 Pepper Drive, Concord, California. 94520.

FOR SALE: DX60, $60.00; HC10, VFO, $30.00; HB10 Receiver, $60.00; 710 dipper, $20.00. Will buy, repairable or uncompleted gear. WA5BFN, 1003 Electra, Longview, Texas. 75601.

SILVER: Part-time business to pay for your ham gear. Buy waste solution and recover silver. High weekly earnings. Small investment. Upchurch Sales Box 9944, Austin, Texas. 78757.

BUY, TRADE, or SELL used Amateur Band Receivers. Steven Kullmer, Evergreen Hatchery, Dysart, Iowa. 52224.

FOR SALE: 2 Meter Transceiver, Knight TR-108 VFO, V-107, Mike, Halo & Manual, Clean, $75.00. GONSET G-63 Receiver, good condition, manual, $75.00. WA9MRX, Jim Smith, 822 East Evergreen, Wheaton, Illinois. 60187.

DON'T BUY QSL Cards until you see my FREE samples. Fast service. Economical prices. Little Print Shop, Box 9848, Austin, Texas. 78757.

PWR TXmer: 1700V CT 70MA, 6.3 V 2.5A, 5V3A, and 650 VCT 150 MA, 6.3V5A, 5V3A, $4.00 ea., FIL 6.3V 5A $1.50 ea; shipping incl. M. Bae, Box 9, Kingston, N. J. 08528.

SALE: Vibroplex Bug Champion; good condition. $10.00 or Best Offer. WA3LPK, 2300 Louise Avenue, Baltimore, Maryland. 21214.

WANTED: 12 Volt Self-Priming Bilge Pump. For cash or swap, model 28 Teletype Parts. W9YVP, 8280 S. Tennessee, Clarendon Hills, Ill. 60514.

WANTED: Power Transformer No. 30026 for EICO Model No. 720 transmitter for Boys' Club. K9YHB. Write c/o Henry Wroblewski, 3747 S. Harvey Avenue, Berwyn, Illinois. 60402.

FOR SALE: Motorola No. T43G-1, ready-to-go with 146.94 Xtals and 12 VDC and 115 VAC supply.- W9LAX, 1114 Amsterdam Avenue, Madison, Wisconsin. 53716.

TRADE: Office Copy Machine and Supplies for Ham or Test Equipment. W4API, Box 4095, Arlington, Virginia. 22204.

TH-3 - MKIII, $85.00; Heath Monitor Scope, SB-610, $75.00; Valiant I, Make offer; New Turner 350C mike, $8.00; Bill Fulcher, K4RTA, 105 Freshrun Drive, Hendersonville, Tenn. 37075.

SELL OR TRADE: FM Gear, High Band, Low Band, 430 M.C. For Wireless gear, radio receivers, magazines, parts, tubes, etc. Circa before 1929. Jerry Vanicek, 3313 South Lowe Avenue, Chicago, Illinois. 60616.

SELL: Collins 32S-3, 516F-2, 75-S3B, all manuals and cables, $1200.00 firm. APX-6s, New, w/tubes, at $25.00. Ship express, collect. K5AEU, F. Abide, Jr., Box 146, Leland, Mississippi. 38756. Phone: (601) 686-4992.

SALE OR TRADE: For Mobile rig: Johnson Navigator and/or Valiant II. W6AT, 606 Buckeye Vacaville, California. 95688.

EICO 460. $80.00; Hallicrafter SR-75 Transceiver, $40.00; SP-44 Panadaptor, $40.00. T. Gosman, 143 Roxton Road, Plainview, New York. 11803.

HEATH MOHICAN GC-1A, all band transistor receiver, excellent, with book, $49.00. Cal Enix, W8EN, Box 474, White Pigeon, Mi. 49099.

WANTED: QST issues before 1923 to complete file. Also Globe DSB-100 in good condition. W9CO. Box 37, Lincoln, Illinois. 62656.

FOR SALE: Heath SB-110 Transceiver with Power Supply, A-1 condition, $275. You pay freight. Johnson Viking Matchbox & SWR Bridge, $85. (600 P.E.P. Model). WB4INE, G. Craig, Route 2, Box 291, Granite Falls, N. C. 28630.

FOR SALE: Heath SB-500 2-meter transverter and HW-18-3 160 meter transceiver. Best offer. W8JBA, 1832 North Donna Dr., Stevensville, Mich. 49127.

SELL: Galaxy III Transceiver, VOX, III Power Supply, $175.00. K9YSR, Box 472, Eau Claire, Wisconsin. 54701.

SELL: Send SASE for long list of equipment, parts, tubes, Xmtrs., rcvrs., Xcvrs., Quad Ant., Rtty., HF, VHF, FM, etc. WA8QBJ, 6305 Redbird Terr., Clinton, Ohio. 44216.

FOR SALE: Hallicrafters SR400 Transceiver, $495.00. W. R. Stangel, K6JB, P. O. Box 372, Lakeport, California. 95453.

WANTED: Heath Monitor Scope. Please state model, condition and price. W2PZQ, 10 Evanshire Ln, Williamsville, New York. 14221.

SELL: TR-3, TR-4, RC; SB301/401, CW filter; Comdel CSP-11; R. Nevers, 1591 Norwich-N.L., Apt. 31, Uncasville, Connecticut. 06382.

WANTED: Schematic and/or Instruction Manual for Model 100 Superotor Antenna Rotator with Leader Superotor control box-Series SHC 2B4. A. M. Gus Goings, P. O. Box 1195, Tavares, Florida. 32778.

WANTED: Heathkit VF-1 VFO. Send details, price. First letter. Bruce, 10884 San Miguel, Lynwood, California. 90262.

SELL: Swan 350/117 xc with manual, $300 ppd or trade for Lampkin 105B. K8RXD, 612 Lindy Lane, North Canton, Ohio. 44720.

SELL ONLY: Complete parts for KW Linear Power Supply built and working from QST FEB 66, pg 17. RF section to be completed. Includes three, $75. WB2VZW, 10 Scott St., Massapequa Park, New York. 11762.

SELL: 30 AMP FILAMENT CHOKES FOR GG LINEAR AMPLIFIERS. Perfect for pair 4-400A, 3-500Z, 813's, or single 3-1000Z, 4-1000A, etc. $5 ea. postpaid USA. Vonn R. Murrell, K4HHA, 712 Rich Road, Newport, Tenn. 37821.

COMPONENTS. Unused brand-name surplus at junk prices. Write for list. R. Stinaff, 206 Magnolia Terrace, Pendleton, South Carolina. 29670.

F.M. Transceiver Motorola T44A6 450 mc, $30; G.E. ME306 450 mc, $30; Elmac PMR-8 Rec., $40. W. Davis, 4434 Josie Ave., Lakewood, Ca. 90713.

FOR SALE: Megger 'Meg' Type Hand-Cranked, Catalog No. 7679 ARK, 500 volts DC. Cost $300 SELL: $160. New. SASE. K0JHW, 7061 Idlewild Avenue, Jennings, Mo. 63136.

FOR SALE: BC-1031 Panadapter $99.00. 45-General Radio 200KC Quarts Bar (Crystal) $6.95; Heath MR-1, MT-1, UT-1, MP-1 with MIC & Cables, $99.45. LM 1000KC X'tal $4.95. J. Brink, POB 3734, Fayetteville, North Carolina. 28305.

FALL 1969 USA CALLBOOK, $4.00 postpaid. Mint condx. 1970 QST's-73's, 30 cents ea (mm. 3). George Clark, 123 Davis Avenue, Hackensack, New Jersey. 07601.

SBE 34, Mobile Mount, and Hand Mike in A-1 condition, $280 FOB. Keith O'Brien, 8401 North Atlantic Avenue, Number L15, Cape Canaveral, Florida. 32920.

TRANSISTORS: What do you need? K3DTL, Art Prutzman, 31 Maplewood, Dallas, Pa. 18612.

TRADE: Heath HD-15 Hybrid Phone Patch for 1945 CQ complete year. W2IXT, 447 South Ocean Avenue, Patchogue, L. I., New York. 11772.

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FOR SALE: HQ170A Receiver with manual, $125.00, Sbl-La Linear Amplifier, $85.00; DX-100 AM Rig, $50.00, and a B & W TR Switch, No. 381 for $10.00. Will ship. Eugene Prince, 720 Maple Street, Camden, Ark. 71701. (501) 836-2360.

SELL: Model 2827 HiFi Webcor Tape Recorder with manual, operational $50.00 or TRADE. W3-VK, Chas. A. Weaver, 689 Wengler Avenue, Sharon, Pennsylvania. 16146.

SALE OR SWAP: Freq. Meters: TS-175/U (85-1000 MC); TS-127/U (375-725 MC); Variac 2 KVA. Need SB200 or Make offer! W2NUE, 205 Hollywood, Crestwood, New York. 10707.

HAVE LIMITED NUMBER NEW COPIES of Greenwood's Album Wireless & Radio, $3.00 PP, WA4N-ED, Box 468, Gainesville, Ga. 30501.

DB-24 Duo-Band Beam: 20 mtr & 40 mtr Hy-Gain with Balun. Like new. Pick-up preferred. $100.00. M. E. Knowles, K1HVV, 9 Brown Street, N. Billerica, Massachusetts. 01862.

FOR SALE: HT-9 for $50.00. In good working order. Arthur R. Rosselle, WB2YBR, Box 255, Hyde Park, New York. 12538.

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WANTED: 800 CPS Collins Mechanical Filter for early model 75A3. Instruction book for 32V3 and Ranger I, will take good care and return after I make copy. KH6HCM, G. Elliott, 5952 Gannet Avenue, Ewa Beach, Hawaii. 96706.

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48" Base Section	9.50

80-10m MOBILE "SWANTENNAS"

Model 45 (Manual Bandswitch)	$ 79.50
Model 55 (Remote Bandswitch)	129.50
Custom Contour Bumper Mount	24.95
Kwik-on Antenna Connector	5.95

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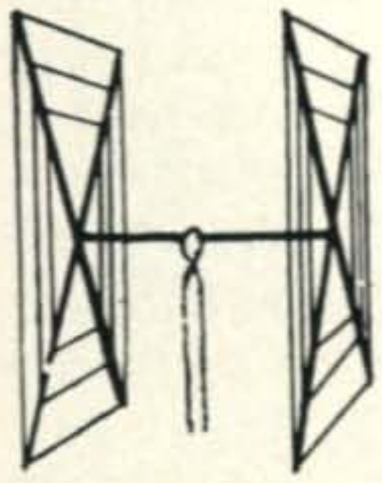
AHA! YOU THOUGHT GOTHAM

made run-of-the-mill ordinary antennas. No, no, no. Our materials are the best, and our design superior. WA1JFG won the New England Round-Up championship with our 3-element 15meter beam by a margin of 5,982 points!

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

Antenna Designation: 10/15/20 Quad
Number of Elements: Two. A full wavelength driven element and reflector for each band.
Freq. Covered: 14-14.4 Mc. 21-21.45 Mc. 28-29.7 Mc.
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

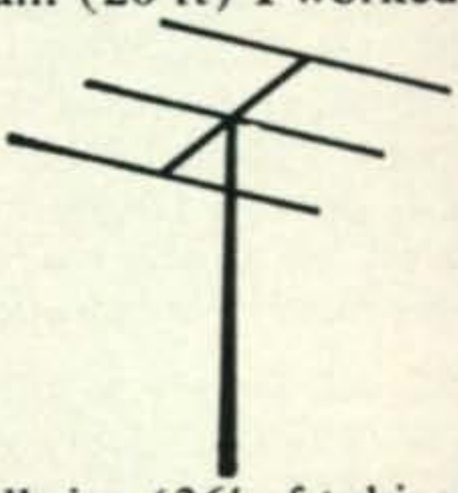
Feedline (not furnished); 52 ohm coaxial cable

Now check these startling prices—note that they are *much lower* than even the bamboo-type:

10-15-20 CUBICAL QUAD	$37.00
10-15 CUBICAL QUAD	32.00
15-20 CUBICAL QUAD	34.00
TWENTY METER CUBICAL QUAD	27.00
FIFTEEN METER CUBICAL QUAD	26.00
TEN METER CUBICAL QUAD	25.00

(all use single coax feedline)

BEAMS The first morning I put up my 3 element Gotham beam (20 ft) I worked YO4CT, ON5LW, SP9-ADQ, and 4U1ITU THAT ANTENNA WORKS! WN4DYN Compare the performance, value, and price of the following beams and you will see that this offer is unprecedented in radio history!



Each beam is brand new; full size (36' of tubing for *each* 20 meter element, for instance); absolutely complete including a boom and all hardware; uses a single 52 or 72 ohm coaxial feedline; the SWR is 1:1; easily handles 5 KW; ⅞" and 1" alumnium alloy tubing is employed for maximum strength and low wind loading; all beams are adjustable to any frequency in the band.

2 EL 20	$21	4 EL 10	20
3 EL 20	27	7 EL 10	34*
4 EL 20	34*	4 EL 6	20
2 EL 15	17	8 EL 6	30*
3 EL 15	21	12 EL 2	27*
4 EL 15	27*		
5 EL 15	30*		

ALL-BAND VERTICALS

"All band vertical!" asked one skeptic. "Twenty meters is murder these days. Let's see you make a contact on twenty meter phone with low power!" So K4KXR switched to twenty, using a V80 antenna and 35 watts AM. Here is a small portion of the stations he worked: VE3FAZ, T12FGS, W5KYJ, W1WOZ, W2-ODH, WA3DJT, WB2FCB, W2YHH, VE3-FOB, WA8CZE, K1SYB, K2RDJ, K1MVV, K8HGY, K3UTL, W8QJC, WA2LVE, YS1-MAM, WA8ATS, K2PGS, W2QJP, W4JWJ, K2PSK, WA8CGA, WB2KWY, W2IWJ, VE3-KT. Moral: It's the antenna that counts!
FLASH! Switched to 15 c.w. and worked KZ5-IKN, KZ5OWN, HC1LC, PY5ASN, FG7XT, XE2I, KP4AQL, SM5BGK, G2AOB, YV5-CLK. OZ4H. and over a thousand other stations!

V40 vertical for 40, 20, 15, 10, 6 meters	$14.95
V80 vertical for 80, 75, 40, 20, 15, 10, 6 meters	$16.95
V160 vertical for 160, 80, 75, 40, 20, 15, 10, 6 meters	$18.95

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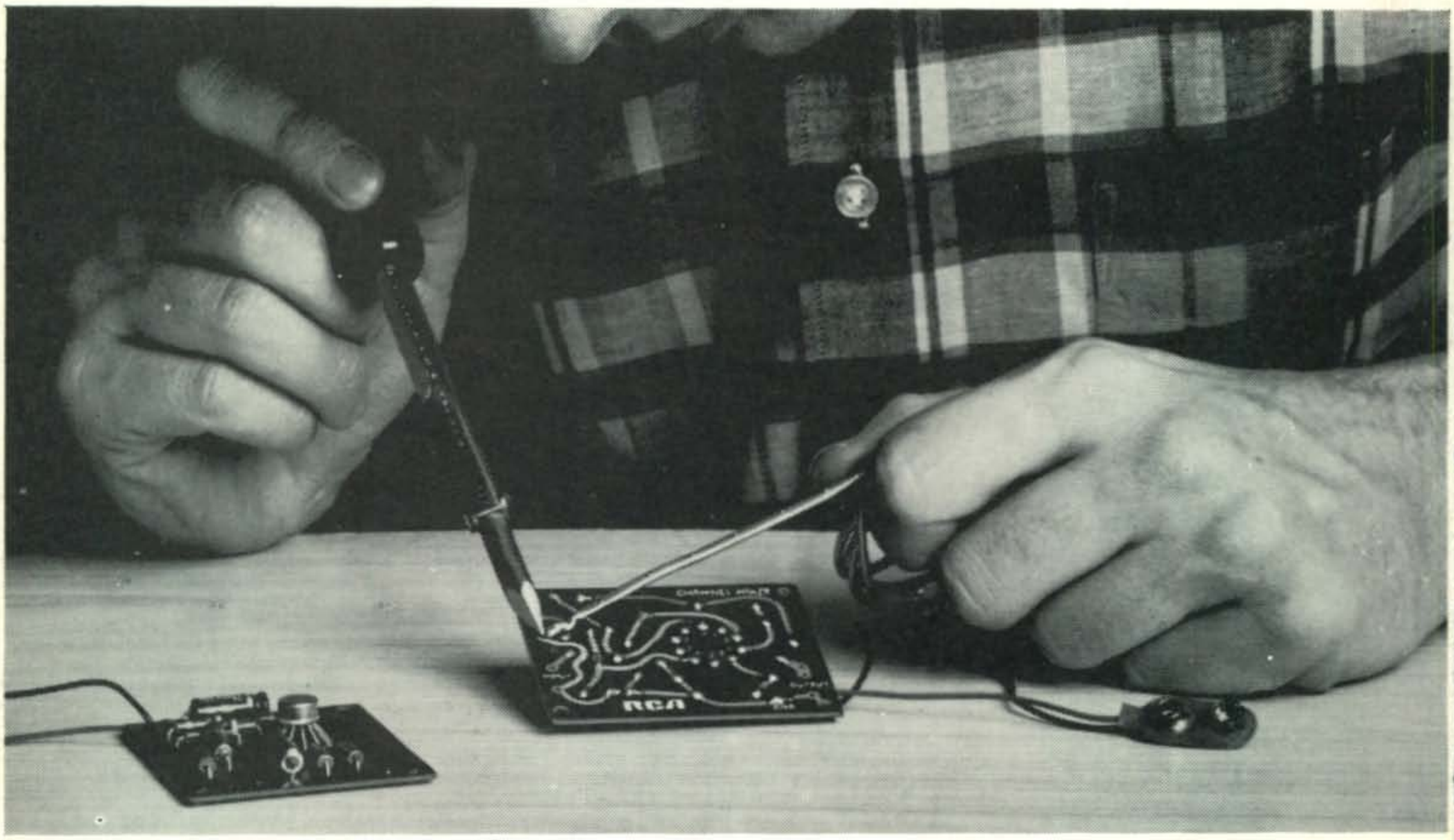

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Assemble these new RCA IC Experimenter's Kits quickly and easily.
All the active and passive components, the pre-drilled printed circuit boards, and full clear instructions are included. (Add your own preference of alarm indicator to kits KC4005 and KC4006.)

KC4000: Microphone Preamplifier IC Kit—a high-gain, low-noise, wideband preamplifier that accommodates both low- and high-impedance microphones.

KC4001: 2-Channel Mixer IC Kit—combines any two audio inputs, such as microphone, radio, phono, or oscillator, into a single output.

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KC4002: Audio Oscillator IC Kit—for testing audio, hi-fi equipment, and amateur radio transmitters—also for code practice.

KC4003: Amplifier/Oscillator IC Kit—a 500 mW audio amplifier or a variable tone audio oscillator.

KC4004: 9-V Regulated Power Supply IC Kit—supplies 9 volts DC output with voltage regulation of 3% at a maximum current of 250 mA.

KC4005: Intruder Alarm IC Kit—a circuit that develops a "whooping" signal for a security system.

KC4006: Fire Alarm IC Kit—a low-melting-point solder sets off this circuit for a warning device.

KC4500: IC Kit Enclosure and Hardware Pack—optional for KC4000, KC4001, and KC4002—a handsome, sturdy, prepunched case with input and output jacks, switch, and other hardware.

Buy these kits from your RCA Distributor. For information, write: RCA Electronic Components, Commercial Engineering, Section 40-l /S30R, Harrison, N.J. 07029

* Optional distributor resale price

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