CQ

October 1972
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These Things We Call Countries— What Are They?

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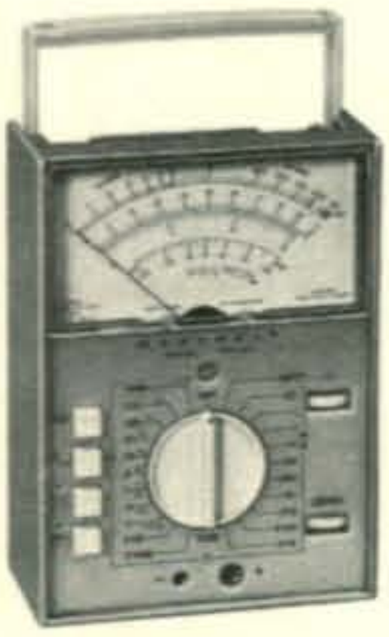
The Radio Amateur's Journal
08240

The peanut whistle heard 'round the world...

and Heathkit instruments that



The New Heathkit FET VOM... 79.95*. This is the tool hams have been waiting for. A portable lab-grade FET VOM combining accuracy, versatility, convenience and ruggedness – in an easy-to-build dollar-saving kit! Our new IM-104 has low-drift 1% precision metal film and wirewound resistors for exceptional stability. Dual FET meter amplifier circuitry for 10 megohm input impedance and instant operation. And there are 53 ranges on four scales. Nine DCV ACV ranges from 0.1V to 1000V. Six current ranges cover 0.01mA to 1000mA, DC & AC. Seven resistance ranges from 1 ohm to 100 megohms, conventional or low voltage modes. Decibel ranges from –40 dB to +62 dB. DC null scale with better than 1 mV resolution. The 4½" ruggedized, taut-band meter is diode protected, built to take plenty of abuse. Built-in circuitry shows battery condition at the flip of the range selector.

Kit IM-104, 4 lbs. **79.95***

The Heathkit 10 MHz Triggered Scope... 229.95*. Maximum flexibility in a general purpose scope, at a price to fit any budget... the new Heathkit IO-103 is a ham's dream come true! Big 6x10 cm screen with lighted graticule for easy, accurate measurements. DC-10 MHz ±3 dB response with less than 50 ns rise time on vertical channel. Horizontal expansion gives x2 magnification ±5% for a 50 ns/cm sweep rate. Triggered sweep, too, with selection of either normal or automatic modes. Other features are switch controlled AC-DC coupling; provision for external triggering signals and horizontal deflection signal; front-mounted connectors for vertical inputs and 1V peak-to-peak signal for checking calibration; easy-access cabinet with removable side panels for service or demonstration purposes; 120/240 VAC operation. Put this budget-minder in your shack now.

Kit IO-103, 37 lbs. **229.95***

The latest QSL count is 27 countries, 40 states, all continents! That's what the Hams at Heath have scored field testing the new HW-7 CW QRP Transceiver. And the new contacts are coming in every day. The HW-7 is flea-power operation at its finest. With three-band CW coverage, running a tidy 3 watts on 40, 2.5 watts on 20 and 2 watts on 15 meters. That's a bare minimum, but the HW-7 gives you more than a sporting chance. It has both built-in VFO and crystal transmit capability. Sensitive Synchrodyne Detector receiver circuitry for a readable signal with a 1 uV input or less.

Operation is nice and neat too. Band selection is at the push of a button, and the 6-1 vernier drive gives you "backlashless" VFO tuning. The pushbutton crystal transmit provision makes the HW-7 perfect gear for novice or QRP roundtable use. Built-in sidetone and relative power meter are other top quality features.

You can carry your HW-7 peanut whistle anywhere. As you see it at left it's ready to run on any 12 VDC supply. For a fixed flea-power station there is an optional low voltage power supply that plugs into your 120 VAC line.

You can build this rugged little transceiver in an easy two evenings – building-in the dollar savings as you go. One-circuit-board design and the check-by-step assembly manual help you get it together without a hitch.

The Heathkit HW-7 – for novice or veteran QRP amateurs operating in the field or fixed. It's the ultimate Mini-Rig. From the folks who brought you the Maxi.

Kit HW-7, 6 lbs. **69.95***

Kit HWA-7-1, 12 VDC power supply, 4 lbs. **14.95***

HW-7 SPECIFICATIONS – TRANSMITTER: RF Power Input: 3 watts on 40 meters. 2.5 watts on 20 meters. 2 watts on 15 meters. **Frequency Control:** 40 meter crystal, or built-in VFO on 40 meters. 20 meter crystal or built-in VFO on 20 meters. 15 meter crystal, or built-in VFO on 15 meters. **Output Impedance:** 50Ω unbalanced. **Sidetone:** Built-in. **Spurious and Harmonic Levels:** At least 25 dB down. **RECEIVER: Sensitivity:** Less than 1 microvolt provides a readable signal. **Selectivity:** 2 kHz at 6 dB down. **Types of Reception:** CW or SSB. **Audio Output Impedance:** 1000Ω nominal. Receiver frequency response is ±3 dB at 200 Hz to 2500 Hz. **GENERAL: Frequency Coverage:** 40 meters, 7.0 to 7.2 MHz. 20 meters, 14.0 to 14.2 MHz. 15 meters, 21.0 to 21.3 MHz. **Frequency Stability:** Less than 100 Hz drift after 10 minutes warm-up. **Power Required:** 13 volts DC, 35 mA receive and 450 mA transmit. **Dimensions:** 4¼" H x 9¼" W x 8½" D, including knobs and feet.

keep the ham world working

The Heathkit 100 MHz Counter... 269.95*

Accepts input levels from less than 50 mV to over 200V, depending on frequency, without damaging the instrument; full 5-digit readout can be expanded to 8-digit capability with range selector and overrange circuitry; decimal point automatically positioned with range selection; MHz, kHz, overrange and gating conditions indicated by illuminated legends on front panel; one megohm input impedance & low input capacitance minimize possibility of circuit loading; all solid-state circuitry with cold cathode readout tubes for instant operation; count storage circuitry gives non-blinking or count-up readout, changing only with count; stable time-base crystal has better than ±3 ppm from 17° to 32° C. dual primary, 3-wire line cord & regulated supply for stable operation over long periods.

Kit IB-1101, 8 lbs. **269.95***

The New Heathkit FET Tester...49.95*. The new Heathkit IT-121 checks transistors in or out of circuit. Five current ranges measure leakage as low as 1uA and collector currents as high as 1A. Gain (DC Beta), transconductance (GM), and leakage values read directly on large meter face. Has color-coded pushbutton range selection, battery testing circuit (batteries not included), handy 3' leads.

Kit IT-121, 6 lbs. **49.95***

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CQ

OCTOBER, 1972 VOL. 28, NO. 10

The Radio Amateur's Journal

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DEPARTMENTS

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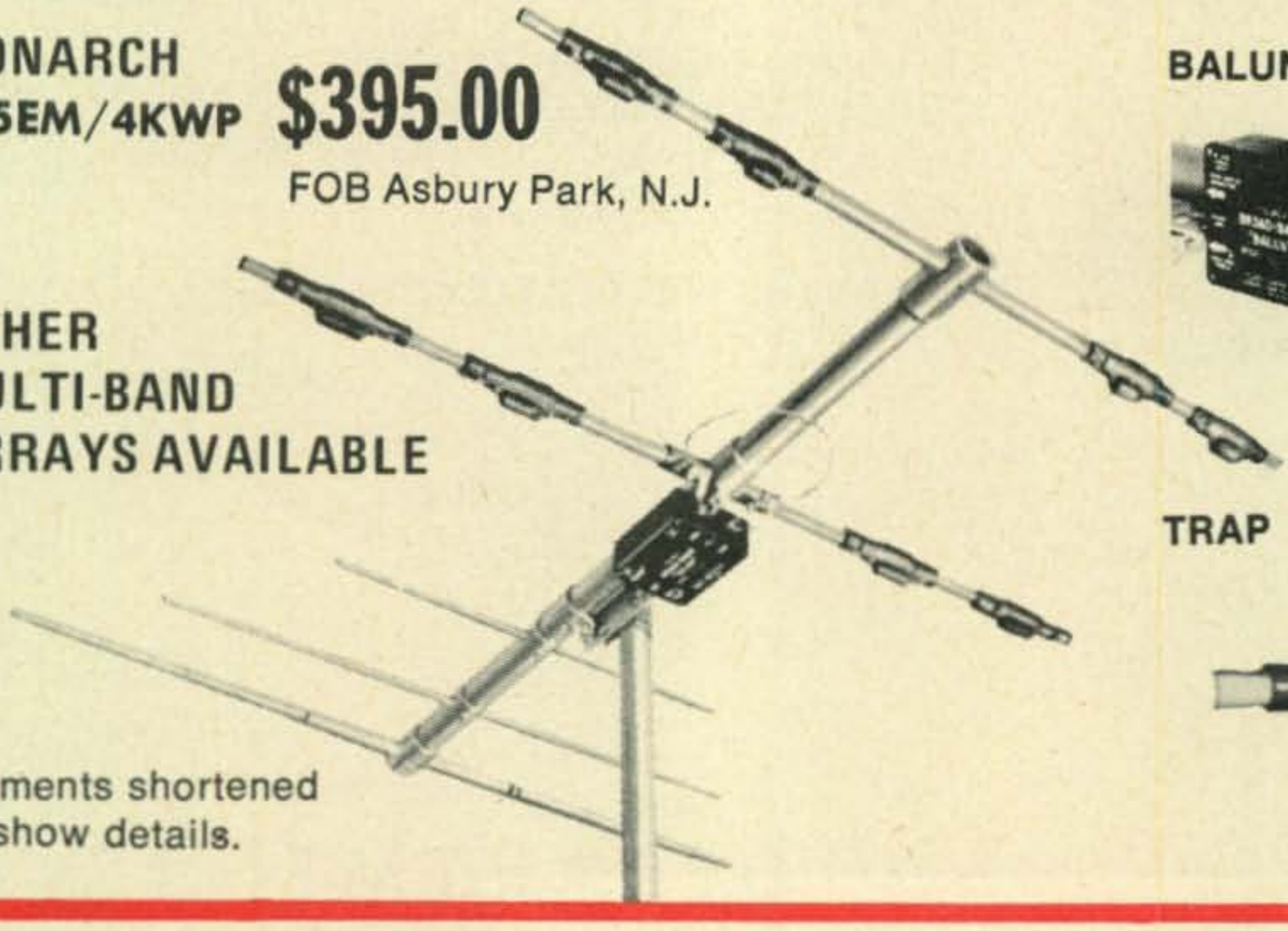

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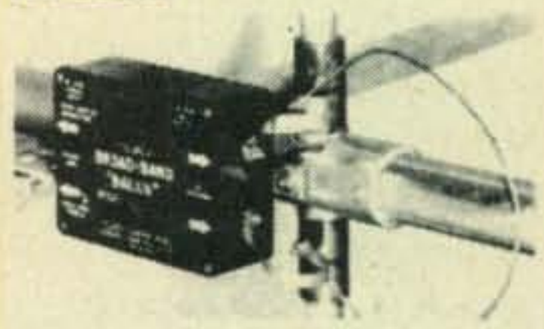
BALUN



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ZERO BIAS

The long-awaited FCC action on Docket 18803-better known as the "Repeater Docket" has finally been taken. On August 29 new rules were adopted, to take effect October 17, 1972. The rules will "legitimize" the mushrooming field of repeaters by officially recognizing their existance and establishing guidelines for their design and operation.

The complete 18-page text of Docket 18803 had not been released even as we held the presses for this preliminary announcement. To fill the time gap, however, we reproduce below the text of FCC's news release on the Docket, which describes the action in general terms. See next month's *CQ* for the full text of Docket 18803.

ACTION IN DOCKET CASE LICENSING AND OPERATING RULES REPEATER STATIONS IN AMATEUR RADIO SERVICE AMENDED BY FCC

Amendments to Part 97 of the rules concerning the licensing and operation of repeater stations in the Amateur Radio Service have been adopted by the FCC (Docket 18803).

Repeater stations receive and automatically retransmit the radio signals of other amateur stations and are used primarily to extend the radiocommunication range of vehicular and hand-held mobile stations. Although the present rules do not specifically refer to repeater stations, it has been Commission policy to permit amateur stations to operate as repeaters under the rules applicable to all amateur stations.

In a rulemaking notice adopted February 26, 1970, the Commission invited comments on rules proposed for repeater stations. It said that the rules it was adopting are intended to permit "the flexibility needed in the Service, and to provide the licensing framework for accommodating future technical and operational advancements in amateur radiocommunication."

Beginning July 1, 1973, a separate station license will be required for every amateur repeater station. These stations will be identified by a call sign having the distinctive prefix WR. In order to qualify for a repeater station license, an applicant must be at least a Technician Class licensee and must submit certain data regarding the technical and operational provisions of his proposed station.

An amateur's license, which now specifies the location of his station and his operator privileges, will also include the privileges authorized for his station. At a minimum, the station privilege would be "primary station." The various kinds of station privileges may be combined with a primary station license upon submittal of the appropriate information.

The remote control operator may be any qualified amateur designated by the licensee. The new rules permit a licensee to use his own repeater station while he is operating mobile or portable; provide for auxiliary link stations to be used when terrain makes "multiple-hop" control links necessary; and provide for "wire" remote control. Certain stations other than repeater stations now authorized for "wire" remote control but not in compliance with the new rules may continue to operate until their current station licenses expire.

Approximately one-half of each Amateur VHF band and 8 MHz of the 420 MHz band was authorized for repeater usage, and Technician Class licensees will be permitted to op-

[*continued on page 120*]

OSCAR 6 Launch Oct. 16

Despite delays which threatened to push back the launch date of OSCAR 6, late word is that the launch will occur on October 16 aboard the same vehicle which was to be used in July. All orbit information published in June *CQ* therefore is still valid. This 2 m./10 m. communications satellite *will not* require sophisticated equipment for its use, opening the way for wide amateur participation in this ,exciting project. Be a part of it!

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MC-4 Mobile Console (shown in photos above.	$ 69.00
MMK-3 Mobile Mounting Kit . .	$ 6.95
AC-4 115/230 VAC 50/60 Hz Power Supply	$ 99.95
DC-4 12 VDC Solid State Power Supply	$125.00
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TR-4 SPECIFICATIONS: • **Frequency Coverage:** Full coverage on all amateur bands 10 thru 80 meters, in seven 600 kHz ranges: 3.5 to 4.1 MHz, 7.0 to 7.6 MHz, 13.9 to 14.5 MHz, 21 to 21.6 MHz, 28 to 28.6 MHz, 28.5 to 29.1 MHz, 29.1 to 29.7 MHz. • **Solid State VFO:** Has linear permeability tuning. Tunes 4.9 to 5.5 MHz for all ranges. • **Dial Calibration:** 10 kHz divisions on main tuning dial and 1 kHz divisions on the tuning knob skirt. • **Frequency Stability:** High stability solid state VFO tunes same range on all bands. Drift is less than 100 cycles after warm-up, and less than 100 cycles for plus or minus 10% line voltage change. • **Modes of Operation:** SSB Upper and Lower Sideband, CW and AM. • **Misc:** 20 tubes including voltage regulator; two transistors; 8 diodes; 100 kHz crystal calibrator built in; Dimensions: 5½" high, 10¾" wide, 14⅜" deep. Weight: 16 lbs . . . **TRANSMITTER:** • **Single Sideband:** 300 watts P.E.P. input power, VOX or PTT. Two special 9 MHz crystal filters provide upper or lower sideband selection on any band, without the necessity of shifting oscillators. • **CW:** Power input 260 watts. Carrier is shifted approximately 1000 cycles into one sideband, and mixer and driver are keyed. Grid block keying is free from chirps and clicks. Automatic transmit/receive switching when key is operated. CW sidetone oscillator for monitoring. • **AM:** Controlled carrier AM screen modulator is built-in. 260 watts P.E.P. input. Low carrier power increases 6 times to 50 watts output at maximum modulation. This system is compatible with SSB linears. VOX or PTT. Diode detector used for receiving on this mode. Product Detector can be used by switching manually . . . **RECEIVER:** • **Sensitivity:** Less than ½ microvolt for 10 dB S/N • **I. F. Selectivity:** 2.1 kHz at 6 dB, 3.6 kHz at 60 dB. • **Antenna Input:** Nominal 50 ohms. • **Audio Response:** 400 to 2500 cycles at 6 dB. • **Audio Output Power:** 2 watts. • **Impedance:** 4 ohms.

MC-4 SPECIFICATIONS: • **Frequency Coverage:** 1.8-54 MHz • **Line Impedance:** 50 Ohm resistive • **Accuracy:** ± (5% of reading +3 watts) • **Power Capability:** 300 watts forward or reflected • **Controls:** Front panel 2-position switch selects forward or reflected power • **Speaker:** 3" x 5" oval, 2.98 ounce ceramic mag.

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OUR READERS SAY

What Price Chauvinism?

Editor, *CQ:*

I am an ARRL life member. This is addressed to all ARRL members, as well as to you to ask for your help in a matter that has been troubling me since last November. That month a guest editorial supporting the ARRL, actually a letter printed as an editorial, by James Russell, W8BU, of Cleveland, appeared on page 77 of *QST*. Mr. Russell did a very unfortunate thing in that letter — he owed how we oughtn't only chastise ARRL for its shortcomings, but how we should also stand behind it as the best hope for a strong, viable amateur radio.

This would've been fine except that Mr. Russell used the case of a young girl concerned, who had six children to support, had been hauled into a Cleveland court for wearing an American flag on the seat of her pants, and with the suspension of her subsequent $1000 fine and thirty day jail sentence, had been properly humbled (humiliated) to the point of telling the judge, ". . . meekly, 'Yes, she thought it was a pretty good government after all.'" Obviously, this sort of situation is emotionally, socially and politically supercharged — it is much deeper than the level at which Mr. Russell chose to use it as a ploy for the introduction of his pro-League argument. Yet this is exactly what he did, i.e., use the words of a troubled welfare mother as a good example of how we ought not knock our "good government," or our good League. This is nothing but patent, and potentially dangerous, malarky. This kind of thing belongs nowhere in amateur radio — a realm of technical, not social, investigation — let alone on the editorial pages of *QST*. Yet there it was in black-and-white.

I wrote to ARRL in protest. My letter was not printed in *QST*_though W8BU had had a *second* letter of his printed as the first letter in the correspondence section of the *same November issue!* Check this out (page 88) if you do not believe me. Where does this man get off? Does he own the ARRL? I am an ARRL member, Extra Class, etc., just as W8BU is. How does he, or anyone, rate *two* letters in one issue, one of them printed as an editorial, no less, to my *zero* letters, especially when one of them is untenably political and potentially divisive in its implications? It--tions? It is al there in print, in *QST*.

Moreover, *no* letters protesting W8BU's ill-considered stand were printed, while letters supporting him were, e.g., one by K8MMH/9, of Buffalo Grove, Illinois, a personal friend of W8BU. Yet I know protest exists — I protest this. WA9SXQ protests it. I brought this issue to the attention of ARRL Hawaii SCM, KH6BZF, one night on twenty meters and he admitted, after I had stood by for him to read the editorial, that he felt like hanging his life membership plaque upside down on the wall of the shack.

What I want is for all ARRL members who feel likewise — and I urge those of you who haven't read W8BU's editorial to do so — to write their Division Directors, as well as Headquarters, demanding the retraction of this editorial. That's all I want, that and that the amateur world know there are people who disagree with W8BU and ARRL on this and were not allowed to express that disagreement in the same forum that bred it — the pages of *QST*. That's why I ask your help in printing this — injecting politics of any kind into ARRL policy is bad, but apparently ARRL has an even worse policy of not allowing dissent against its major blunders to be voiced. Let's get that editorial retracted!

Peter Erk, WA9TCR/KP4
Camp Garcia, Vieques, P.R. 00765

Pen Pal Wanted

We received the following letter from a Russian amateur:

I hope you will forgive me for writing to you. I am a Soviet ham. I've been looking for a ham in a foreign country with whom I may correspond and you can't imagine how happy I should be if you would enable me to realize my cherished dream.

Well, I'm going to tell you a little about myself. My name is Vladimir. I am 22 years of age. I am studying English. My hobbies are ham radio, records, stamps, pop music, and so on. I want to correspond with any boy, from any state. With best wishes.

Vladimir Kerch
P.O. Box 805
Kiev, 70
252070 U.S.S.R.

Announcements

Philadelphia, Pennsylvania

The Mount Airy V.H.F. Radio Club, Inc. will hold the first annual Pack Rat Hamarama, Sunday, October 1, at the Warwick Fire Co., Jamison, Pa., located on Rt. 263 above Willow Grove. Activities include giant flea market, auction, and an amateur TV demonstration. Festivities begin at 10 a.m. Food concession on premises. Registration is $1.00, flea market tables or tailgate sales, $2.00. Talk-in on 146.94 and 52.525. For further information contact W3ZD at 520 Centennial Rd., Warminster, Pa. 18974

West Ghent, New York

The Northeastern States 160 meter Amateur Radio Association will hold its annual banquet and election of officers on Saturday, October 7, at Kozels Tavern, 5 miles northeast of Hudson, New York on Rt 9-H. Flea market at 1 p.m., meeting at 5 p.m., and dinner at 6 p.m. For details contact W1EUB.

Kalamazoo, Michigan

The 18th annual V.H.F. Conference at Western Michigan University, Kalamazoo, will be held Satur-

day, October 21. Flea market, speaker from AMSAT, etc., For full details write V.H.F. Conference, P.O. Box 934, Battle Creek, MI 49016

Bemis Point, New York

The Chautauqua County FM Repeater Association will sponsor an auction on Oct. 15 at 11 a.m. at the Shore Acres Boat Yard, Bemis Point, NY 14712

Broadcasters Net

Jim Beedle, WØMPT, who is promotion director and announcer for KCKN AM-FM in Kansas City, is trying to organize a Broadcasters Net. If you are an announcer for radio or television and would like to meet on the air once a week, send your QSL and a short resume of your duties, station, format, etc., and most important what band and time is most convenient. If response is great enough, there are plans for a monthly newsletter. Write to Box 9153, Kansas City, KS 66109

Hunlock Creek, Penna.

We have been informed that Quaker Electronics lost their office, warehouse, including over 100,000 equip. catalogs and mailing lists during the recent flodding in Pennsylvania. They are rebuilding slowly and regret the unfortunate loss of customer catalog requests and orders. You can check with them at P.O. Box 215, Hunlock Creek, Penna. 18621 concerning orders and catalogs.

Flushing, New York

The Hall of Science of the City of New York will conduct a series of twelve instructional and practise sessions for teens and adults in amateur radio beginning Sept. 30, at the Hall, 111th Street and 48th Ave., Flushing Meadows Corona Park. The sessions will be held on Saturdays. There is a fee of $5.00 and a nominal charge for text books and code practise equipment. For complete details write to: Hall of Science, P.O. Box 1032, Flushing, N.Y. 11352 or phone 212-699-9400.

Chicago, Illinois

The Chicago Amateur Radio Club will hold its 2nd annual Hamfest and mini-auction at St. Viators School parking lot, 3606 N. Kedvale (4100 W) corner of Addison on Oct. 1, 1972. It starts at 2:00 P.M. and ends when the last deal is made. Swaps, prizes, refreshments. Donation at the door $1.50, or $1 in advance. For tickets and other information contact Don, W9KUJ at 889-0329 or George, WA9JEZ at KI 5-3622.

Tarrytown, New York

The 1972 Hudson Division ARRL Convention sponsored by the Hudson Amateur Radio Council will be held on Oct. 21 and 22nd Hilton Inn in Tarrytown. There will be exhibits, talks, forums and special events. Registration is $3.00 and is required for forum attendance and special events. The Saturday evening banquet tickets are $10 in advance. For tickets and information contact Dave Popkin, WA2CCF, 303 Tenafly Road, Englewood, N.J. 07631. Contact the Hilton Inn, 455 South Broadway, Tarrytown, N.Y. for room reservations.

Q AND A

WILFRED M. SCHERER, W2AEF

Noise Figure Measurements

Quite a few articles on r.f. noise generators and their use have appeared in amateur-radio publications. As far as we know, except for one case, no mention has been made concerning the problem of obtaining a stable a.f.-voltage reading of the noise at the output of a receiver involved with the measurement. No doubt anyone who has pursued this task has experienced the "bobbling" of the meter pointer back and forth anywheres between 0.5 and 1 db of the desired reading, making it necessary to mentally average out the indications.

This can be a source of error and certainly cannot consistently provide an accurate noise-figure measurement to within less than a 0.5 increment of a db as often claimed. An average-reading or a highly damped meter, however, can provide closer indications and repeatably accurate measurements.

This can be done by connecting a 500-2000 mf capacitor across the terminals of the meter itself, *not* across the test leads. This will dampen the movement sufficiently to provide an average reading of the noise amplitudes. Variations in the noise-generator output level will have to be made slowly in order to allow the meter pointer time to reach the desired point. This will consume more time than usually required for a measurement, but should provide a closer result.

As for noise-figure specifications, we do not put much stock into published comparative figures (especially within a 1 db N.F.) of or between different pieces of gear, unless the measurement for each is made by the same person using the same method and test equipment for each case. There are too many possible variations in the accuracy of the associated test gear and the operation thereof.

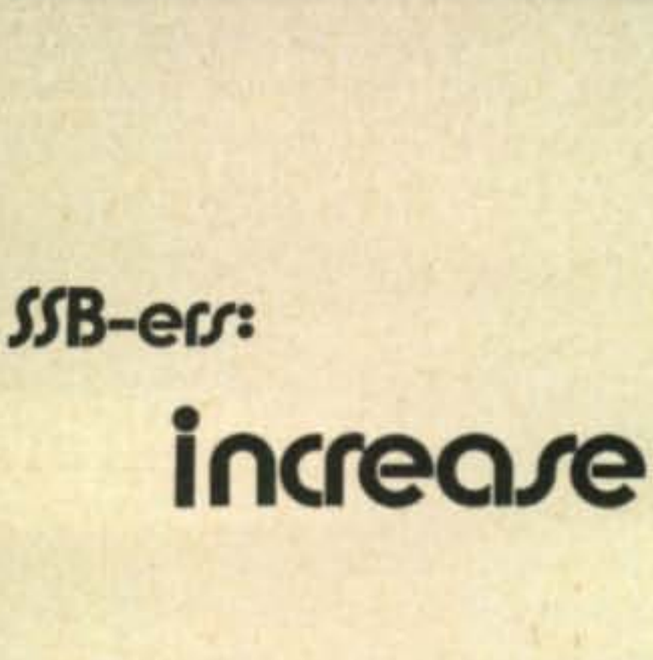
Crystal Control With Eico

QUESTION: How could I modify an Eico 753 s.s.b. transceiver for crystal control, and can it be done without impairing the v.o.x. and the receiver offset functions?

Q & A is a free technical assistance program offered by CQ to its readers. We ask your cooperation to enable us to assist as many amateurs each month as possible. Always include a self-addressed stamped envelope with your question. Only one question per letter, please. Before writing to ask where a published article appeared, try to find it yourself by consulting the annual indexes of the various amateur magazines. Mail questions to: CQ Q & A, 14 Vanderventer Ave., Port Washington, N.Y. 11050.

SSB-ers:

increase talk power. cut "splatter"



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Shure Brothers Inc.,
222 Hartrey Ave., Evanston, Ill. 60204

SHURE

ANSWER: If the Eico 753 were modified for crystal-control operation, both the receiver and transmitter would be crystal-controlled. This leaves you without a tunable receiver. The best way is to use a separate outboard crystal oscillator for the transmitter and leave the v.f.o. as is for the receiver.

To use a separate crystal oscillator for transmitting, break the connection between C^{94} and C^{48}. Then feed the crystal oscillator to C^{94}.

Any changeover as this will not affect the v.o.x. or incremental tuning.

Viking 6N2 As F.M. Amplifier

QUESTION: How can the Viking 6N2 be modified so that it can be used as an f.m. amplifier on 2 meters using the Motorola D33GGV transceiver (10 watts) as a driver?

ANSWER: Use of the Viking 6N2 as a 2-meter amplifier with an f.m. exciter requires the following: 1 — Remove plate and screen voltages from low-power stages to disable them, but do not remove voltages from the clamper (V^4). 2 — Link couple the output of the motorola unit to the center of the amplifier-drive inductor (L^4). 3 — Adjust the drive to the amplifier stage (V^3) for normal grid drive on V^3. Make the adjustment by varying the position of the link.

Only the p.a. (V) of the 6N2 will then be used to up your power output.

R.F.I. with DX-40 in Standby

QUESTION: My old Heathkit DX-40 has recently developed a "click" in the r.f. range that can be heard on my receiver, transistor portable radio and even on a CB walkie-talkie. I suspect it is sparking, but no sparks can be seen. It clicks only on standby, never in tune or c.w. Can you please help me locate and solve the problem?

ANSWER: The problem with the interfering click is probably due to a leaky filter capacitor or other component (such as a bypass or resistor) that tends to break down when the voltage is high during standby, but does not defect when the voltage drops during transmit. Also check tubes by seeing if click disappears when a particular tube is removed. Do not remove the rectifier tube for this test. On the other hand, if the trouble persists, try a new rectifier tube. In addition, check tube sockets, particularly at rectifier, to make sure arcing has not at some time caused the socket to be charred near a terminal, and thus tend to break down at this point. It may even be breaking down here even though no charring is evident.

Neutralizing Problem

QUESTION: My question involves the tuning characteristics of the Tempo I (10-80 meter transceiver) on 80 meters. The sets I have used tune as if they are not neutralized on 80, although this appears Okay

[*Continued on page 113*]

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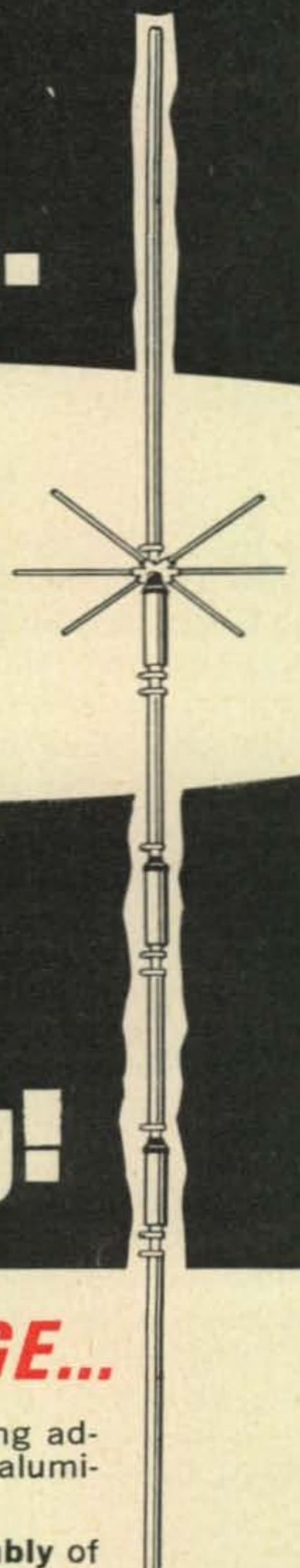

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The Envelope Elimination and Restoration Transmission System for SSB

BY WILLIAM I. ORR,* W6SAI

THE advantages of s.s.b. communication are well known and include greatly reduced radiated power and signal bandwidth to accomplish a given communication function, as contrasted the power and bandwidth requirements of a conventional double sideband with carrier amplitude modulation system.

The classic method of generating an s.s.b. signal is to separate out one of two sidebands created in an amplitude modulated wave by means of a selective filter. The s.s.b. signal may also be created by the phase shift method centered about two separate simultaneous modulation processes and the subsequent combination of the modulation products to cancel one set of sidebands and reinforce the other set. In either case, the signal carrier may be suitably attenuated at the transmitter, a locally generated carrier being used in the demodulation process at the receiver.

Regardless of the technique used to generate the s.s.b. wave, it is generally created at a very low power level and amplified in a series of cascaded linear r.f. amplifiers. The linear amplifier is a device having power gain and whose output signal is an exact replica of the input signal. Distortion products caused by amplifier departure from a linear condition are termed *intermodulation products* and the distortion is termed *intermodulation distortion.* The distortion can be caused by nonlinearity of amplifier gain or phase shift with respect to the input signal and is apparent when a multitone signal is used to drive the amplifier.

The main source of intermodulation distortion in a linear amplifier is the transistor or vacuum tube as these devices have inherently nonlinear characteristics. When linear amplifiers are cascaded for higher power output, it becomes more difficult to maintain a low level of intermodulation distortion as the distortion is additive in a general sense. Maximum linearity may be achieved by the proper choice of device, the accompanying operating parameters and the use of external negative feedback. In the case of the vacuum tube, this calls for class A or AB operation with reduced power efficiency, as contrasted to class C operation of the same device.

In the case of the transistor, low efficiency class A or AB operation is also required for linear service. Most very high frequency NPN power transistors, however, are designed for on-off (class C) service and the forward bias necessary to place them in a class A or AB operating mode leaves them susceptible to *second breakdown,* a destructive phenomenon characterized by local heating within the transistor chip, leading to regenerative layer damage.

Second breakdown may be controlled to some extent by the addition of emitter resistance of low value. A compromise amount is usually chosen as excessive resistance limits stage gain and output. Unfortunately, the higher the frequency response of the transistor, the more severe the second breakdown energy level at high voltage becomes a small fraction

*EIMAC Division of Varian, San Carlos, CA 94070

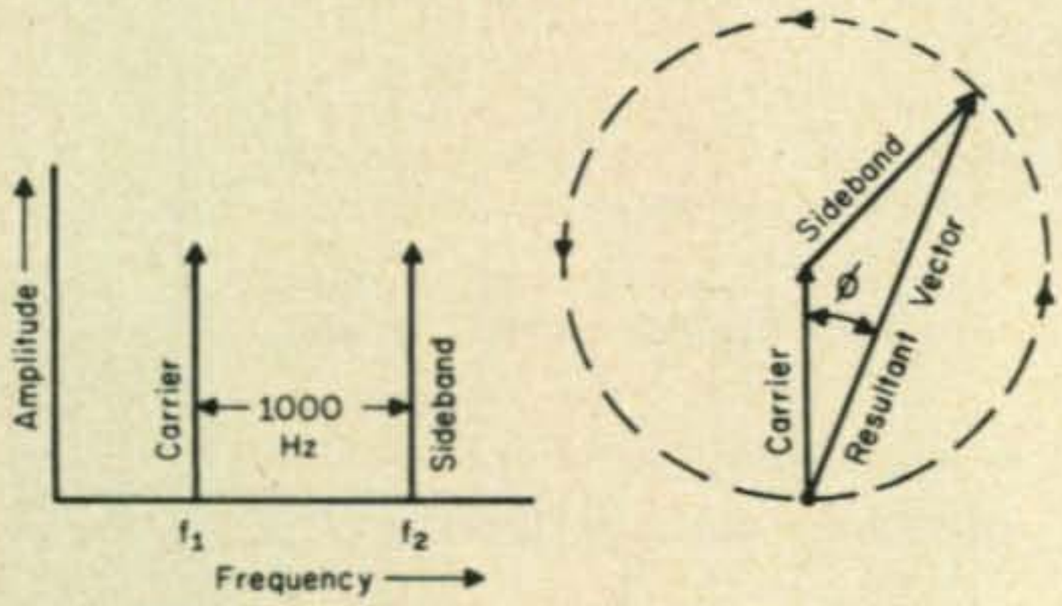

Fig. 1—(A) Spectrum representation of single sideband signal consisting of carrier and one sideband separated 1000 Hz. The upper sideband is being generated. (B) Vector representation of (A). The sideband vector revolves about the carrier vector at a velocity equal to the modulation frequency (1000 Hz). The s.s.b. wave has both amplitude and phase modulation components

of the rated maximum power dissipation rating.

To overcome this difficulty, special experimental transistors have been developed having many separate emitter sites featuring series emitter resistors on the chip.

In addition to the second breakdown problem, operation of the transistor in class AB service calls for an idling collector current level to be maintained over a wide temperature range of the device. It is difficult to maintain bias current at a constant level in class AB service for as the drive signal level increases, the chip dissipation increases and junction temperature rises. Special temperature sensitive bias control diodes are often included in the transistor adapted for linear service to compensate for this effect.

As s.s.b. techniques invade the v.h.f. region, the problem of designing a solid state, low distortion linear amplifier becomes acute. A few such devices have been built and used, but the vacuum tube still remains the most practical linear amplifier in this portion of the frequency spectrum.

A novel and relatively unexplored technique exists that permits amplification of an s.s.b. signal in a class C stage that holds promise for solid state h.f. and v.h.f. techniques. The system is not new, being first proposed in 1952[1]. This technique is called *envelope elimination and restoration (EER).*

The SSB Wave

Before discussing the EER system it is helpful to examine the structure of the s.s.b. waveform (fig. 1). The spectrum picture of a representative single tone signal with carrier (f^1) is shown at (A). The upper sideband (f^2) is transmitted and represents a modulation frequency

[1]Kahn, L. R. "Single-Sideband Transmission by Envelope Elimination and Restoration;" *IRE Proceedings,* July 1952, pp. 803-806.

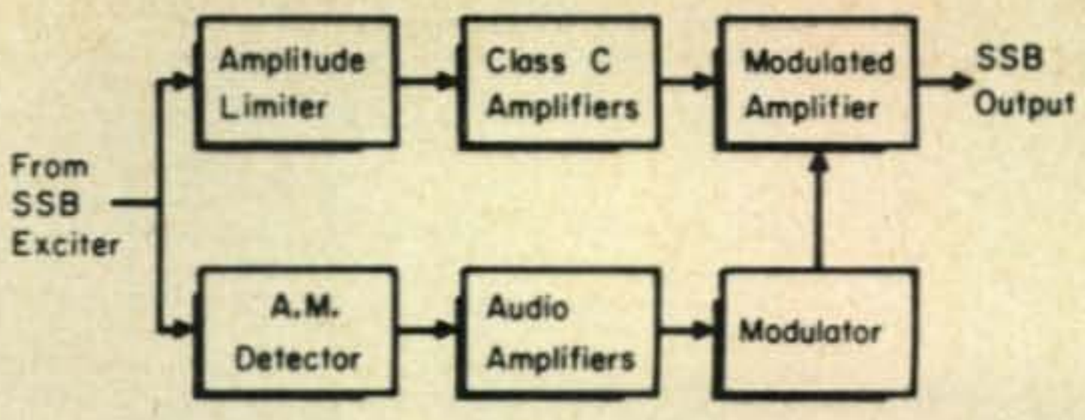

Fig. 2—Block diagram of envelope elimination and restoration technique for amplification of an s.s.b. signal. The s.s.b. wave is split into phase and amplitude components. Phase modulated wave is limited and amplified in class C stages. Amplitude modulation component is amplified and used to modulate p.m. wave in class C modulated stage. If phase shift is properly controlled and the modulator has sufficient frequency range, the output signal is a reconstructed replica of the s.s.b. input signal.

of 1000 Hz. The vector representation of the wave is shown at (B), with the carrier frequency as the reference vector. The sideband vector revolves about the carrier vector at a velocity equal to the modulation frequency. The *resultant vector* varies both in amplitude and angular velocity. The s.s.b. wave, therefore, *has both amplitude and phase modulation components.* It is possible, therefore, to separate the s.s.b. wave into two components, one containing the phase information and the other containing the amplitude information. When this is accomplished, the phase modulated portion of the s.s.b. signal may be amplified by nonlinear, class C stages, with the amplitude modulated portion of the s.s.b. signal amplified and added to the phase modulated wave so that a reconstructed copy of the s.s.b. input signal is achieved. The envelope elimination and restoration system accomplishes this technique.

The EER Sideband System

A block diagram of the envelope elimination

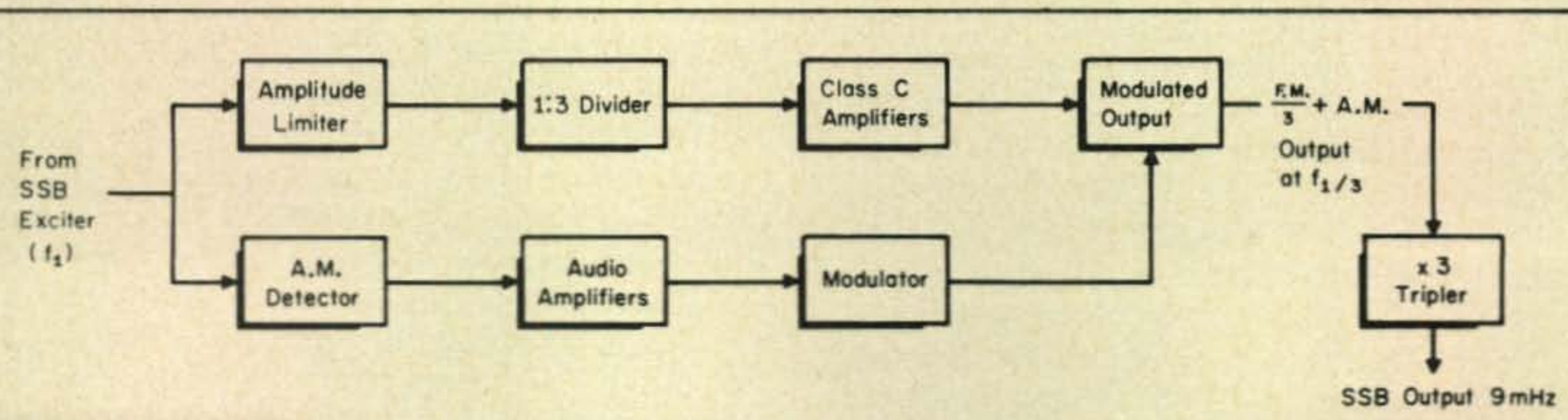

Fig. 3 — Block diagram of DJ4ZC signal processing technique which allows the use of conventional frequency multipliers following the p.m. chain of the EER system. Deviation of p.m. signal is reduced by passing it through a 1:3 divider. The resulting signal will have 1/3 the original frequency. When passed through a tripler stage this combined signal will be a replica of the original s.s.b. signal.

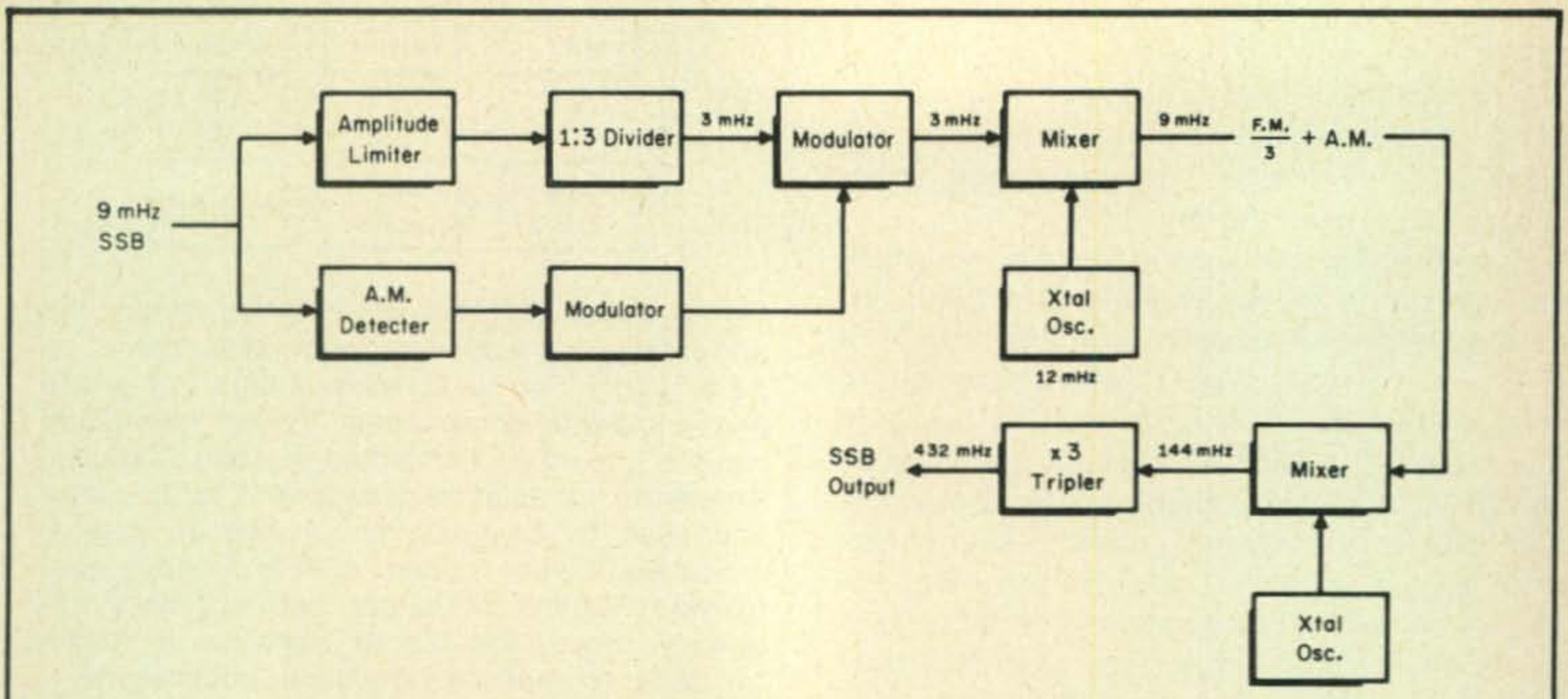

Fig. 4 — DJ4ZC signal processing technique shown in fig. 3 is modified by addition of mixer and tripler stages. First mixer converts processed signal to 9 mHz, with 1/3 the original deviation. The processed signal is now mixed to 144 mHz and tripled to 432 mHz in varactor multiplier. Tripler action restores original deviation to f.m. component of signal and the output signal at 432 mHz is a replica of the original 9 mHz s.s.b. signal.

and restoration system is given in fig. 2. In brief, the output of the s.s.b. generator is impressed upon a *limiter* stage which removes the amplitude modulation component of the s.s.b. wave, leaving only the phase modulated component. This p.m. signal is not distorted by amplitude nonlinearities and may be amplified in high efficiency class C amplifier stages.

The amplitude modulated portion of the s.s.b. wave is separated from the phase modulated portion by an *a.m. detector,* whose output signal is identical to the envelope waveform of the s.s.b. wave. It bears only a casual relationship to the original audio signal. This signal is amplified and passed to *modulator* stage which amplitude modulates the phase modulated component of the original signal. If the real time relationship between the phase and amplitude modulated components is properly maintained throughout the system, the output signal of the modulated stage is a reconstructed and amplified replica of the s.s.b. input signal.

In order to achieve a good degree of linearity with this system, the audio channel and amplitude modulator must have sufficient high frequency response to pass the third harmonic of the difference frequency between the highest and lowest frequency information signals. For a voice band of 200 to 3000 cycles, therefore, the audio response of the system should be linear up to 8400 Hz.[2]

Additional shaping and sampling circuitry is required to process the envelope component so that it modulates the final class C amplifier with the proper delay. In addition, r.f. feedback may be added to the EER system to increase the overall linearity.

These circuit techniques are well within the capability of high power, "on-off" v.h.f solid state devices and point the way towards their use for inexpensive and reliable s.s.b. amplifying stages.

VHF Operation of the EER System

The EER system adapts itself to v.h.f. and u.h.f. operation and a recent signal processing technique developed by Karl Meinzer, DJ4ZC[3] provides the means of applying conventional frequency multipliers and class C amplifiers to s.s.b. waveforms. A block diagram of the DJ4ZC system is shown in fig. 3.

In brief, the s.s.b. signal is split into the amplitude and phase modulated components, as described earlier. However, if the phase modulated portion of the signal is passed through a frequency multiplier, the relationship between the original audio signals is lost and the resulting signal is unintelligible. The frequency multiplier multiplies the deviation of the p.m. component thus destroying the original signal.

If, however, the phase modulated component of the signal is run through a *frequency divider,* the deviation of the signal will be re-

[2]Kahn, L. R., "Comparison of Linear Single-Sideband Transmitters with Envelope Elimination and Restoration Single-Sideband Transmitters," *IRE Proceedings,* Dec. 1956, pp. 1706-1712.

[3]Meinzer, K., "Frequency Multiplication Technique for VHF and UHF SSB," *QST,* Oct. 1970, pp. 32-35.

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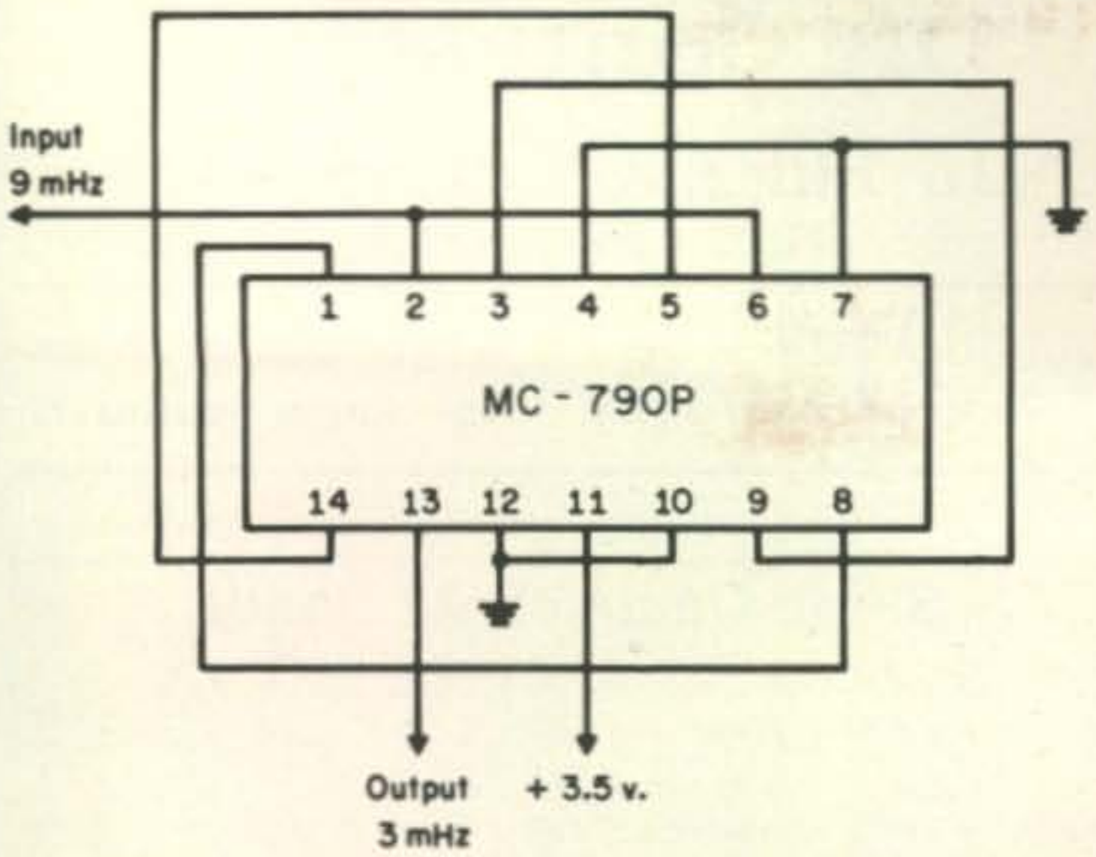

Fig. 5 — "Johnson Counter" using single Motorola dual JK flip-flop provides 1:3 frequency division.

duced by the factor of division. Thus, if the phase modulated signal has a deviation of 9 kHz at the s.s.b. frequency and is passed through a 1:3 divider, the resulting signal will have one-third the original deviation, or 3 kHz at one-third the original frequency. When this p.m. signal is recombined with the a.m. signal in the modulated stage *and then passed through a frequency tripler,* a replica of the original s.s.b. signal will be achieved at the tripler output frequency.

A practical v.h.f. EER system is shown in the block diagram of fig. 4. In this case, it is desired to achieve an s.s.b. signal at 432 mHz from a 9 mHz s.s.b. exciter. The 9 mHz s.s.b. signal is split into two channels containing phase and amplitude information. The p.m. signal is limited to remove any amplitude modulation, turned into a square wave and passed to a 1:3 divider circuit, which may consist of a *divide by three* circuit consisting of two flip-flop stages (fig. 5). The new p.m. signal, have one-third the deviation and one-third the frequency of the original signal is applied to the modulated stage, which is controlled in amplitude by the modulation envelope passed through the a.m. demodulator and audio amplifier chain.

This recombined signal is converted to the original frequency of 9 mHz and is now mixed with a 135 mHz oscillator to provide a composite p.m. and a.m. signal at 144 mHz using common techniques. The recombined signal is now tripled to 432 mHz in a varactor multiplier stage where it is indistinguishable from an s.s.b. signal generated in the normal fashion. For 1296 mHz s.s.b., the 9 mHz signal may be

[*Continued on page 122*]

CQ World-Wide DX Contest
ALL-TIME PHONE RECORDS

BY FRED CAPOSSELA, JR., W2IWC

In the records listed below, boldface listings denote world records. Number groups after calls are: year of operation, total score, contacts,

Single Operator/Single Band
WORLD RECORD HOLDERS

1.8	**GM3YCB ('71)**	**4,590**	**253**	**4**	**14**
3.5	**VE3MR/4X ('71)**	**197,106**	**742**	**22**	**69**
7.0	**HR1RF ('71)**	**207,749**	**1166**	**21**	**62**
14	**KV4FZ ('71)**	**1,208,180**	**2680**	**40**	**153**
21	**CW4CR ('70)**	**1,196,085**	**2462**	**39**	**126**
28	**YV1LA ('68)**	**664,560**	**1898**	**33**	**87**

AFRICA

1.8	No Entrant				
3.5	CN8HD ('71)	44,200	287	8	44
7.0	ZS6DW ('69)	1,144	20	12	14
14	ET3DS ('71)	1,026,480	1957	35	147
21	9F3USA ('71)	455,400	1035	33	117
28	XX7IK ('71)	588,930	1502	32	102

ASIA

1.8	No Entrant				
3.5	**VE3MR/4X ('71)**	**197,106**	**742**	**22**	**69**
7.0	JA2BTV ('67)	46,620	196	29	55
14	UA9DN ('69)	699,105	1478	39	126
21	JA1RJW ('69)	379,136	1197	37	91
28	4X4JU ('69)	570,836	1522	34	99

EUROPE

1.8	**GM3YCB ('71)**	**4,590**	**253**	**4**	**14**
3.5	LAØAD ('70)	80,754	757	20	66
7.0	SM5BPJ ('69)	138,061	622	30	91
14	G5AAM ('67)	824,344	1634	39	144
21	G3HCT ('69)	832,016	2124	37	112
28	DL4PM ('68)	614,544	1858	34	84

NORTH AMERICA

1.8	VE3BS ('69)	1,947	74	6	5
3.5	VE3ZZZ ('71)	83,997	491	26	55
7.0	**HR1RF ('71)**	**207,749**	**1166**	**21**	**62**
14	**KV4FZ ('71)**	**1,208,180**	**2680**	**40**	**153**
21	VE3MR ('69)	550,212	1292	39	117
28	KP4AST ('70)	630,180	2010	31	104

OCEANIA

1.8	No Entrant				
3.5	KH6EPW ('66)	5,040	82	10	11
7.0	VK6CT ('71)	96,050	397	27	58
14	AX2APK ('70)	607,128	1281	37	127
21	KG6AQY ('70)	749,529	2353	32	72
28	KH6GMP ('70)	454,181	1697	32	59

SOUTH AMERICA

1.8	No Entrant				
3.5	YV5BTS ('66)	69,471	296	21	62
7.0	YV1BI ('70)	142,496	660	20	53
14	PY4AP ('71)	1,012,506	1979	36	138
21	**CW4CR ('70)**	**1,196,085**	**2462**	**39**	**126**
28	**YV1LA ('68)**	**664,560**	**1898**	**33**	**87**

Single Operator/All Bands

AF	ZD8Z ('68)	4,184,680	3210	122	327
AS	VS6DR ('70)	2,095,415	2594	134	303
EU	LAØAD ('69)	2,512,692	2425	110	271
NA	KV4FZ ('70)	4,961,551	4362	128	369
O	**VK2ADY/9 ('67)**	**5,045,115**	**3310**	**153**	**384**
SA	9Y4AA ('69)	4,318,925	3056	130	355

WORLD RECORD

Station	Band	Contacts	Zones	Countries
	1.8	—	—	—
VK2ADY/9	3.5	29	15	20
(1967)	7.0	118	25	37
5,045,115	14.0	949	38	110
	21	1084	38	104
	28.0	1130	37	113
	Total	3310	153	384

Multi-Operator/Single Trans.

AF	CR6GA ('70)	2,982,980	2806	106	258
AS	UA9KAX ('69)	3,673,969	2378	131	402
EU	**ON4UN ('69)**	**5,117,716**	**3339**	**149**	**408**
NA	HH9DL ('70)	3,302,640	4138	97	263
O	KH6SP ('70)	2,088,870	2424	100	194
SA	PJ9AF ('70)	4,536,780	4598	102	230

WORLD RECORD

Station	Band	Contacts	Zones	Countries
	1.8	—	—	—
ON4UN	3.5	143	18	55
(1969)	7.0	208	23	54
5,117,716	14.0	1177	39	129
	21.0	1138	35	95
	28.0	673	34	75
	Total	3339	149	408

Multi-Operator/Multi-Trans.

AF	ZS5JY ('69)	3,979,346	3126	127	307
AS	4Z4HF ('71)	6,106,290	3994	125	409
EU	OH5SM ('69)	11,593,925	6771	153	526
NA	PJØMM ('68)	7,037,658	6406	134	343
O	W7UXP/KH6 ('70)	2,424,552	3312	97	150
SA	**PJØDX ('69)**	**17,613,400**	**9270**	**156**	**488**

WORLD RECORD

Station	Band	Contacts	Zones	Countries
	1.8	36	4	8
PJØDX	3.5	452	22	60
(1969)	7.0	929	24	70
17,613,400	14.0	2739	39	146
	21.0	2699	35	116
	28.0	2415	32	88
	Total	9270	156	488

CLUB RECORD, POTOMAC VALLEY

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zones, and countries. All-band and Multi-Operator records include a band-by-band breakdown of the world leader in each category.

Single Operator/Single Band WORLD RECORD HOLDERS

1.8	**KG4CS ('71)**	**7,884**	**143**	**10**	**17**
3.5	**UC2AA ('66)**	**83,496**	**714**	**20**	**64**
7.0	**KV4FZ ('71)**	**420,546**	**1440**	**28**	**91**
14	**KV4FZ ('70)**	**908,514**	**2315**	**36**	**117**
21	**TJ1AW ('70)**	**549,888**	**1447**	**35**	**93**
28	**CX1AAC ('70)**	**681,636**	**1711**	**36**	**93**

AFRICA

1.8	No Entrant				
3.5	CN8DW ('70)	15,759	153	9	26
7.0	5A1TW ('64)	227,814	918	22	64
14	1G5A ('66)	792,370	1594	37	133
21	**TJ1AW ('70)**	**549,888**	**1447**	**35**	**93**
28	CR6IK ('69)	498,800	1439	36	80

ASIA

1.8	ZC4RB ('67)	4,335	86	3	14
3.5	UG6AD ('70)	76,012	436	13	49
7.0	4X4FA ('64)	174,505	781	25	60
14	HL9KH ('63)	339,920	910	37	103
21	JA1XGI ('70)	211,850	767	33	62
28	HZ1AB ('68)	132,390	578	21	55

EUROPE

1.8	DL1CF ('70)	5,206	295	3	16
3.5	**UC2AA ('66)**	**83,496**	**714**	**20**	**64**
7.0	LAØAD ('71)	177,450	851	31	74
14	SM4CMG ('71)	367,356	1172	38	100
21	G3HCT ('70)	317,312	924	38	96
28	DL4AAP ('57)	253,680	728	36	84

NORTH AMERICA

1.8	**KG4CS ('71)**	**7,884**	**143**	**10**	**17**
3.5	W3MFW ('71)	61,243	239	23	68
7.0	**KV4FZ ('71)**	**420,546**	**1440**	**28**	**91**
14	**KV4FZ ('70)**	**908,514**	**2315**	**36**	**117**
21	WA8LYF ('70)	286,767	756	35	94
28	K1JGD ('68)	158,510	520	28	82

OCEANIA

1.8	VK5KO ('64)	6	1	1	1
3.5	KH6HCM ('70)	11,286	200	10	6
7.0	VK5NO ('69)	87,542	411	26	48
14	VK3APJ ('67)	422,240	1150	35	95
21	VK6HD ('71)	531,354	1576	32	82
28	VK8UG ('67)	320,008	1048	32	72

SOUTH AMERICA

1.8	YV10B ('70)	1,656	63	4	5
3.5	YV5AW ('71)	52,608	372	14	34
7.0	YV5AW ('70)	87,730	476	17	45
14	PY4AP ('71)	836,250	1874	37	113
21	PY4SO ('68)	479,385	1211	38	97
28	**CX1AAC ('70)**	**681,636**	**1711**	**36**	**93**

RADIO CLUB (1969) 44, 441, 644

Single Operator/All Bands

AF	ZS3AW ('70)	2,098,466	2467	91	202
AS	UK9ABA ('70)	1,719,663	1366	124	327
EU	OH5SE ('69)	1,419,186	1374	124	298
NA	KV4FZ ('69)	2,719,152	2867	127	287
O	VR2EW ('65)	2,499,536	2215	126	268
SA	**9Y4AA ('69)**	**3,088,968**	**2623**	**123**	**279**

WORLD RECORD

Station	Band	Contacts	Zones	Countries
	1.8	—	—	—
9Y4AA	3.5	128	12	23
(1969)	7.0	373	23	44
3,088,968	14.0	603	30	77
	21.0	819	32	74
	28.0	700	25	61
	Total	2623	123	279

Multi-Operator/Single Trans.

AF	ZS5QU ('67)	1,615,350	2005	94	181
AS	**4L3A ('67)**	**3,084,536**	**2376**	**116**	**330**
EU	DLØKF ('68)	1,969,830	2329	128	302
NA	ZF1AN ('70)	2,343,665	2804	110	255
O	KH6HCM ('71)	1,405,249	1916	100	151
SA	4M5ANT ('70)	2,657,892	2423	108	258

WORLD RECORD

Station	Band	Contacts	Zones	Countries
	1.8	—	—	—
4L3A	3.5	306	13	49
(1967)	7.0	472	23	64
3,084,536	14.0	604	31	88
	21.0	425	26	63
	28.0	569	23	66
	Total	2376	116	330

Multi-Operator/Multi-Trans.

AF	ET3FMA ('67)	1,387,680	1476	105	231
AS	VU2IRA ('70)	2,273,616	2128	125	307
EU	OH2AM ('68)	4,118,688	3277	155	412
NA	W4BVV ('70)	5,552,352	3056	158	456
O	KG6FAE ('57)	691,601	1321	76	105
SA	**PJØFC ('70)**	**11,586,428**	**7090**	**150**	**401**

WORLD RECORD

Station	Band	Contacts	Zones	Countries
	1.8	92	8	8
PJØFC	3.5	668	17	46
(1970)	7.0	1338	26	75
11,586,428	14.0	1974	34	109
	21.0	1641	34	84
	28.0	1377	31	79
	Total	7090	150	401

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341 8 element high performance beam. 14.5 db gain. Coaxial balun. VHF Beta Match. Unidirectional. Boom length 14'. VSWR 1.5:1. 52 ohm feedpoint. Heavy gauge commercial type aluminum construction.

231 15 element high performance beam. 17.8 db gain. Coaxial balun. Beta Match. Unidirectional. Boom length 28'. VSWR 1.5:1. 52 ohm feedpoint. Extra-strength heavy wall commercial aluminum tubing.

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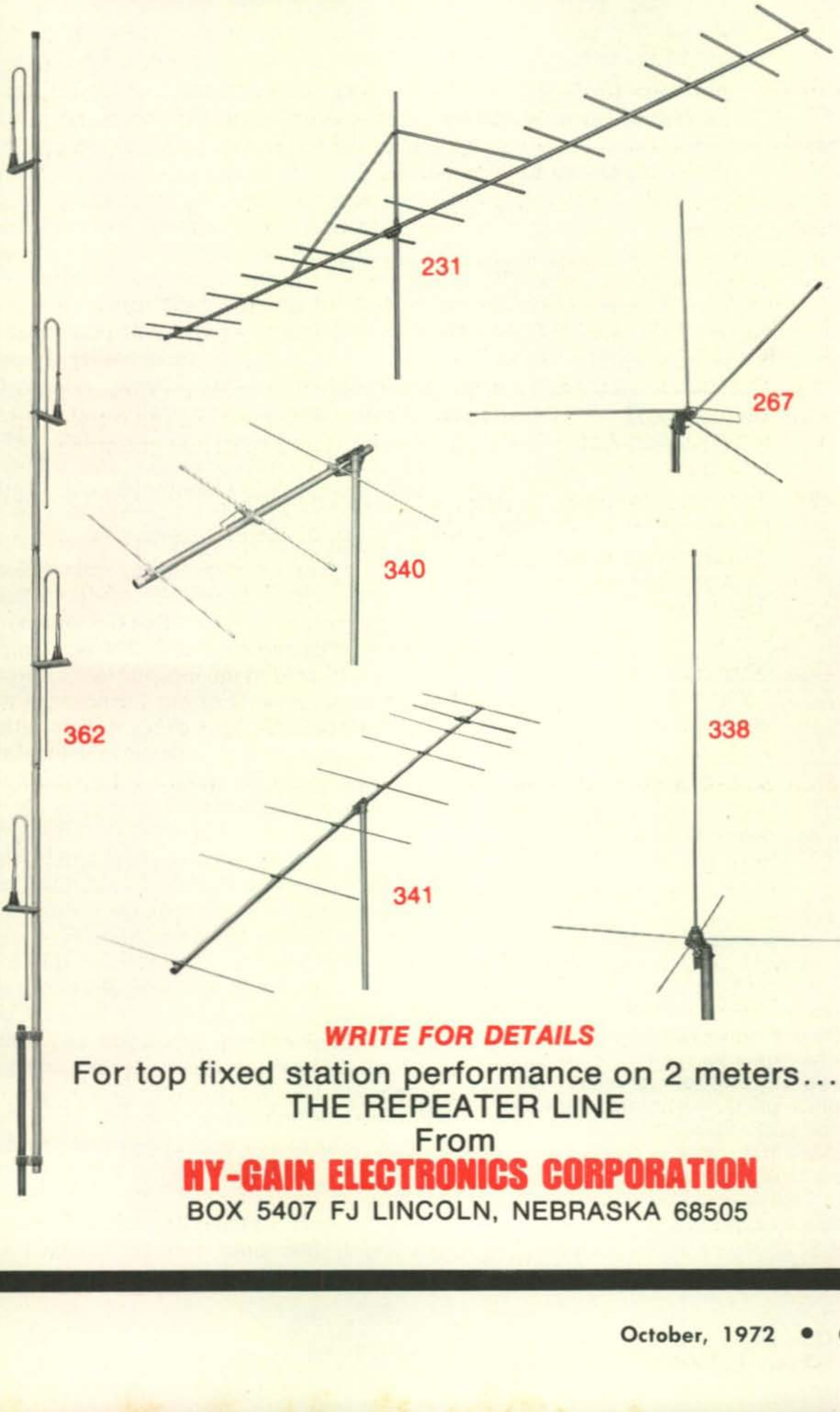

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Extending The Use Of Filters

BY IRVING M. GOTTLIEB,* W6HDM

MANY experimenters know how to design image-parameter filters. Their reward for mastery of a few algebraic-equations, and for compliance with some simple rules, is the ability to tailor frequency-response for a wide variety of purposes. Such filters can be quickly calculated, readily fabricated, and can then provide exceedingly flat-response throughout a desired passband. Additionally, they can yield rapid transitions into the highly attenuating regions of the stopbands. All this *cannot* be accomplished by *RC* networks, "tank-circuits," or by indiscriminantly cascading reactive elements, no matter how high their Q's. The only competitive approaches appear to be the various active-filters, "modern network synthesis," and certain piezoelectric and mechanical systems. These alternate types of filters most certainly have their relevant applications. They have their shortcomings too, not the least of which are difficulties in translating mathematically-indicated performance to practice. The image-parameter filter remains admirably suited for "workhorse" selectivity-applications. Indeed, it's generally no trick at all to wind up with even better performance than is needed if we abide by the rules in the good book (any text or engineering handbook covering the subject).

We are admonished to pay strict heed to the generator, or source, impedance, and the load impedance when applying these filters. Specifically, we are informed that the source impedance, the designed-in characteristic impedance of the filter, and the load impedance *must all be the same value.* (For our purposes, it will be OK to henceforth speak of resistances rather than impedances.) Figure 1 depicts the ideal situation. The penalty for violating this rule is the loss of the nice flat passband, and possibly severe degradation of the general response. We are, however, tempted to dwell here and further contemplate the effects of mismatch. Our reason stems neither from enthusiasm for novelty, nor from any wish to upset traditional concept. Rather, it is because the hardware world often precludes realization of the ideal operating situation, particularly with low-pass filters. Confining our interest, then, to the low-pass function, let us see how this theory-application gap comes about.

The formulas pertaining to the low-pass filter seemingly lead to the conclusion that there is complete liberty allowed in the choice of the characteristic resistance $\overline{R}$. (See fig. 2). In other words, once we have stipulated the cutoff frequency, f_c, the filter can be designed for matched insertion between any equal-valued

*931 Olive St., Menlo Park, CA 94025

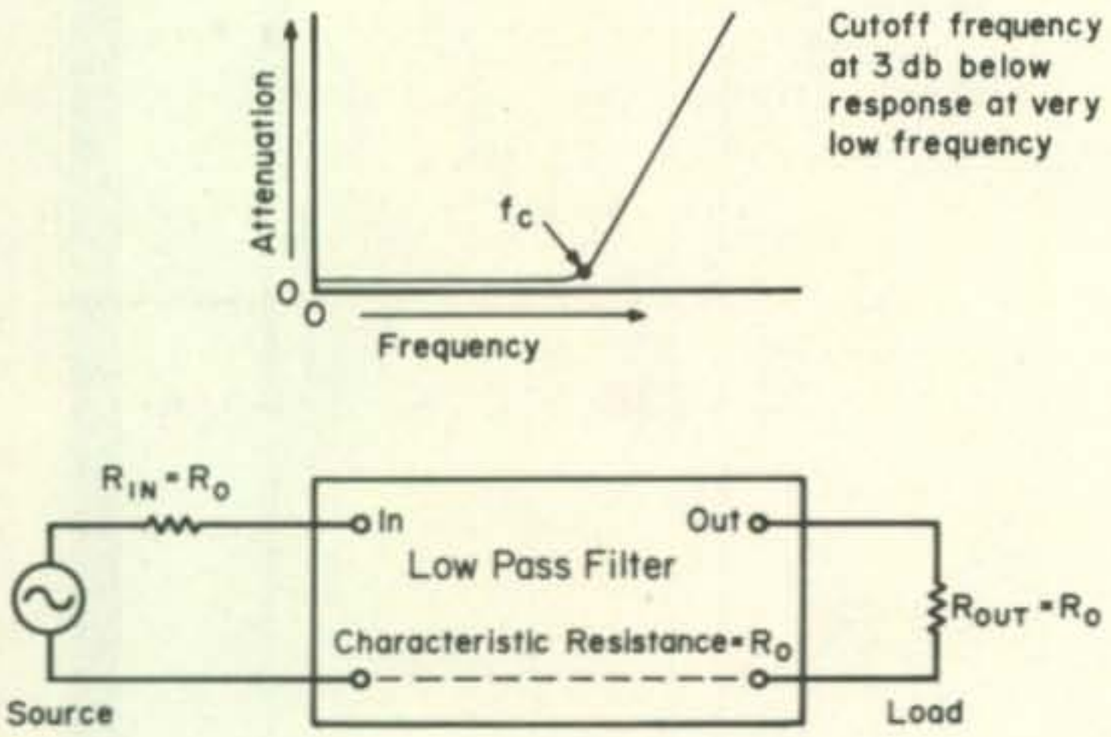

Fig. 1—Operation of the image parameter filter under matched conditions. R_{in} represents the total resistance of the signal source. Thus, R_{in} would be a physical resistor of R_0 ohms if no resistance were present in the signal source. On the other hand, if the signal source had a resistance of R_0 ohms no physical resistor would be needed in the input circuit. In most cases, R_{in} is a physical resistor of such value that the filter "sees" a net resistance of R_0 ohms in its input circuit. R_{out} represents the resistance of the load circuit. Here again, the filter must "see" a net ,resistance of I_0 ohms whether this value resides entirely in the load, or whether it is brought about by adding additional resistors.

source and load resistance. But, is this actually so?

Suppose we design toward *higher* values of characteristic resistance. The inductances of the series-arm elements then become proportionately greater. Even if the filter need not fly, nor even float, the inordinately-large inductors become costly, difficult to obtain, and become electrically degraded. And when ferromagnetic cores are used, saturation sets in with smaller signal currents as the inductance of these elements is increased. Also, the distributed capacitance of larger inductors can adversely modify the response of the filter. As if this isn't enough, the filter becomes susceptible to detuning effects of stray capacitances even with neat and concise physical-layout. This is because the capacitors in the shunt arms now become very small, their capacitance being *inversely* proportional to the characteristic resistance.

Well, how about designing filters for very *low* characteristic resistance? This gets us into the region of *tiny* inductors and *tremendous* capacitors. The small inductors may or may not become troublesome, but giant capacitors present a more immediate problem. To begin with after we exhaust available space, we must bail ourselves out with *electrolytic* capacitors. These are generally *not* what the doctor ordered for filters. Electrolytic capacitors tend to have excessive losses, and their capacity ratings are extremely sloppy. Moreover, capacity changes considerably with temperature, and capacity change is one of the pronounced symptons of aging. Because of polarization, the effective

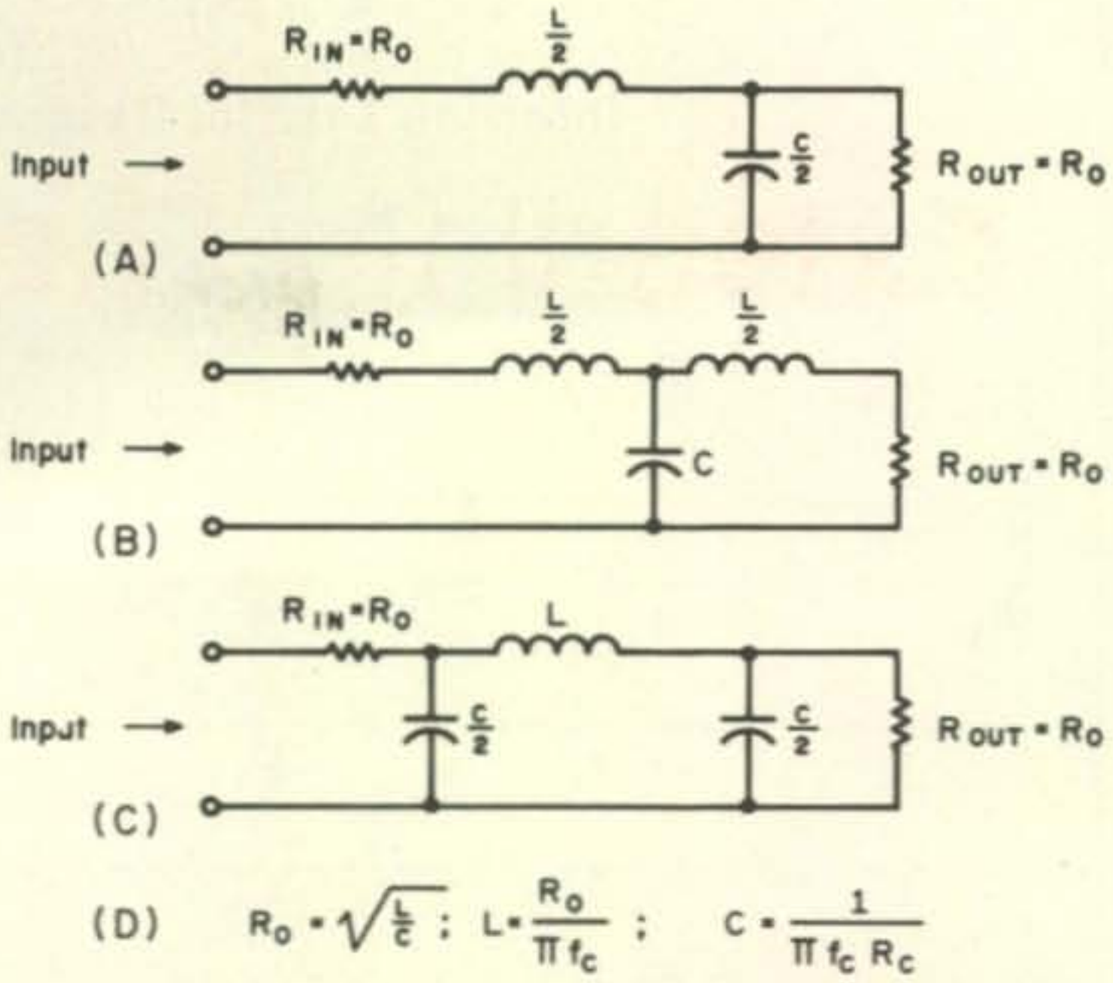

Fig. 2—The basic low-pass filter formulas. (A) The L section. (B) The T section. (C) The Pi section. (D) The image-parameter formulas which apply to all three sections. *L* is in henries; C is in farads. R_0 is in ohms, and F is the cutoff frequency in Hz.

capacitance can change significantly with signal level. To get around this, it may be necessary to somehow introduce a d.c. bias, or to use non-polar units. Better success has been achieved with solid-state tantalum types, but here economics begins to assert itself. Even if we somehow circumvent problems from the aforementioned plagues, we may still have to centend with the deleterious effects of self-inductance in the capacitor. Small? Yes, but

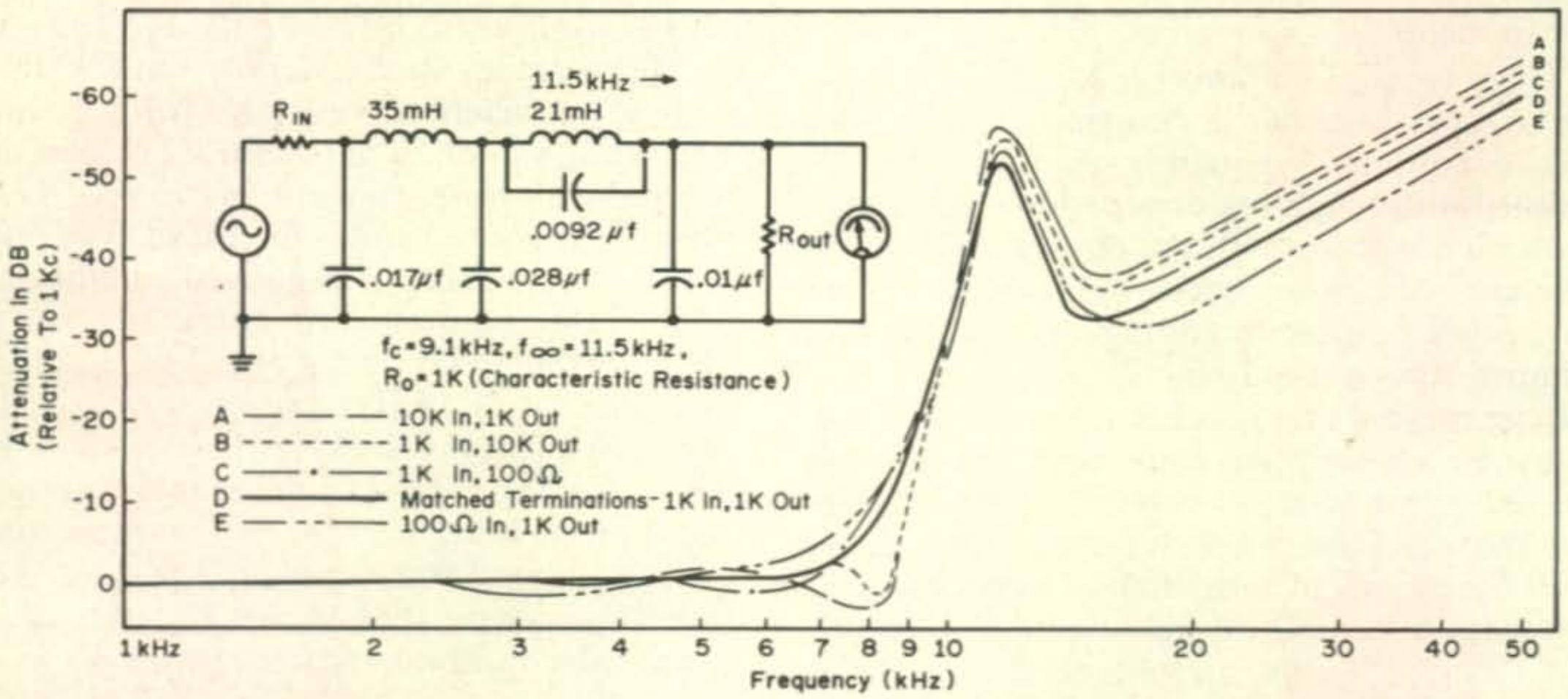

Fig. 3—Response curves of a test filter under various input and output impedar.ce situations. The filter is ,designed for 1000 ohm input and output impedances. (A) Mismatched, 10K in; 1K (B) Mismatched, 1K in. 10K out. (C) Mismatched, 1K in; 100 ohms out. (D) Matched, 1K in and out. (E) Mismatched, 100 ohms in. 1K out.

Table I—
Insertion Loss for Response Curves of Figs. 3 and 4.[1]

Curve	$\frac{E_{out}}{E_{in}}$	$\frac{E_{out}}{E_{in}}$ *in db*	*Comments*
Fig. 3A	1/11	—20.8	High insertion loss will tend to limit use of this mismatch ratio.
Fig. 3B	10/11	—0.83	Negligible insertion loss. *Very useful response.*
Fig. 3C	1/11	—20.8	High insertion loss will tend to limit use of this mismatch ratio.
Fig. 3D	1/2	—6.0	Theoretically, the ideal response. $R_{in} = R_o = R_{out}$.
Fig. 3E	10/11	—0.83	Negligible insertion loss. Response is not as good as fig. 3B.
Fig. 4A	1/5	—14.0	Insertion loss is greater than for matched operation. *Response is good.*
Fig. 4B	1/2	—6.0	Theoretically, the ideal response. $R_{in} = R_o = R_{out}$.Same as fig. 3D.
Fig. 4C	4/5	—1.9	Low insertion loss and good response make this a *useful* condition.

[1] These are idealized values. Actual insertion loss will tend somewhat higher because of element dissipation and because of internal reflections when the mismatch ratio is high.
Also, the decibel loss represents the voltage ratio indicated by the numerical fraction. This is the same approach as is commonly used to indicate the voltage gain of an amplifier wherein the input and output impedances of the amplifier are ignored. This approach is valid for applications where the important change in level pertains to voltage or current, rather than to power.

perhaps comparable with the now-tiny inductors! Let's face it, our allowable choice of characteristic resistance is definitely narrowed by physical facts the *design formulas* fail to mention!

There remains yet *another* real-world obstacle to operation of the low-pass filter under ideal conditions. Frequently, we find ourselves trapped with a high-resistance source and a low-resistance load, or with the converse situation. (We can, of course, make the source or load have a desired value by adding series or shunt resistance. This not only increases insertion loss, but can prevent the source from operating satisfactorily. So, we often cannot go too far with this technique.) But, do we really have to abandon the use of the image-parameter filter under such conditions of mismatch? The author performed some empirical investigations in an effort to provide general guidance to situations which preclude operation under matched conditions. The results proved to be interesting and appear to be useful.

After evaluating the effects of mismatch for a number of low-pass filters of varying complexities, cutoff frequencies, and characteristic resistances, the author was able to choose a simple network which could be said to typify the behavior of filters likely to be used in amateur radio. This turned out to be a two-section filter with cutoff frequency in the vicinity of 10 kHz and with a characteristic resistance of 1 K ohms. The input section is "constant k," which tends to produce ever-higher attenuation as the frequency in the stopband is increased. The output section is a so-called, "m-derived" modification of the input section. This output section provides peak attenuation not at infinite frequency, but rather at 11.5 kHz, not too far beyond the cutoff frequency of 9.1 kHz. This monkey-business alters the overall response in a way generally deemed desirable, for now the transition between passband and stopband (the skirt) is considerably *steeper* than if we had merely cascaded two constant k sections. So far, so good.

The theoretical insertion loss of this filter is 6 db when R_{in} and R_{out} are both 1 K ohms. (In real-life, the loss tends a wee bit higher because of dissipation in the filter elements.) The response of the filter when operated under such

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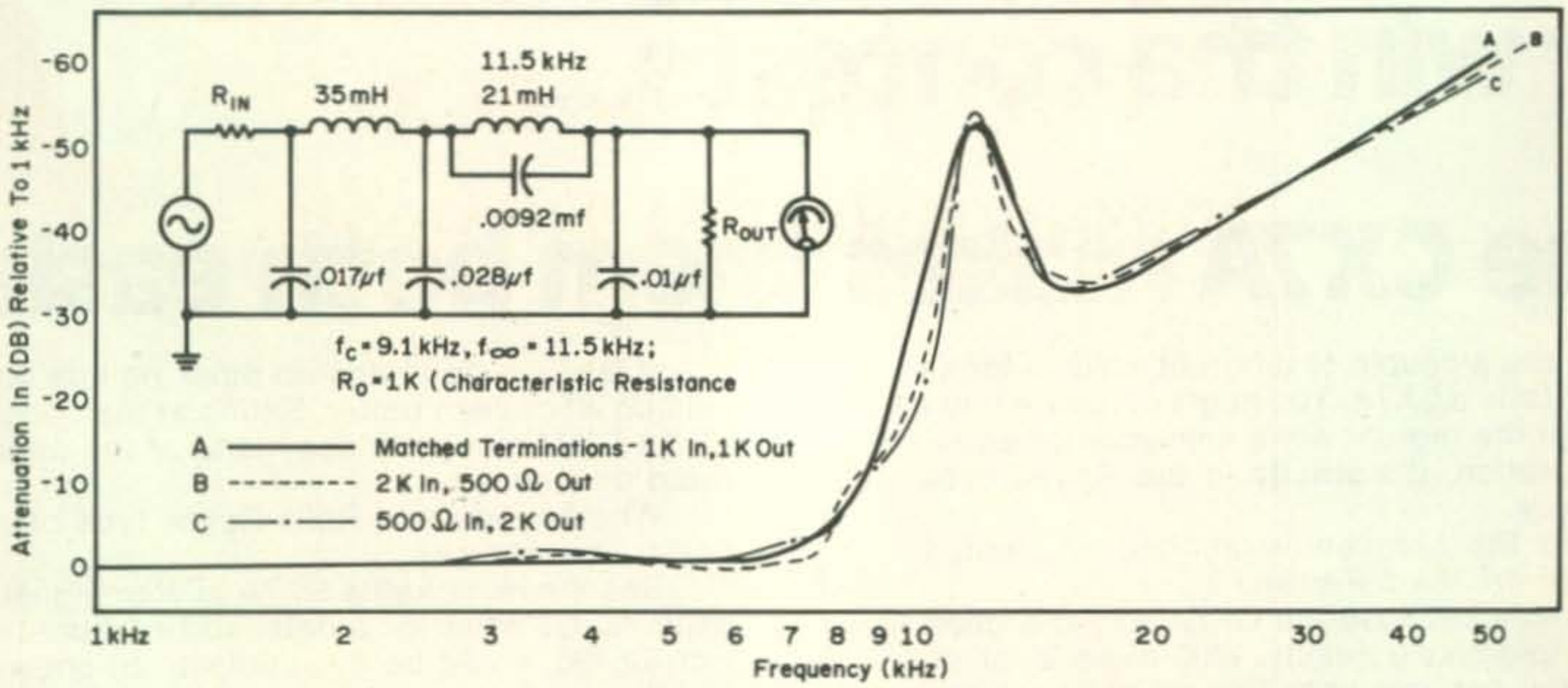


Fig. 4—Filter response curves for less severe mismatch than shown in fig. 3. (A) 2K in, 500 ohm out. (B) Matched, 1K in and out. (C) 500 ohms in. 2K out.

matched conditions is depicted as curve D in fig. 3. It should be explained that this "standard" curve, together with the others of fig. 3 are all plotted with respect to *zero* db insertion loss. This "normalizing" technique facilitates comparison of the curve shapes. Insertion-loss information is given separately in Table I. We see that in some cases, the insertion loss is *less* than 6 db, whereas in others, the price of mismatch is an insertion loss in excess of the nominal 6 db. In fig. 3 four conditions of mismatch are shown in which one of the resistances differs by a factor of ten from the designed-in characteristic resistance of the filter. Some, at least, of these unconventional responses are certainly useful, and are encouraging for mis-matches less than the drastic tenfold ratios involved.

First off-the-bat, we see that curve A of fig. 3 is in some respects an improvement over the conventional response of curve D. Assuming that our application is not adversely affected by the passband ripple, we now achieve a steeper rise into the stopband. Also, we see that the general stopband attenuation is greater for curve A than for curve D! In this type of mismatch (where R_{in} is too high) however, we pay the price of *increased* insertion loss. We next turn our attention to curve B. Here it appears that we can eat our cake and have it. The response is quite similar to that of curve A, but now the insertion loss is actually *less* than 6 db. And the passband is not too wiggly either!

The operating condition shown by curve C of fig. 3 is similar to that of curve A, but R_{in} and R_{out} have been decreased by a factor of ten. The response remains useful and approximates the response of curve B quite closely. Here, however, we must again reconcile to an insertion loss exceeding 6 db. Finally, we come to the response of curve E. The operating condition is opposite that for curve C, with R_{in} and R_{out} now interchanged. We now suffer degradation of the response in both the pass and stop regions. A favorable aspect though, is the less-than 6 db insertion loss. Probably this operating condition would deserve consideration for lower mismatch ratios.

In fig. 4, we see similar data, but for milder mismatches. Here, both R_{in} and R_{out} are mismatched by a factor of two. The overall mismatch ratio is therefore four to one. These mismatches affect the transition region, but no great upsets are produced in either the passband or stopband. Most certainly, these responses are worthy of consideration when we apply our filter to the real world of source and load resistances.

In summary, we can develop a feeling for the general effects of mismatching low-pass filters of image-parameter design. This can lead to an *extension* of use beyond the narrow constraints implied by the literature on these filters. Nor are compromise and penalty necessarily the order of the day, for in some applications the response under the mismatched condition may, indeed, prove more useful than that pertaining to "ideal" operating conditions. Surely, it has been shown that a decision to forego the use of a filter because of "improper" source or load resistances could be an unfortunate one. And, although not brought out in the discussion, it is now appropriate to point out that multi-section filters tend to be even more tolerant of mismatch. ■

A Scope/VSWR Monitor For The Shack

Inexpensive, Yet Adequate!

BY JOSEPH P. FINCUTTER, *K3STU

ONE of the most useful and necessary gadgets in a ham shack for the phone man is a modulation monitor. It could be a very expensive commercial model such as a spectrum analyzer, a less expensive "kit" model,[1] a general purpose scope with suitable associated external circuitry,[2] or even a "junk box" monitor. What will it be? Take your pick, — *but pick one!* Particularly so if you're an ssber and have a tendency to increase the drive (power in/out) whenever you're trying to work that elusive DX station — and you know for a *positive fact* that the design of the automatic control circuitry in your rig *absolutely* prevents flat-topping Ho! Ho! Ho! But, your DX compatriots (and others) complain about your broad signal, to say nothing of the "buckshot" up and down the band for 10 to 50 kHz. Well, a monitor won't prevent flat-topping, but it will inform you that you are!

From the experience of using modulation monitors of both the "scope" and "meter" variety on a.m. in days of old, I knew that I not only wanted but needed a scope monitor so that I could watch the quality of my transmitted signal, but also I would like to keep track of my antenna system by watching the v.s.w.r. at the same time. So, why not put them in the same box? The photograph shows the results of an attempt to accomplish the following in an inexpensive yet adequate manner.

A. A scope monitor for the output of the transmitter.

B. A v.s.w.r. meter to indicate forward and reflected power.

C. House them in a "package" that would match the decor of my Swan 240/TCU combination. (Since the article was originally written I have repainted the front panel to match my Swan 270/1200W equipment.)

The circuit of the scope monitor is very similar to the many circuits that have already been published in all the magazines and in all the handbooks,[3] so I won't go into the circuit diagram here. But for a moment let's consider

[*Continued on page 118*]

*5620 Alta Vista Road, Bethesda, MD. 20034

[1]Heathkit Scanalyzer, SB-620, or SB-610 signal monitor.

[2]"A Scope Adapter for Transmitting Monitoring," *QST*, Oct. 1970, p. 36.

[3]"Miniature Monitorscope," *Ham Radio*, Mar. 1969 p. 34. "An Automatic Band Scanner/Transmitter Monitor," *QST*, June 1968, p. 19, ARRL *Handbook*, (any edition). *Radio Handbook*, (W6SAI), (any edition).

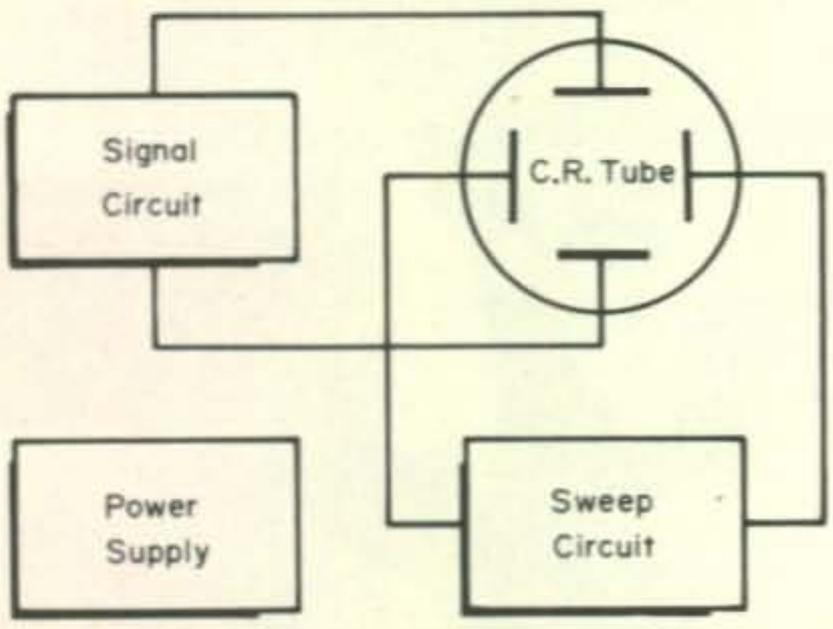


Fig. 1 — Block diagram of the essential elements of a simple scope for s.s.b. transmitter monitoring.

The scope/v.s.w.r. monitor package blends easily with the other station equipment.

West African DXpedition

Part I

BY GEORGE PATAKI,* WB2AQC

THE dream of almost every amateur radio operator is to go on a DXpedition. Combining the thrills of being rare DX with the pleasures of a trip to an interesting country, is what makes the DXpeditioner go.

Taking in consideration the financial possibilities of the average American ham and the very easy way of today's traveling, it is quite amazing how few amateurs are enjoying this kind of fascinating adventure.

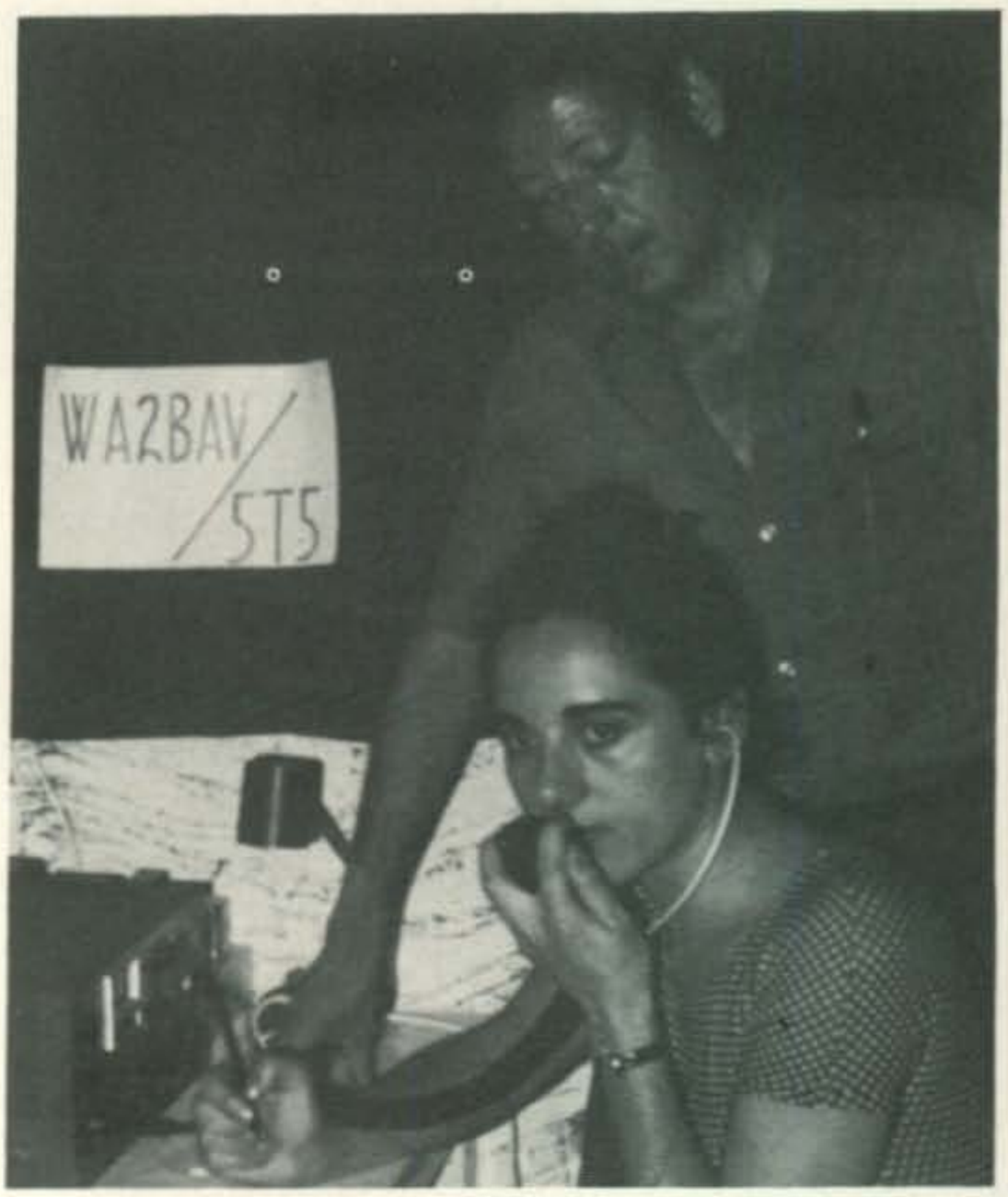
To organize a DXpedition three things are needed: money, time and the desire. It is also advisable to learn a few things about the places you are going to visit, by reading a few books about those countries. If there are some local amateurs, they can supply you with important information about licensing, transportation, customs, hotels, etc. Tourist offices, the Consulates and the Embassies of those countries to the U.S. and the American Embassies in those countries can also give you some useful facts.

To acquire the operating licenses it is necessary to write for application forms directly to the Ministries of Posts and Telecommunications of those countries. It is important that all the correspondence with the foreign authorities should be done in their official language. Very often is helpful if a local amateur or the American Consulate contacts the proper authorities and checks from time to time on the progress of licensing. In some of the places, mostly in the developing countries, the waiting period for a license can be 6-12 months. A constant reminder and push is essential.

It is very important to check out all equipment before leaving. The transceiver has to be used for a few days; the antenna must be assembled, tuned, marked, and tried out. It is also necessary to take along a few basic tools, a v.o.m., and some spare tubes.

The best way to carry your ham gear is in flightbags, taken in the plane as hand luggage. Transceivers and power supplies are very heavy and checking them will result for sure in overweight and a lot of extra expenses. And I guess an amateur will take better care of his rig than a baggage handler.

We also hand carried the aluminum tubes of our antenna and nobody ever objected to it.



In Nouakchott, Mauritania, Jacques, 5T5GJ, assists Eva, WA2BAV/5T5 who appears slightly dazed at the pile-up.

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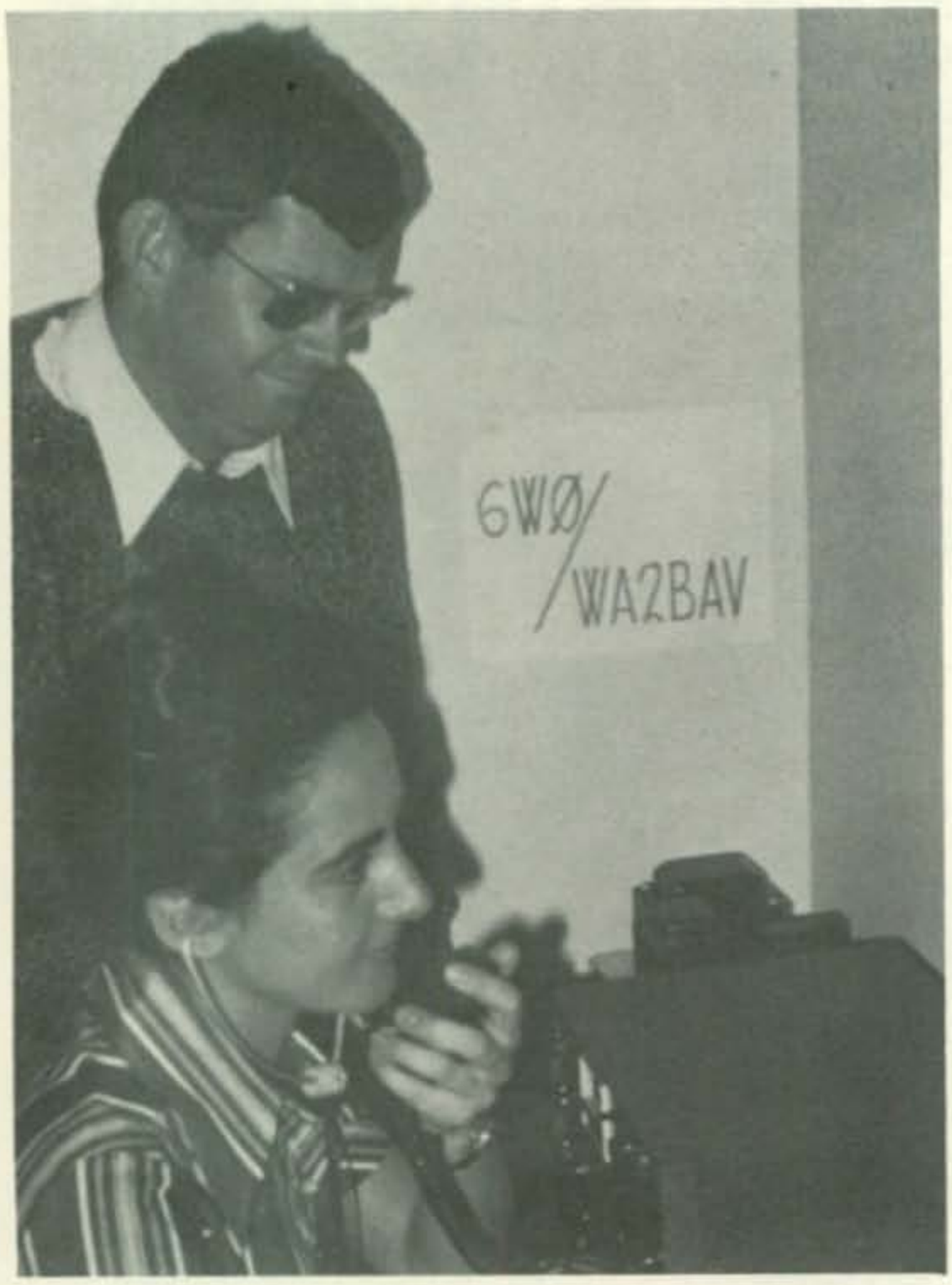

Guy, 6W8ER, watches as Eva patiently explains to another stateside amateur that her "upside-down" call is correct: 6WØ/WA2BAV. the QTH is Dakar, Senegal.

The customs generally do not present any problem, especially when it is emphasized that the gear will not be sold in that country but will be brought back to the States.

I found that the best gifts for the local hams are little hard to get but useful items like hand mikes, connectors, tubes for their rig, etc. Their wives will be happy with a nice silk scarf. We distributed about 20 colorful world maps (we met a lot of people) with the amateur radio prefixes and on our return we made several gift subscriptions to amateur radio magazines.

For our DXpedition we chose West Africa because it can be reached easily, most of the countries have very few active amateurs and the places and people seemed to be interesting.

Our itinerary was decided mainly by the possibility of obtaining operating licenses and by the available time. In some of the places we stayed with local amateurs, otherwise in hotels recommended by local hams.

We visited 11 countries and for the best connections and cheapest fares, my friend Bernie from the Star Travel Agency in New York worked out a schedule and booked the whole trip with Pan Am.

For six weeks we did what we enjoy the most: amateur radio and travel. Here is our travelogue.

Nouakchott, Mauritania

From New York we flew with Pan Am to Dakar, Senegal, then switched to Air Mauritania to fly to Nouakchott. We were about to take-off when the Mauritanian pilot saw that one of the propellers was not rotating. He turned the plane back, fixed something and tried again. This time it worked, but all the way to Nouakchott I could not do anything else but watch the troublesome engine.

At the airport, Alban, 5T5AD, a Frenchman working for the Ministry of Posts and Telecommunications, and his XYL Josette, 5T5YL, welcomed us and took us to the Hotel Oasis. The owner knew about amateur radio and gave us room 6 from which other DXpeditions worked successfully. One of DXpeditioners left a long steel mast and we quickly used it to install our 12AVQ vertical antenna.

As soon as the installation was finished, we turned on the NCX-500 transceiver. Alban came with two licenses; my wife Eva got WA2BAV/5T5 and I got WB2AQC/5T5. We started to work; the propagation was bad but our callsigns helped creating nice pile-ups.

While Eva was operating I went sightseeing with Alban, 5T5AD. Later I got a chance to work, while Eva and Josette toured the city.

You can describe this country using three words: sand, sand and sand.

Nouakchott is a very interesting little city; it has a few modern buildings surrounded by hundreds of tents. Every tent has a large family of Berbers, a very friendly Moslem tribe.

I asked Alban if there is anything to export from this country.

"Sand for sand clocks," was the answer, "but lately the Swiss watches are undermining our economy."

We made about 800 QSOs. While operating

In Bathurst, Gambia, Cecil, ZD3D, welcomes Eva, now bearing the call ZD3R.

we were visited by Jacques, 5T5CJ, another Frenchman. Jacques works at the airport and is very active on c.w. only.

I recommend including Mauritania in any West African DXpedition; Nouakchott is very interesting, Alban, 5T5AD, is extremely helpful and the natives are very friendly.

Do not expect sophisticated tourist accommodations but the French cuisine is very good and you can try some local specialties.

Dakar, Senegal

From Nouakchott, with a short stop in St. Louis de Senegal we arrived in Dakar where Jacques, 6W8BL, was waiting for us at the airport. He took us to the Hotel Mon Logis where we got a room on the top floor.

The antenna went up fast and easy and we started to create the most confused pile-up we ever had. The reasons for the mass confusion were the callsigns assigned to us: 6W0/WA2BAV for Eva and 6W0/WB2AQC for me.

I tried to argue with the authorities telling them that 6W0 should be after our call signs and not before. That is the way it is in most other countries. I was told that I am wrong and most of the other countries are wrong too. Later this opinion was reversed but in the mean time we had to listen to hundreds of amateurs teaching us how to use our call. Many hams asked us if we were from Senegal operating portable in the USA or vice-versa.

In one instance Eva heard an Italian station — an old friend of hers — calling CQ. She called him giving her callsign: 6W0/WA2BAV. The Italian was quite happy and said: "How nice to hear you Eva, Let me turn my antenna to New York." So he did and got lost for good.

We had many visitors: Dany, 6W8BE, August, 6W8AU, Guy, 6W8ER, and of course Jacques, 6W8BL, who arranged the licenses for us. With Guy, 6W8ER, we went sightseeing in Dakar and visited the island of Gorée, an old slave trading post.

One evening, a local amateur Paul, 6W8EY, attracted by our unusual callsigns, called us, questioned us, and being very suspicious came to inspect our station, and . . . invited us for dinner.

In Dakar we found a large number of active amateurs, if many Ws still need a 6W8 contact it is because most of the hams in Senegal speak only French, and it is not easy for them to handle the American pile-ups.

I recommend the Hotel Mon Logis, it is not a luxury place but $6-7.00 for a double room, excellent French cuisine and a good antenna location is what counts.

The DXpedition rig was a National NCX-500 transceiver, here operated in Freetown, Sierra Leone by Eva as 9L1EP.

When photographing the natives — most of them are good looking and dressed very colorfully — I recommend using a telephoto lens. In many of these West African countries the local people don't care too much for being photographed.

When shopping for souvenirs I don't recommend paying more than one third of the asked price.

Bathurst, The Gambia

The morning we went to Dakar airport to take a plane to Bathurst, we had our first disappointment. We were told that the flight was cancelled. Simple. Like that.

"When is the next flight?" I asked.

"Tomorrow or after tomorrow, but nothing is sure," was the official answer.

"But I have to get to Bathurst, it is urgent." I tried to sound convincing.

"Nothing is urgent here, this is Africa," came the authoritive answer. Jacques 6W8BL suggested a taxi.

"A taxi from one country to another?"

"There is no other choice."

Indeed "the show must go on," so we hired a taxi. The driver took advantage of the situation and demanded four times the usual rate.

The taxi took us almost to Bathurst. It left us at the ferry boat, which took us across the Gambia river. The same ferry boat — two weeks earlier, lost its way during a sand storm, and drifted into the ocean. There were about 30 terrified passengers on the boat and they tried to pray but because of the sand storm they could not figure out which way was East. So they divided into four groups, each one praying in a different direction. It looks like one of the groups made the contacts because 24 hours later the tide brought them back safely.

We had reservations at the Wadner Beach Hotel, outside Bathurst. Quickly installing our vertical, we started to operate. We did not receive our licenses but Cecil, ZD3D, a local amateur, found out our assigned calls; ZD3R

Sam Watkins, EL2P, from the Ministry on Telecommunications of Liberia welcomes George by giving him his license. EL2AU.

for Eva and ZD3S for me, and passed this info via radio while we were in Dakar.

After about one hour of operation, an energetic knock on the door, made me regret that we started to operate before we received the licenses. I opened the door, two gentlemen stepped in looking with visible interest at our transceiver.

"What would the guy from Mission Impossible do now?" was my thought.

"Hi," said one of the visitors, "I am Cecil, ZD3D."

"Oh, you just don't know how happy I am to see you," I said and I was very honest. Cecil introduced his partner, Ron, G3WYY, who was visiting but not operating in Gambia.

I recommend applying for license at least 6 months before operating time and dropping a letter, from time to time, to the Ministry of Posts and Telecommunications, reminding them of the problem.

I don't recommend the same hotel we stayed at because it is far out from the city of Bathurst, and has a bad antenna location.

Freetown, Sierra Leone

The USA has a Reciprocal Operating Agreement with Sierra Leone but because of a delicate political situation, it seemed that we could not get licenses to operate. I asked several times for application forms from the Ministry of Posts and Telecommunications in Freetown but got no answer. Neither the American Embassy nor the Embassy of Sierra Leone to the U.S. could be of any help.

What was not possible through diplomatic channels, was made possible by the work of a private amateur radio operator: Ray, 9L1RP. He obtained application forms for us and took care of everything.

When we arrived at the Lungi airport, somebody gave me an envelope with a note from Ray and two licenses; 9L1EP for Eva and 9L1GP for me.

From the airport it took us about 1½ hours to Freetown. By bus, we crossed the bay on a ferryboat, then we continued with the bus to the center of the city. From there is was still a long taxi ride to the Cape Sierra Hotel which is very expensive, far from the city but excellent for radio communications.

The first day we were visited by our benefactor Ray, 9L1RP (also GW3MTL) and by two very friendly Englishmen, Ross, 9L1GC (also G3DYY) and Mike, 9L1MF.

Operating from Sierra Leone was a success; we made 900 QSOs. With Ross and Mike we visited an animal farm, we photographed ourselves with chimpanzees, various snakes, a baby elephant, etc. Everybody was quite delighted with this visit except Ross who got the scare of his life. He was posing with a sleeping snake and while Mike took the photos, the snake woke up and made some threatening sounds. Ross dropped the snake and retreated so fast he almost stepped on a crocodile.

I recommend visiting Sierra Leone if you are sure you'll get a license.

I cannot recommend the Cape Sierra Hotel because it was the most expensive of all the hotels we stayed in Africa.

Monrovia, Liberia

Here we were invited to be guests at the homes of two amateurs, Robert, EL2DF who was working near Monrovia on the B. F. Goodrich rubber plantation, and Lee, EL2CB who is with the American Embassy. Robert and his wife Helga waited for us at the airport, so we stayed with them first.

Before we left for the plantation we went to see Sam Watkins, EL2P to get our licenses. Sam, besides being a high official of the Ministry of Posts and Telecommunications, is an active ham and a very nice person. I met him on the air from Gambia and he gave us our callsigns: EL2AV for Eva and EL2AU for me.

At Robert's place I was amazed to see a house in the middle of the rubber plantation, surrounded by jungle, with all the modern conveniences you can imagine. Robert is a Dutchman and he is always in the Dutch net helping the low powered PAs to work some good DX.

We operated quite a lot and after three days we were transfered to Lee's house. Lee, EL2CB, has operated from a few places around the world. At home he is W6MNH.

At the end of his tour of duty in Liberia he will go probably to another good DX location

[*Continued on page 120*]

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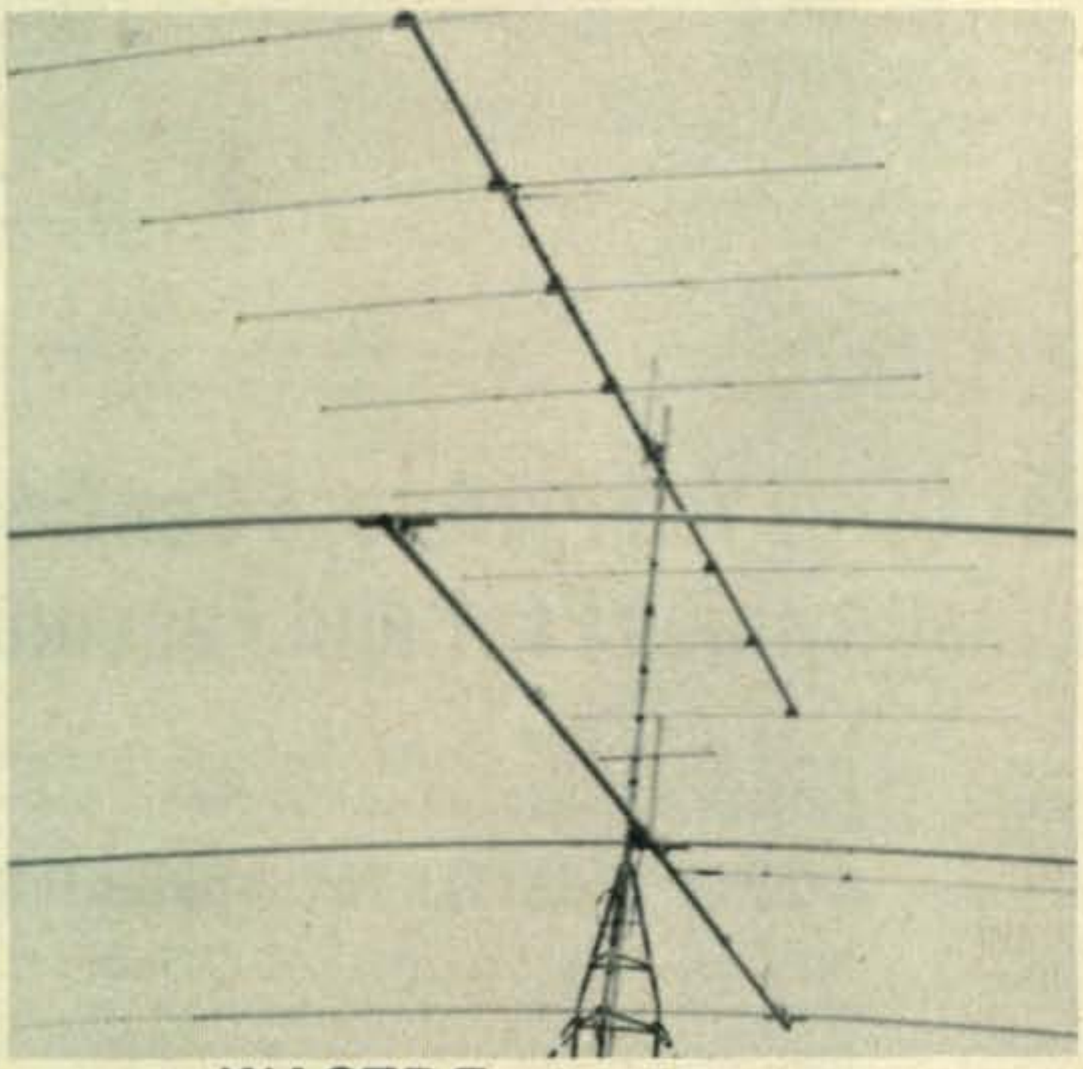

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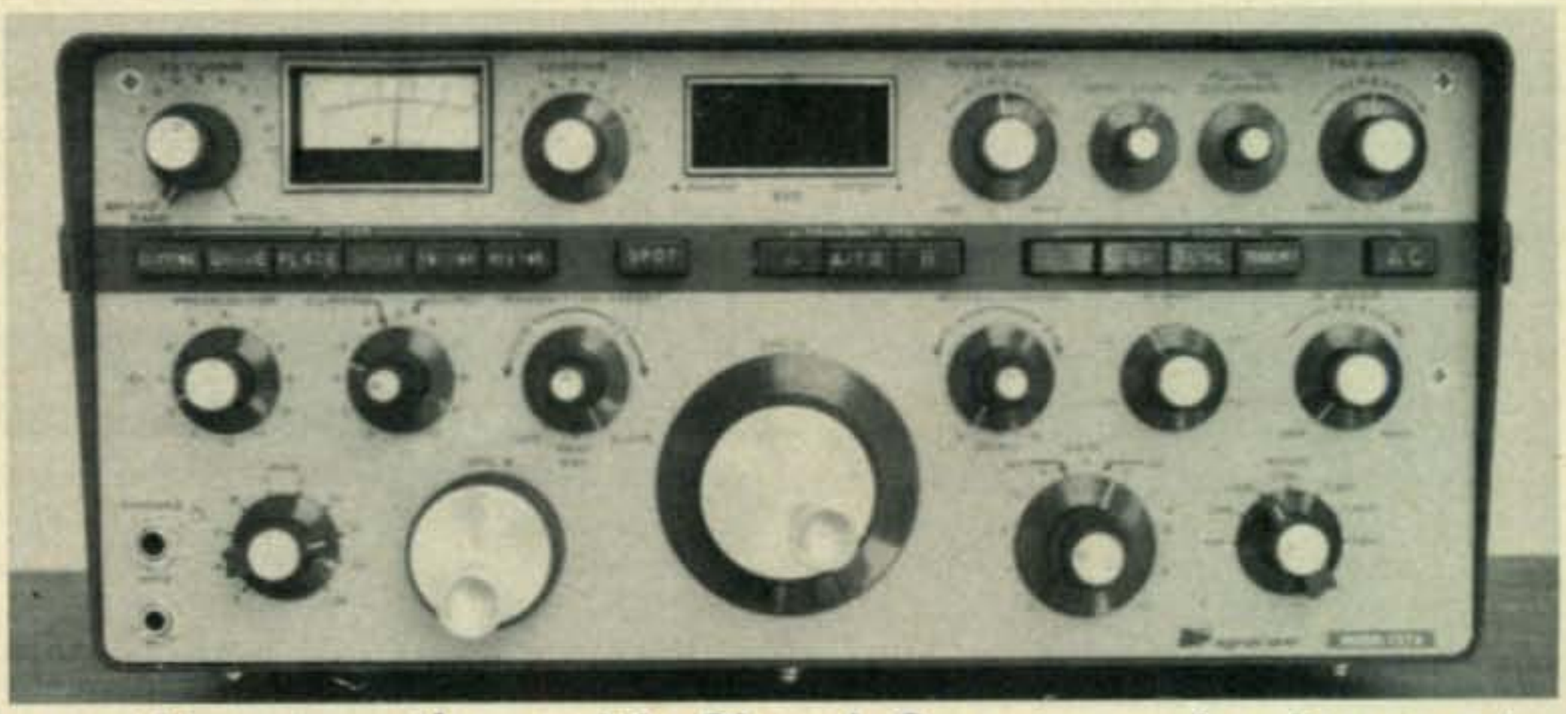

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MATH'S NOTES

BY IRWIN MATH,* WA2NDM

While complex integrated circuits are the current state of the electronics industry, there are many somewhat unconventional applications of simpler devices such as transistors and diodes that will be of interest to the amateur. In an attempt to "stimulate" clever and innovative thought and encourage experimentation, we will therefore present some of these applications, in addition to our normal discussions, from time to time. This month, we will consider some such applications of semiconductor diodes and zeners.

The properties of the silicon diode as a rectifier of a.c. into d.c. are well known to most experimenters. What is not so commonly known, however, is that it may be used as a very good frequency multiplier. Figure 1 shows a ×2 or doubler arrangement. Notice that the circuit very closely resembles a full wave rectifier in both configuration and operation. The two tuned circuits are best adjusted by feeding an input to the pickup link on L_1 and tuning C_1 and C_2 for maximum output. If suitable diodes and LC values are employed, this circuit will function well up into the mHz region.

Figure 2 is a simple diode frequency tripler. This circuit is a bridge with one arm composed of two diodes in parallel. As the a.c. input rises, the bridge balances at two points in each half cycle giving a distorted (from sinusoidal) but tripled output. Feeding this signal into a single tuned stage readily "cleans it up." As in the first example, maximum frequency of operation is a function of diode characteristics.

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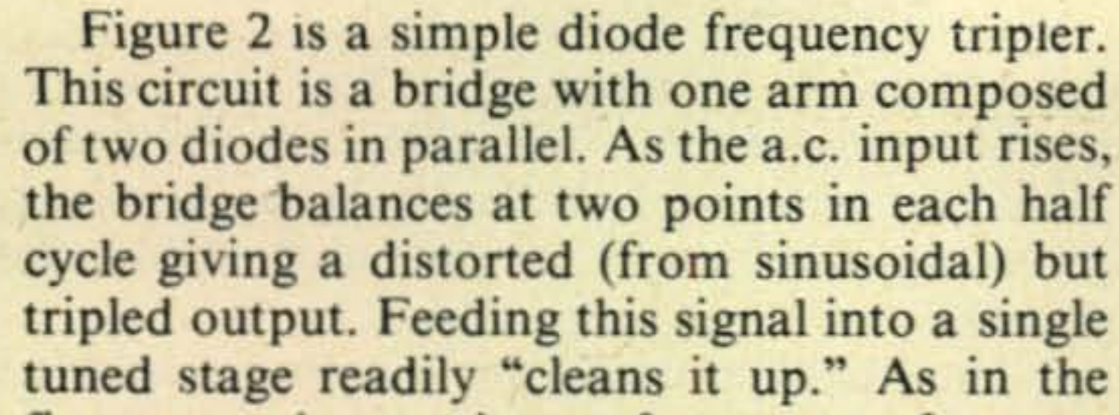


Fig. 1—Simple ×2 frequency multiplier.

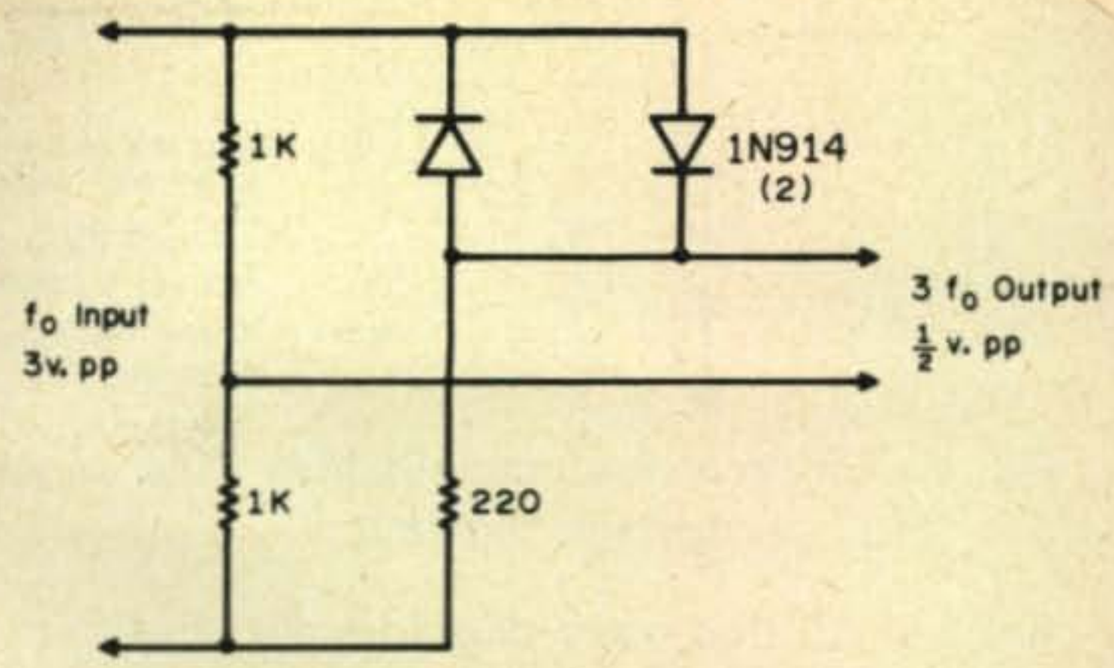


Fig. 2—Simple ×3 frequency multiplier.

In general, the use of simple diodes in multipliers such as these is restricted to low level applications. In higher level uses, such as between vacuum tube stages or transistor stages, the inclusion of a diode pair such as shown in fig. 3 will tend to increase the effectiveness of these stages by distorting the grid waveform, emphasizing the harmonic production.

Another use for non-specialized semiconductor diodes is as voltage regulators in a manner similar to zeners, but at much lower voltage levels. Since the voltage drop across a forward conducting diode is relatively constant regardless of the current flowing through it, the circuit of fig. 4 will produce an output dependent on the number of diodes in the series string. A look at the manufacturer's data sheet will almost immediately indicate the voltage-per-diode to expect as a function of the current flow. Most silicon rectifiers used in this manner will exhibit about 0.5 — 0.7 volts drop.

Because of this low voltage drop across conducting diodes, and because of the fact that at voltages lower than the conducting voltage, the diodes simply do not conduct, two diodes (in parallel) can be connected in parallel with any receiver input to act as protective devices. This practice, shown in fig. 5, will limit the input to an r.f. amplifier stage to about 0.5 — 0.7 volts. In a transceiver, or station employing an antenna change-over relay, this simple procedure will effectively remove the short

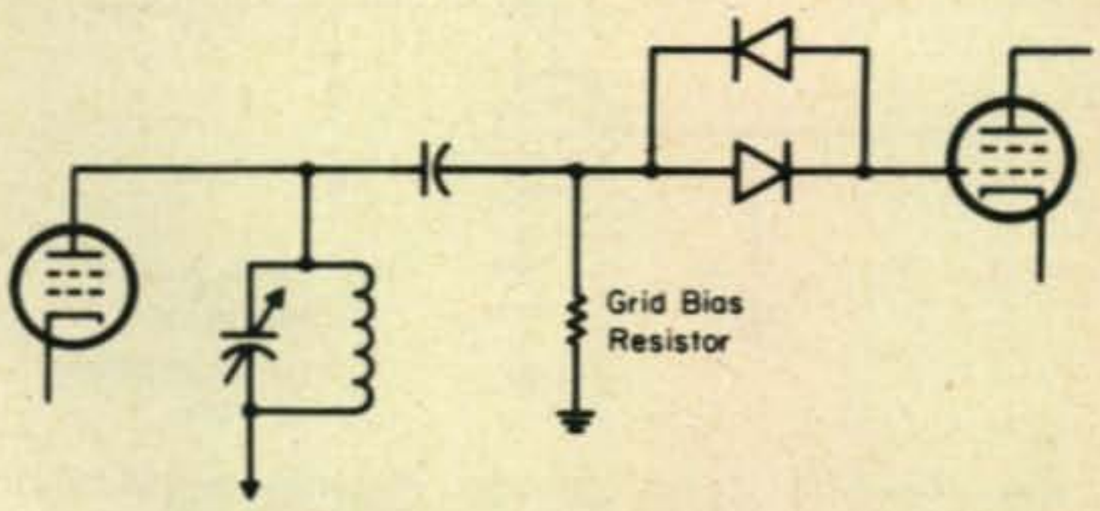


Fig. 3—Use of diodes to distort grid waveform for more effective frequency multiplication.

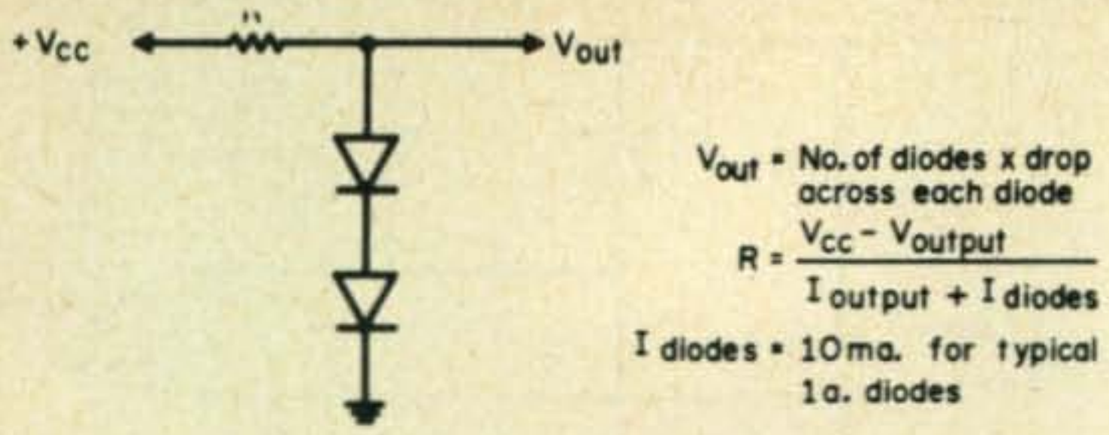


Fig. 4—Forward conducting diodes used as low voltage regulators.

"jolt" of r.f. that often degrades the sensitivity, stability, and noise figure of the input stage. For all signal levels below 0.5 — 0.7 volts, operation is completely normal.

The use of zener diodes is well known to power supply users, but these versatile devices also have other unique applications. Figure 6 shows how a zener can be used as a fixed cathode bias element replacing the common

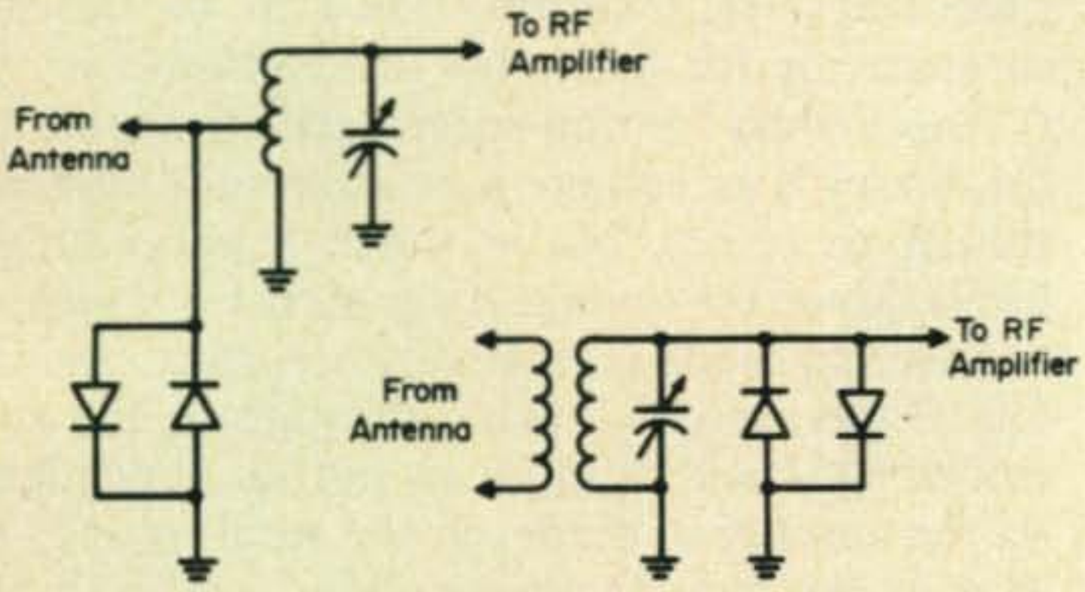


Fig. 5—Diodes used in this manner can effectively protect sensitive transistor or vacuum tube input stages.

resistor/capacitor combination. Because of the low impedance of this diode, a shunting capacitor is not required even at very low operating frequencies. In addition, the physical size of the ½ watt zener is quite a bit smaller than the replaced 2000 mf 50 volt capacitor, for example.

Those wanting a very low cost zener diode should not forget the emitter-base junction of a common transistor. Most silicon units make excellent 5-10 volt units with clamping, occurring at currents as low as 10-20 *microamperes!*

Figure 7 shows the way to use PNP or NPN

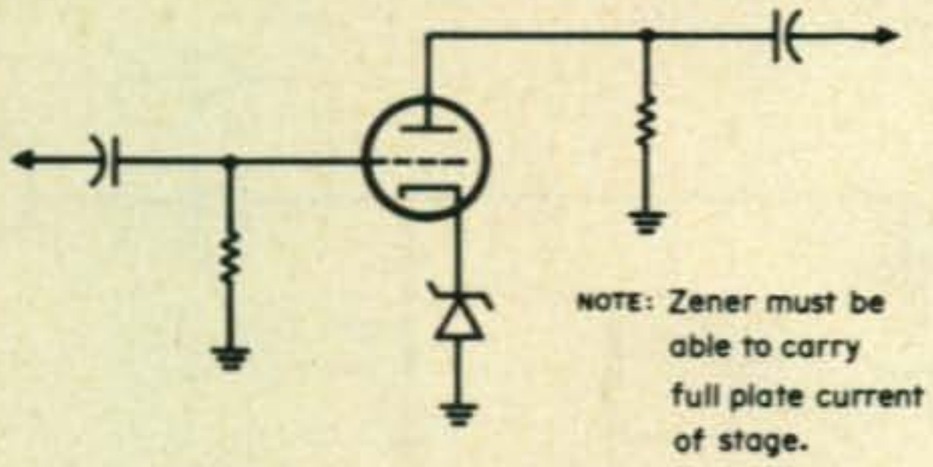


Fig. 6—The zener diode in this application replaces large bypass capacitor and resistor networks.

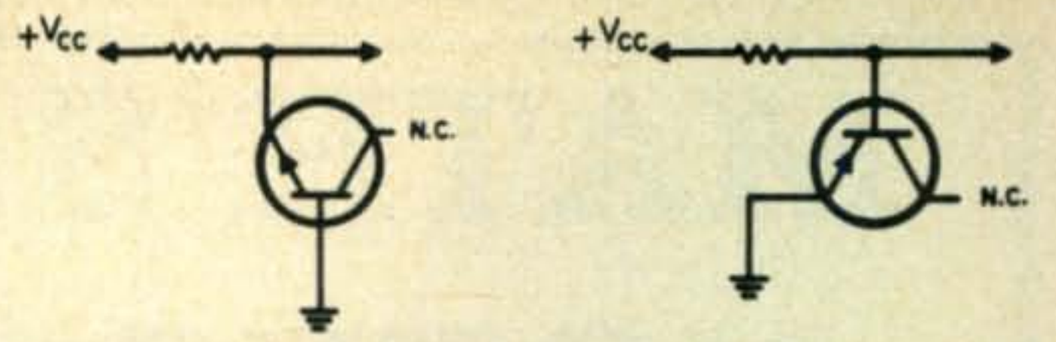


Fig. 7—By using transistors in this manner, excellent low current clamping zeners can be obtained.

transistors as zeners. Maximum dissipation ratings of the devices and maximum collector currents determine the operating characteristics of the "zener." Do not exceed either. Unfortunately, the exact zener voltage will have to be determined experimentally as most manufacturers' data sheets do not indicate this type of operation.

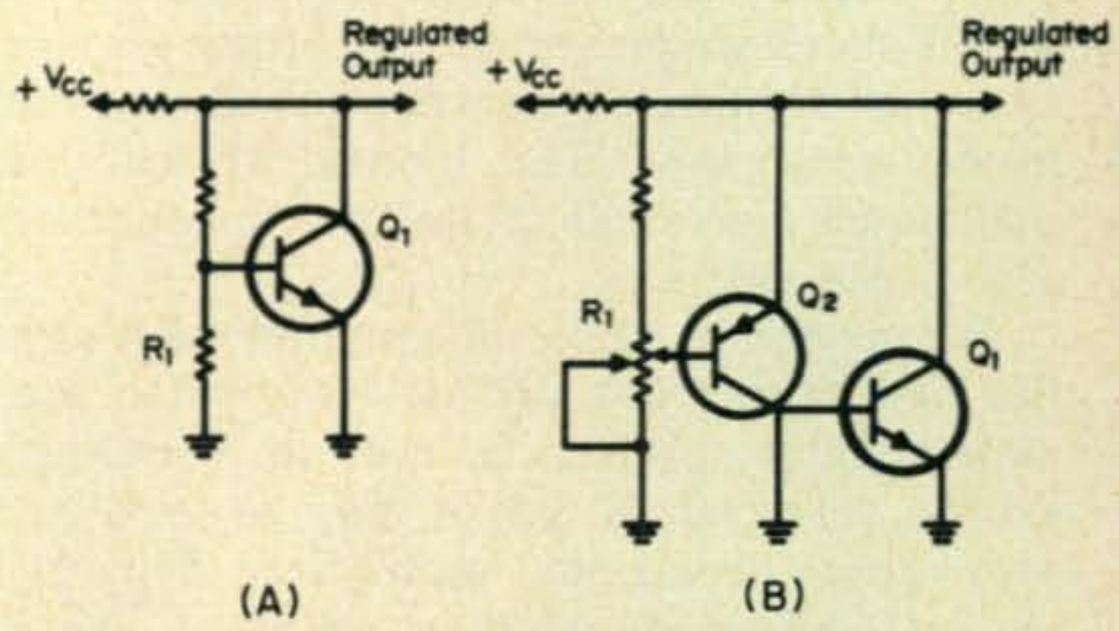


Fig. 8—(A) Simple power zener equivalent. (B) Variable zener equivalent. In each case Q1 determines maximum current.

Another technique for obtaining low cost zener-type units is shown in fig. 8A. Here, a transistor is used to sense the voltage drop across a resistor, R_1, and when this drop reaches the "threshold" of the transistor, it conducts. By changing R_1 to a pot and adding another transistor, a "variable" zener-type configuration can easily be built. Again, be sure to observe maximum current and dissipation ratings.

The final "unusual" use for diodes is as r.f.

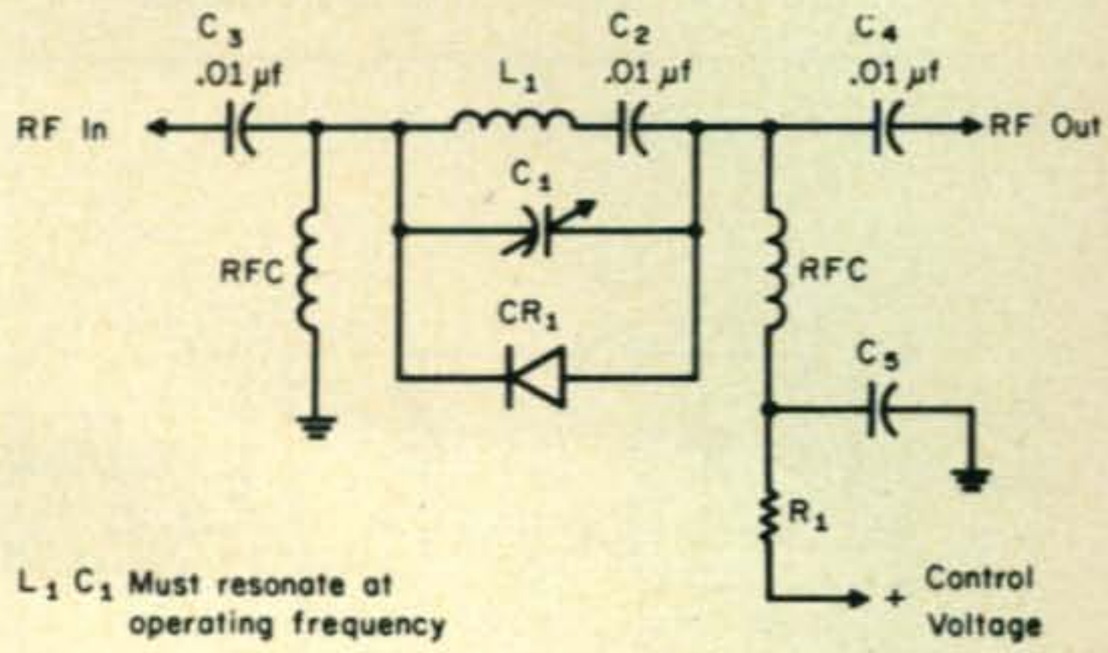


Fig. 9—Basic r.f. diode switch discussed in text.

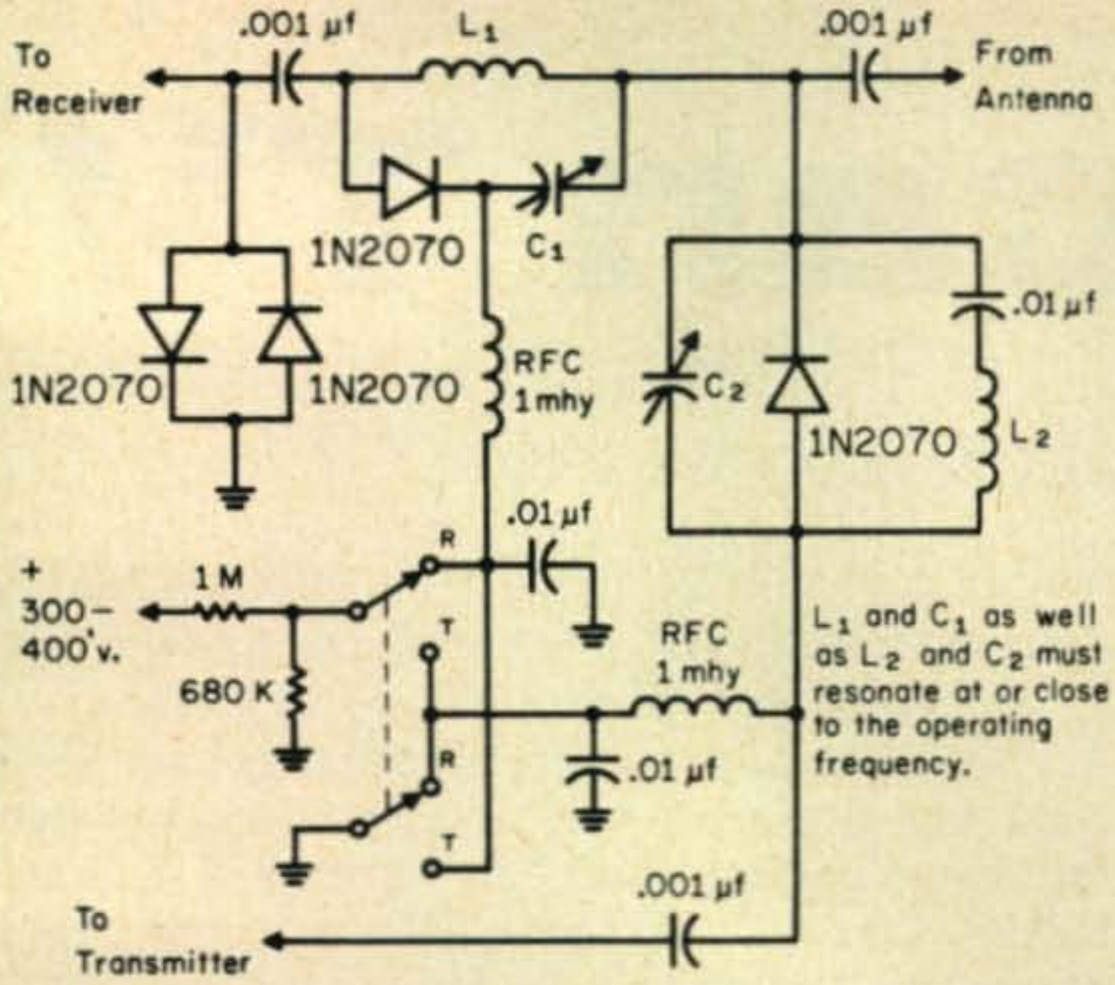


Fig. 10—Antenna relay discussed in text. All capacitors should be 400 v. or higher units. A careful examination of the d.c. paths will indicate operation.

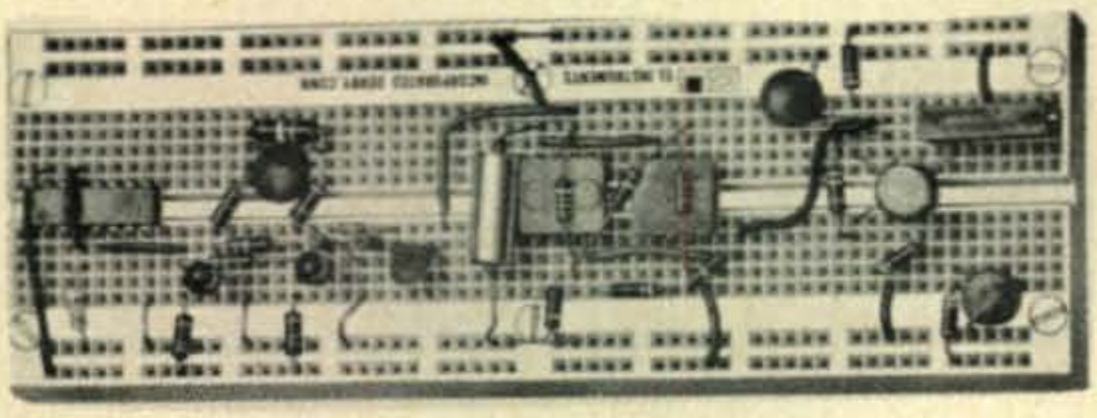
switches — particularly for higher frequencies. Figure 9 shows the basic principle of this technique.

When a sufficiently high positive voltage is applied to the control voltage input, the diode conducts, effectively short-circuiting the parallel resonant circuit consisting of L_1 and C_1. This presents a low impedance path for r.f. through the conducting diode and it passes right through the circuit. When the control voltage is reversed in polarity, the diode becomes reverse biased and does not conduct. This causes the parallel tuned circuit to now offer a very high impedance to the r.f. path between input and output. Capacitors C_1, C_1 and C_1 serve as d.c. blocking capacitors, while C acts as a bypass. The two r.f. choke coils keep r.f. where it should be and R limits current when the diode is forward biased.

In fig. 10, we have indicated a practical 2-meter antenna changeover relay using these techniques and suitable for 10-20 watts of rf.

There are of course, many additional and interesting techniques of the sort just mentioned

[*Continued on page 122*]



The El Instruments breadboard makes circuit design and experimentation an easy job, and saves fragile component leads from damage.

Slow Scan TV

BY COPTHORNE MACDONALD,* W1GNQ

So, we're past the initial stages of getting the call letters on tape, and panning the camera around the shack. And the nude girl stage is either bypassed, over, or dying. (In a recent poll, both prudes and swingers agreed by an overwhelming margin that nudes in P7 yellow are just not where nudity is at). What next?

First, we have to face the fact that while communicating visually is potentially more effective than voice alone, it makes much greater demands on the originator. We can immediately convert many of our thoughts into spoken words. We cannot instantly convert our mental images into physical images. The ham with artistic ability can come close if he is able to draw rapidly. For most of us, however, until someone figures out a way to get those images out of our heads and onto the air directly, the best we can do is to collect a mess of those images that represent ourselves — our experiences and our interests — and keep them around in the form of photos, or slides, or slow-scan tapes. In this way at least, when our mind conjures up a familiar image we can share it.

"What sort of pictures should I collect?," you ask.

"What in your life has some meaning to you?," I ask back. What are you into? Raising kids? Teaching school? Ecology? Astronomy? Building a house? Travelling? Gardening? Whatever those things are that matter to you, there are pictures that will help you share that interest or experience with a lot of other people. And there are other people *really interested* in sharing those things — in coming to know *you* — your feelings, your thoughts, your ideas.

This is one of the interesting things that has come out of the last 4 or 5 years of activity by the "video underground," that group of several thousand people who have been working with portable ½" video tape recorders and portable cameras. After initial hopes for mass distributing "new culture" video the way the traditional culture mass distributes its video, some discoveries were made. Exciting things happened when people got involved in the video process. They enjoyed seeing themselves on the screen. They enjoyed seeing others. Barriers dropped. Longhairs holding cameras found themselves in serious dialogue with the same people who otherwise would have walked right past. The mass distribution hopes haven't materialized, but for many it doesn't matter much anymore. The use of ½" video tape as a tool to help people get to know other people (and to better know themselves) is working. Groups and individuals are swapping tapes. Not fancy stuff. Just tapes about themselves and what they're into.

In on-the-air SSTV we will be doing the same sort of thing, with a dimension of "nowness" and provision for dialogue that is impossible with tape. The actual images will be for a large part "stored" — as are those of the ½" video tape people — but our voice is now and our presence is now. Images on a screen are powerfully attractive. You probably know a good many people who spend at least 10% of their lives (2.4 hours a day) in front of the broadcast TV tube. Those of us who have tried it know that tearing away from the P7 afterglow is perhaps even tougher. That image is being sent to *me*. By some guy a long way off. Wow! My point is that when we're transmitting images, we have the full attention of the ham we're communicating with. Let's take the steps necessary to help make this hypnotic fascination pay off for both him and ourselves.

(For those of you interested in what the ½" video tape people have been doing there is a book, *Guerrilla Television;* a Holt, Rinehart, Winston paperback; $3.95 through your bookstore. The magazine covering current activities

* P. O. Box 261, Forest Park Station, Springfield, Mass. 01108

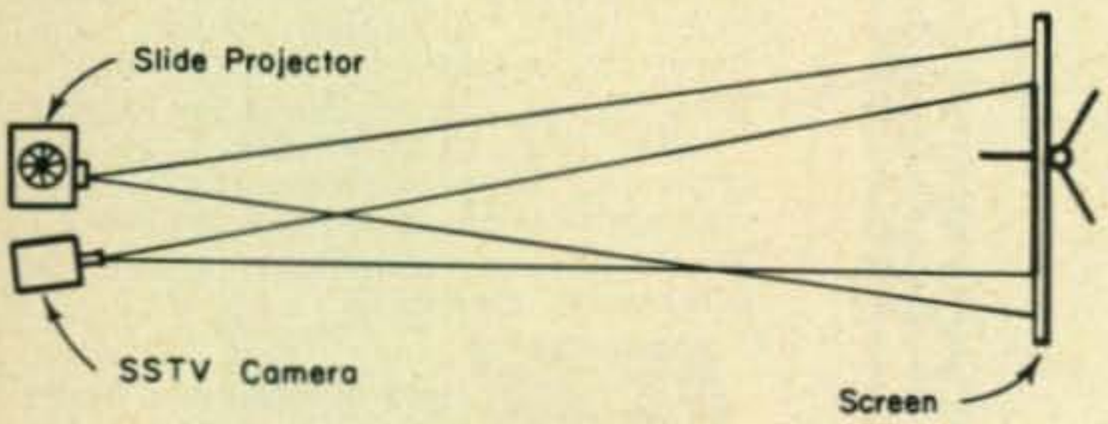
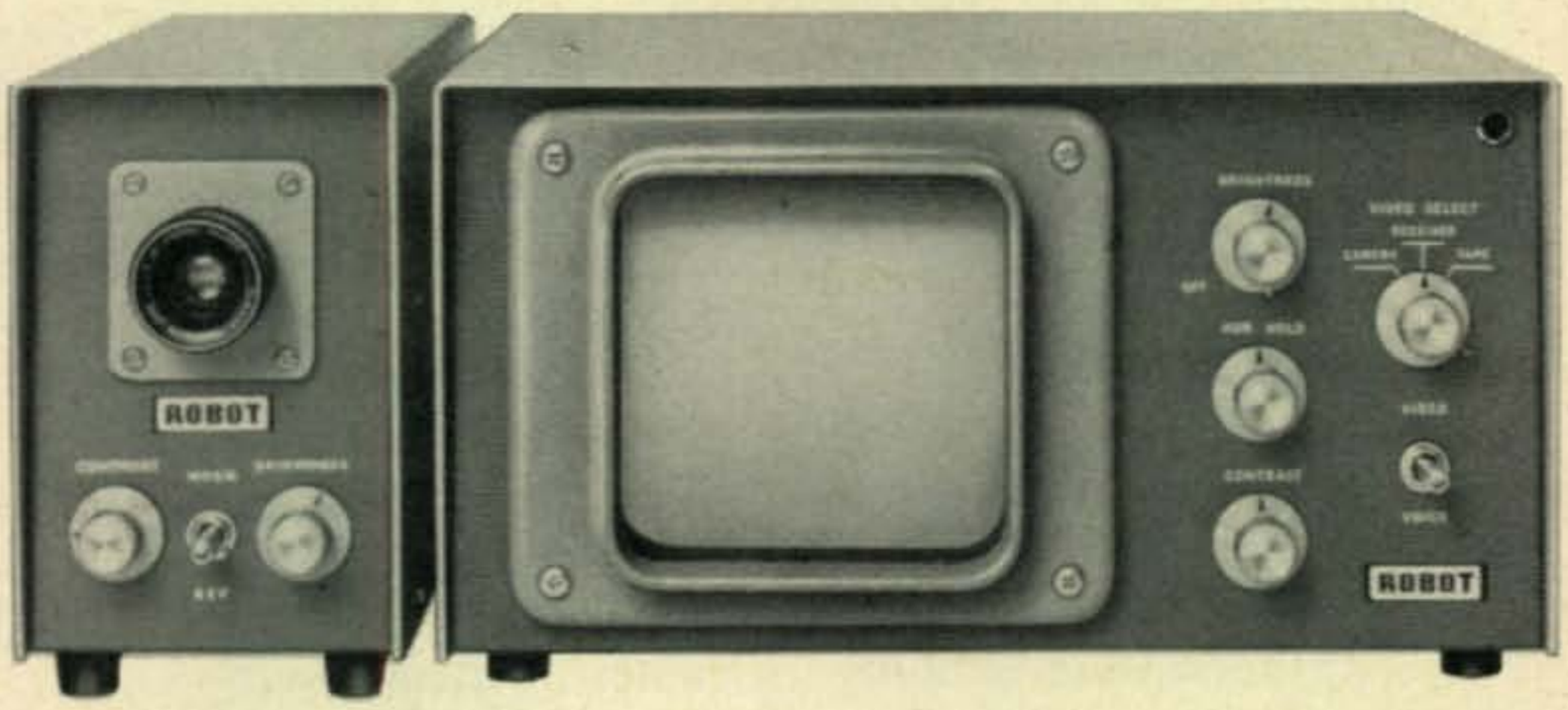


Fig. 1 — A simple method for putting 35 mm slides on the air with an SSTV camera.

The most important development since the beginning of SSTV



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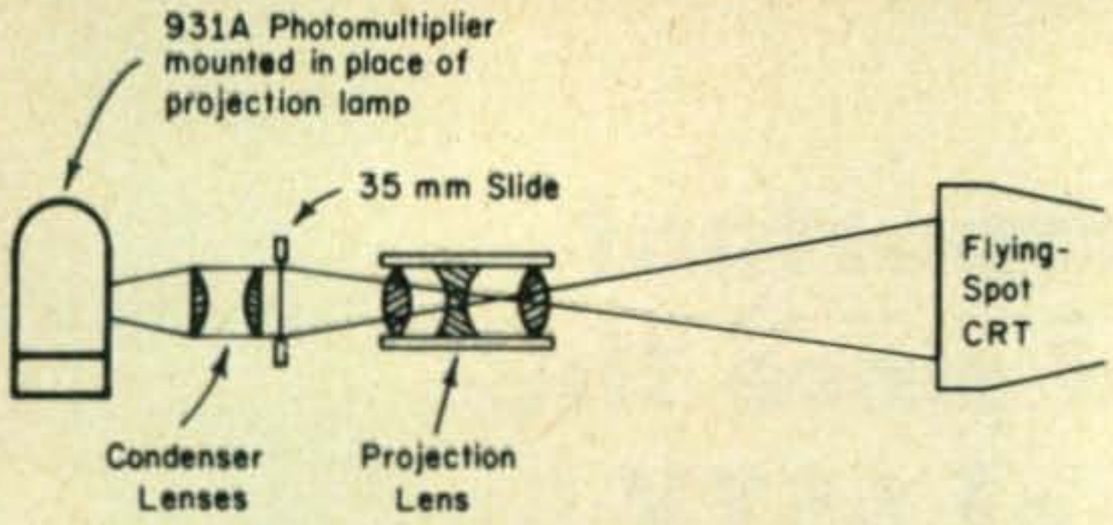

Fig. 2 — A 35mm slide projector converted for use in a flying-spot scanner.

in *Radical Software.* A nine issue subscription is $12.50; Suite 1304, 440 Park Avenue South, New York, New York 10016)

Getting Our Images Together

How can we store our pictures so that we will be able to retrieve what we want, when we want it, in a manner that won't cost too much? The four most likely media for most of us are 35mm slides, snapshots, photographic negatives, and audio tape. There are other possibilities including video tape, movie film, and microfiche, but we'll restrict our present look to the first four.

There are two basic ways of organizing our images, and we will probably want to get involved with both. The first is gathering related images together in advance to form a sort of "program." Here we have decided that by organizing a particular set of visual materials in a particular sequence, we can tell a particular story in an effective way. Any dialogue about it can come after the complete sequence is presented. This is the technique generally used in professional and amateur films, and filmed and videotaped TV. Some slide presentations also fall into this category. The second approach is the impromptu one that we use when we thumb through a photo album to find the picture of that 5 pound bass we caught last summer. In this instance we have stored many unrelated pictures, and their effectiveness as an aid in communicating hinges, at least in part, on the ease with which we can lay our hands on a particular picture. Here too, we may keep related pictures together, but it will be as an aid in finding the one we really want, rather than with the intention of showing every one in a fixed sequence.

Putting together a program is at least straight forward, if not without its problems. You can plan your "story" around the pictures you have, or go take pictures that tell your story — or most likely, some of each. Audio tape is an excellent medium for storing programmed material, and you can either alternate pictures with your voice commentary about them, or put the voice in a parallel track on the tape if you plan to use simultaneous voice/SSTV independent sideband operation. The use of tape has the additional advantage that it frees up the original hard-copy visual material (slides, photos) to go into your "random access" picture file.

You can put together polished programs with either a slow-scan camera or a flying-spot scanner. The camera gives lots of flexibility in choice of image sources. The first picture on your tape could be recorded while focusing the camera on a small snapshot. '(A close-up lens might be needed to focus closely enough). To record the next picture the camera might view a portion of a 35mm slide image projected on a screen. Others might be of live people or activities taped while they are going on. The price here (in addition to that of the camera) is time. Unless the camera is the sampling type equipped with a fast scan monitor, adjusting camera position, focus, light level, etc., can take quite a bit of time. Naturally, if you have 5 slides and 10 snapshots to integrate into a program it would be wise to record all 5 slides at one time, and all the snapshots together. The tape segments could be edited later and assembled into a complete program.

The flying-spot scanner usually forces you to settle on one format for all of your visuals. If you are starting from scratch taking pictures for SSTV use, there is no time penalty — you just have to keep in mind the format size, and the resolution limitations of the SSTV mode, while taking the pictures. Instead of taking the typical picture of your wife standing in front of the Parthenon, you take 3 or 4 pictures. An overall shot of the Parthenon, a close-up of your wife, and close-ups of a column, or the stairs, or whatever else you find of interest. If you already have that slide you took two years ago, all is not lost. You can project the slide on a screen or white surface and take close-up pictures of parts of the projected image with your single lens reflex camera.

So how can I put together a smoothly running program? If you have a fast change flying-spot scanner you may be able to put to-

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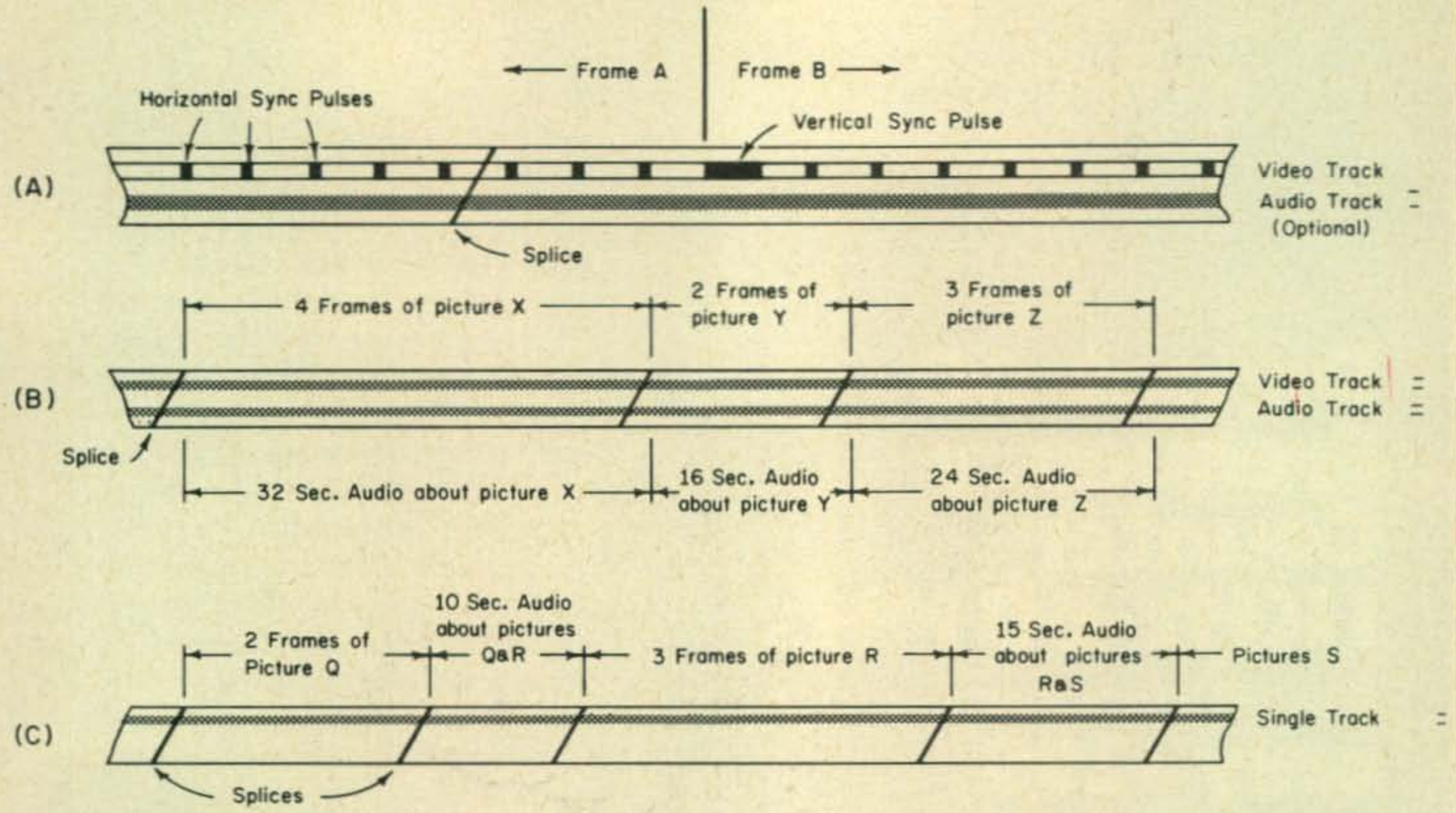

Fig. 3 — Scissors editing of tape to produce SSTV "programs." (A) Optimum splicing point: a line or two before the vertical sync pulse. (B) Video/audio format for simultaneous independent sideband operation. (C) video/audio format for s.s.b. operation.

gether a fairly smooth non-stop program directly. In most cases, however, some sort of editing will be required. If we didn't have to worry about the sync pulses, things would be easier. We could record as many frames of picture #1 as we wanted, then stop the tape and record picture #2 when we got ready. Using this approach we get a sloppy tape. Partial pictures, missing lines, or if the monitor uses an AFC horizontal circuit, bending of the picture while it resets the phase. All of this is distracting. A better approach is to make the tape as above and literally cut out the bad spots with scissors. I like to consider the vertical sync pulse as part of the next picture and usually do my cutting in the last line or two of the previous frame. (At a tape speed 7½ IPS, horizontal sync pulses are half an inch apart.) The pulses can be located by moving the tape reels back and forth by hand while listening carefully to the sound on playback. This approach is not perfect. Unless you are a better splicer than I am you won't even try to get the sync pulses on either side of your splice exactly ½ inch apart. Thus there will be one imperfect line at the bottom of the picture if a triggered monitor is used, or that, plus some bending at the top of the next picture, if the monitor has an a.f.c. horizontal circuit.

Doing high quality all-electronic editing requires that a separate timing track be recorded on the tape, and that the camera, flying spot-scanner, or second tape recorder have its sync/speed controlled by the timing track. Designing a gadget to do all this is on my list of future projects, but so are a number of other things. Tape is cheap, and the scissors approach, while not technically perfect, is not too time consuming.

If audio is alternated with the video, the strips of voice tape can be spliced in between sections of picture tape. If simultaneous voice/SSTV is contemplated, the best approach is to edit the video to give the number of full frames that will give sufficient time to dub in the audio related to those pictures. Then on a recorder that permits it, watch the video track on a slow-scan monitor while recording sound on the second track. With stereo recorders that do not have this feature, it may be necessary to time the video in the second track. If your recorder automatically puts both channels on "record" at the same time (which would erase the video) a possible approach is modifying the circuit to disconnect the video track of the record-playback head during record, and switching in an inductor of the proper value in place of the erase head. (It would be necessary to pre-erase the tape).

Random Access Retrieval

What can we do about the situation where we want to be able to put a particular picture on the air as rapidly as possible? A lot of crea-

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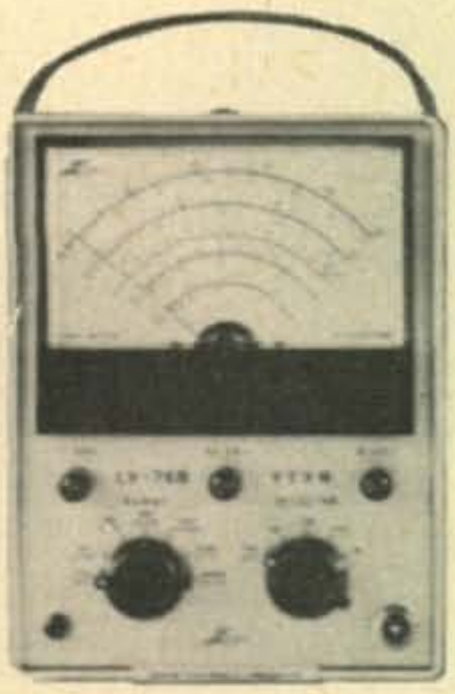

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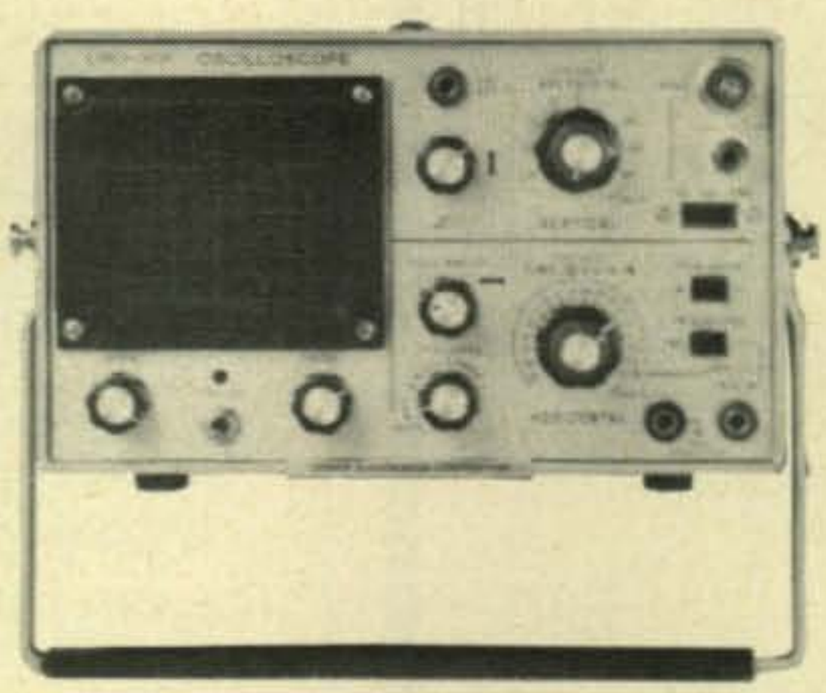

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tive thinking is needed in this area. I guess the primary measure of effectiveness of any system would be the shortness of time required to get a particular image on the air. If your FSS uses snapshots; a 3 x 5 card file might be the answer. The Kodak Carousel slide projector is a possibility. With the push of a button and rotation of the slide tray, any of 140 slides can be brought up within 2 or 3 seconds. The Carousel has the additional advantage that it can be used either with a camera by projecting the image on a screen, or modified to become part of a flying-spot scanner. In the latter case, the photomultiplier tube is mounted where the projection lamp normally would be, and the projector lens is focused on the face of the flying-spot scanner CRT. Obviously, this same approach could also be used with other slide projectors. The cost of film is of course a factor. Black and white 35mm negatives can be put into cardboard mounts and used in any 35mm projector/FSS if the electronics are designed for negative transparencies. If you do your own developing consider the Kodak direct positive processing kits that give black and white positive transparencies directly on ordinary black and white negative film. I understood that results are best with a slow, fine-grained film like Panatomic-X

The long term "best" answer to random access could involve audio tape, or movie film. The challenge here is designing a means for automatically indexing the film or tape to the desired frame, in a hurry.

Q & A

Q. Is SSTV legal on 2 meter f.m.?
A. Under the existing rules, with the usual 2-meter f.m. equipment, no. Section 97.65 (e) of the FCC rules states that:

> "On frequencies between 50 Mc/s and 225 Mc/s. . . . the bandwidth of F5 emission shall not exceed that of an A3 single sideband emission."

What is called for here is a rule change, and this can be most easily accomplished after a number of hams have used the mode for a while under an STA (Special Temporary Authorization) from the FCC. If you and some others in your area would like to undertake a project to demonstrate the compatability of SSTV-on-f.m. with existing f.m. activities; first get organized, then write to the FCC requesting an STA. State your purpose, the duration of the test period, frequencies to be used, emission type to be used (for example: Subcarrier f.m. slow-scan television transmitted

[*Continued on page 124*]

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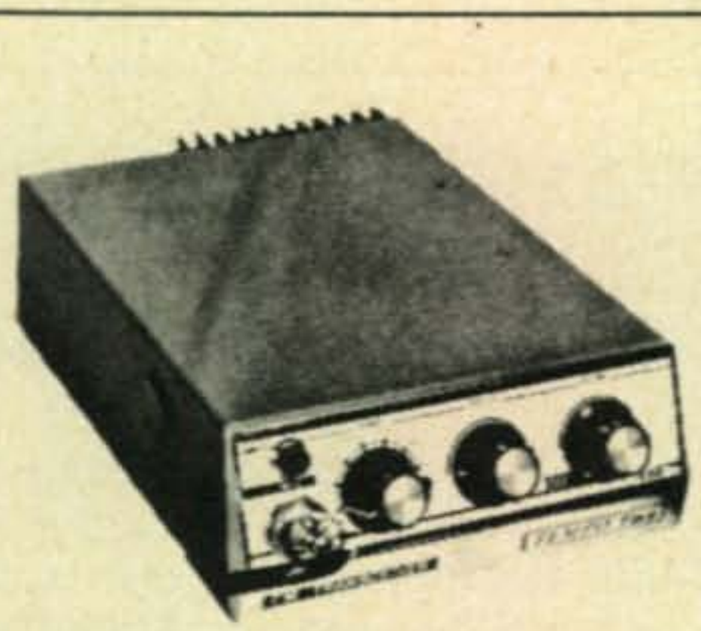

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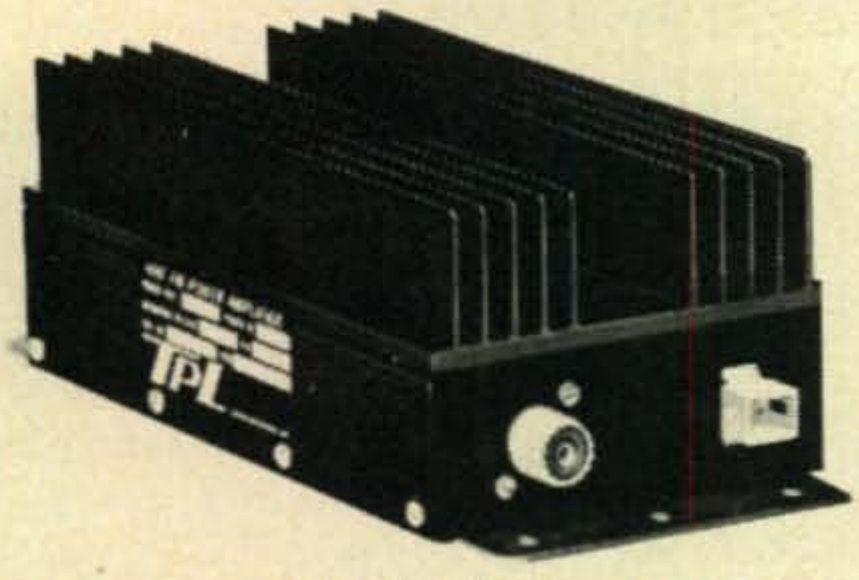

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F. M.

BY GLEN E. ZOOK,* K9STH/5

Progress or Procrastination?

Section 97.1(b) of the Federal Communications Regulations governing the Amateur Radio Service reads: "Basis and Purpose: The rules and regulations in this part are designed to provide an Amateur Radio Service having a fundamental purpose as expressed in the following principles: (b) Continuation and extension of the amateur's proven ability to contribute to the advancement of the radio art." Note the term service. Amateur radio is privilege granted by the FCC dependent on the communications being a service to the people of the United States. There is no inherant right based on previous generations of amateurs. We must all prove our benefit to the FCC and the rest of the country.

The section quoted from the rules shows the need for constant up-grading of our technical abilities to justify our existance. Judging from a number of "letters to the editor" in the various amateur radio magazines some amateurs prefer to rest on the laurels of others and remain stagnent in a technical sense. To some extent this idea arises in f.m. circles. For example, a few f.m.'ers reject narrowband techniques even though crowding is a serious problem in all urban areas. Others build repeaters that cover three counties when coverage of only a small town or city is really needed (an alligator: big mouth and small ears). Still other repeater groups engage in petty fights with neighboring groups resulting in power wars and multiple frequency outputs in-band to cover the opposition. This cannot continue. Sure, most f.m.'ers are a grand bunch of people, but it only takes a few to destroy what all of us have been trying to accomplish. So, lets all try to upgrade ourselves technically and emotionally.

F.m. is the forefront of amateur radio today. Not only is f.m. a medium of communications for the amateur, it represents a different philosophy. Technical advancement has been a part of f.m. since the early days. Lets not fall behind and lose our leadership. Think about it.

ARRL Again!

Like the famous Charlie Brown this columnist can be a bit "wishy-washy." Last month this column was a bit critical of the ARRL. This month, a bit of praise. By the time this is read, the new *VHF Manual* will have been out about six weeks, and many f.m.'ers will have read it. Contained therein are three new chapters on f.m. and repeaters with excellent data and construction projects. All three chapters were written by Doug Blakeslee, W1KLK, and, for a first effort by the ARRL, both Doug and Newington are to be commended. It has taken time, maybe a bit too much time, for the ARRL to recognize f.m., but they finally have, and in a relatively large way.

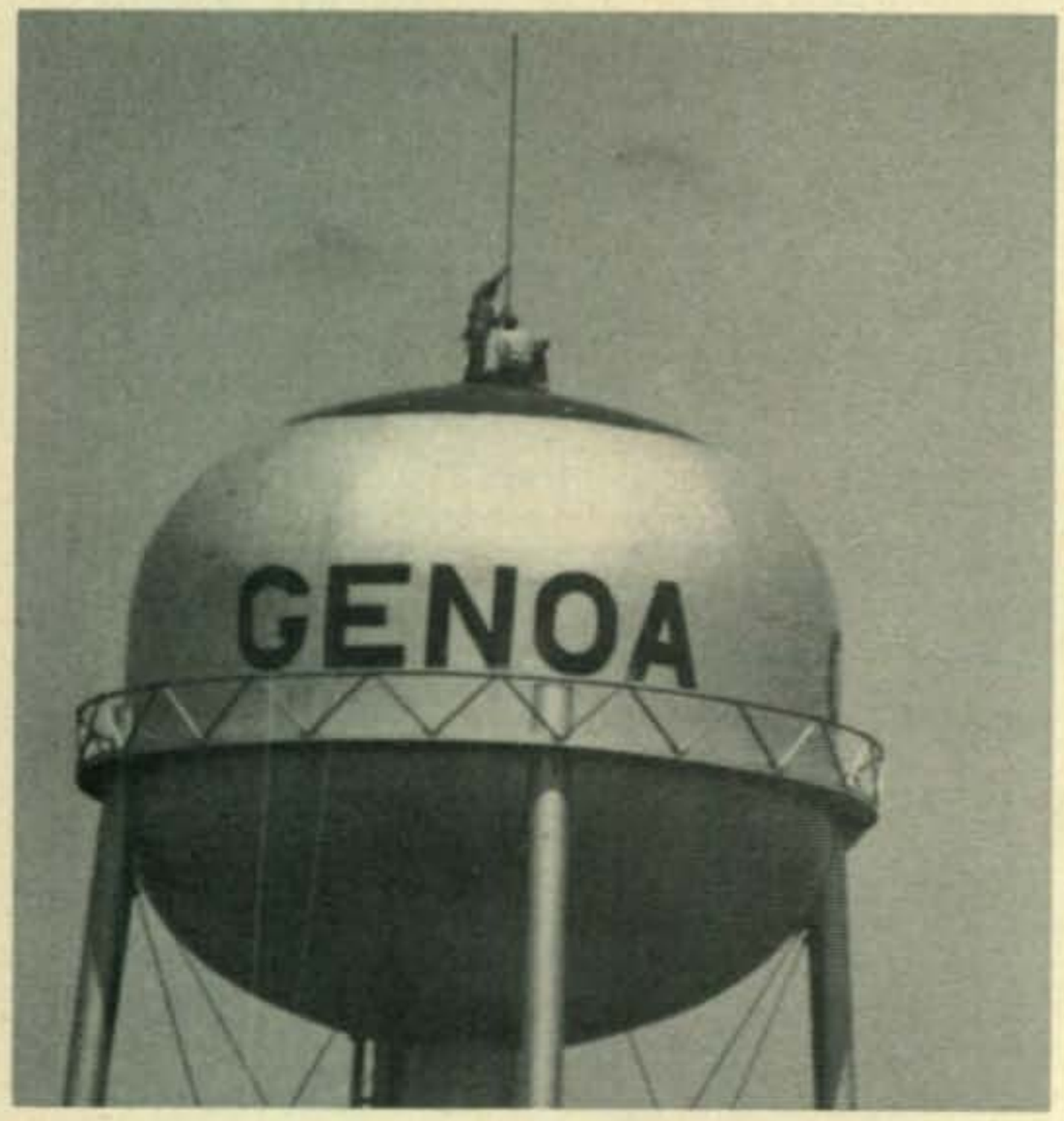
Seven-Oh

Comments about the validity of reserving 146.700 mHz for RTTY operations are rising rapidly. With the filling of other frequencies in the 146-147 mHz range, a channel reserved specifically for RTTY (AFSK) is becoming harder and harder to justify considering the level of activity around the country. Possibly there is a way out. With the rising interest in SSTV and with some f.m.'ers utilizing selective calling (sequential two-tone, etc.), possibly the solution is to share RTTY, SSTV, and paging on 146.700 mHz. Since all three use tone signals and since phone men cannot tolerate such wierd sounds on the repeater, .70 could be the place for all three. This could be a chance for all facets to have a place to operate, and sharing could be worked out on a local cooperation basis. Lets hear pro and con.

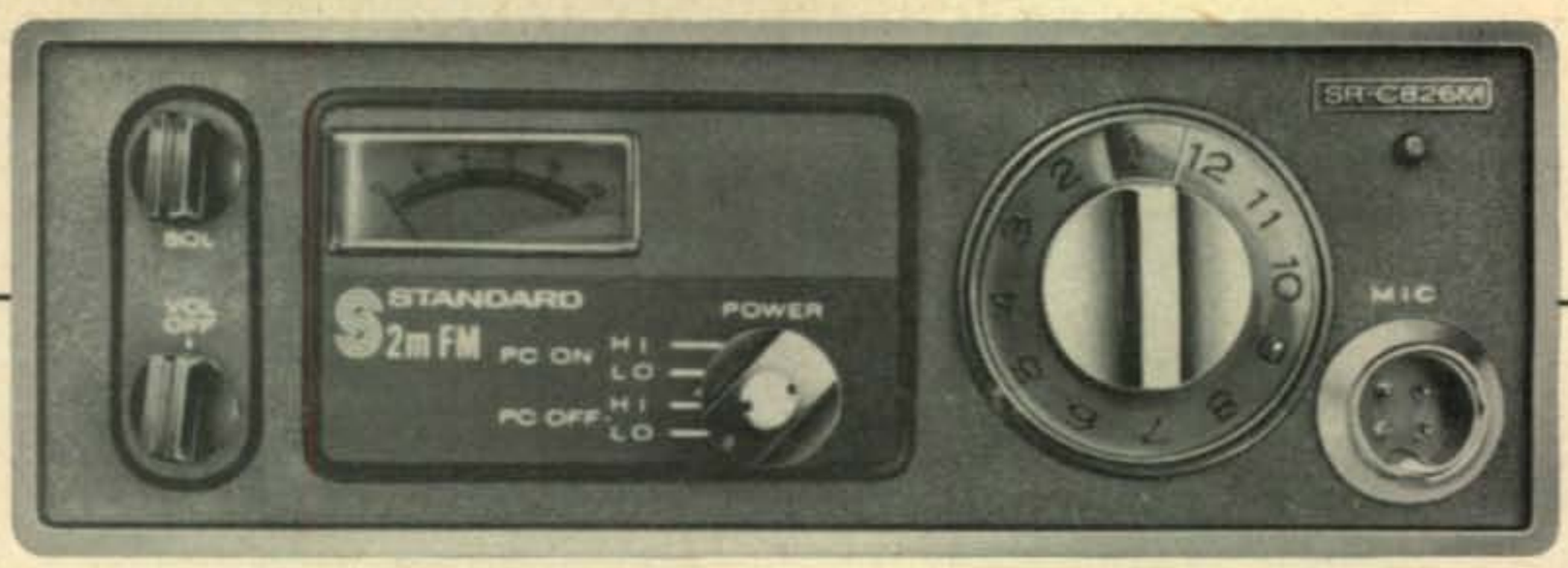
Technical Talk

The eight frequency deck described in last month's column may be a bit tight-fitting in some Motorola "A" transmitters. The prototype was used in a "K" (5894 final) with only a shoe-horn and a very small elf helping. The measurements given were for the

*410 Lawndale Drive, Richardson, Texas 75080.



An antenna party at the Genoa, Illinois, transmitter site. Daring the installation are W9HWS, WB9HTC, and K9GZA.



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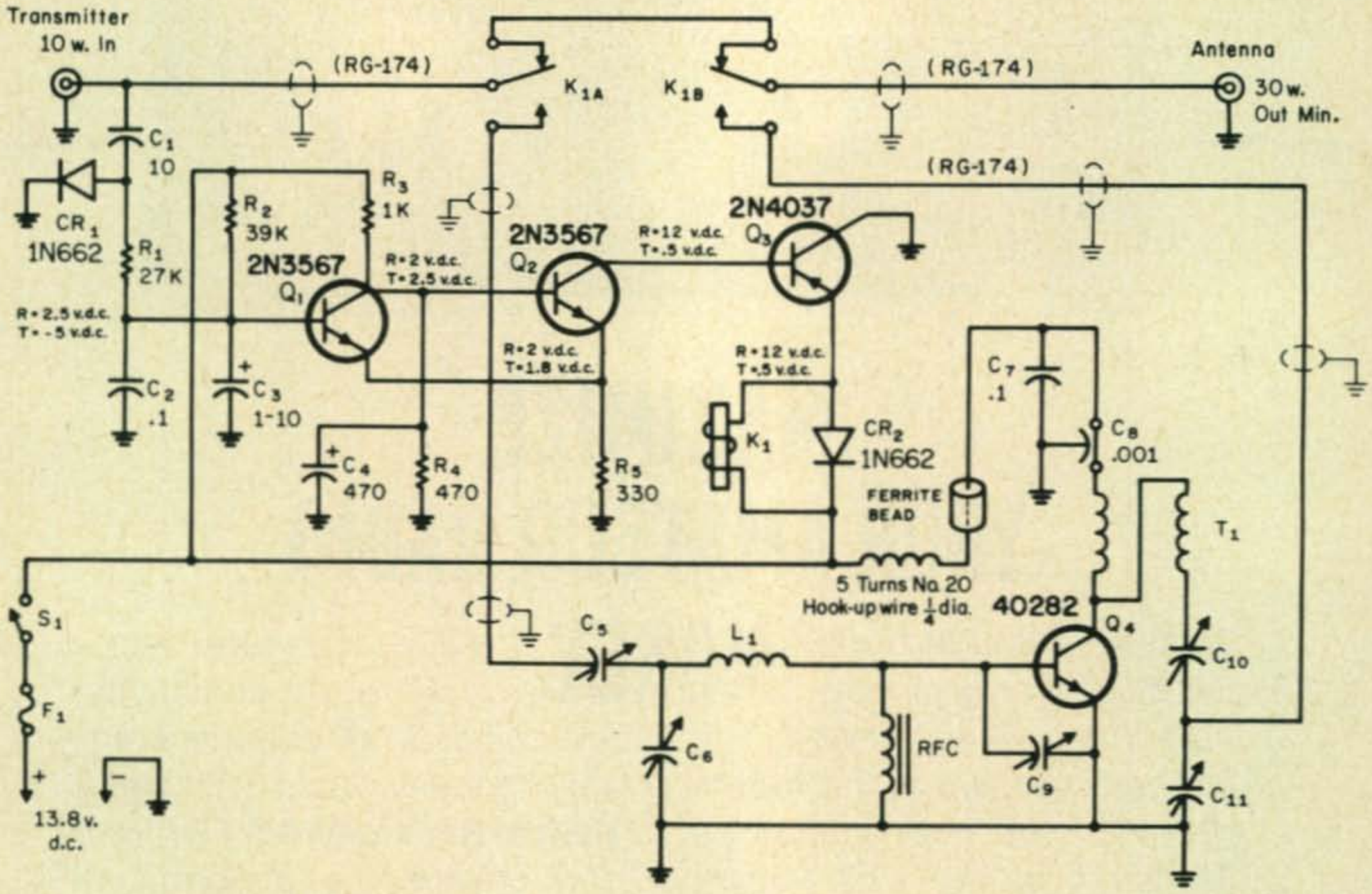

Fig. 1 — A class C transistorized final amplifier that delivers 30-40 watts. Construction details are given in the text.

C5, C9—7-100 pf compression trimmer. Arco 423.

C6—4-40 pf compression trimmer. Arco 422.

C10—14-150 pf compression trimmer. Arco 424.

C11—24-200 pf compression trimmer. Arco 425.

K1—D.p.d.t. relay. 12 v.d.c. 100 ohm coil.

L1—½ t. #14 ¼" i.d.

RFC—Ferroxcube VK-200-09/38.

TI—One inch of #20 e. twisted pair, twisted 14 t.p.i., formed into ⅜" dia. loop. End of one winding connected to beginning of other.

"K" transmitter. WA5KKJ of Sherman, Texas, built an assembly from the original sketches and had a need for about ⅛" additional opening on the transmitter of his "A." Because of this, several "A" transmitter units were measured, and the opening varied about 3/16". Thus, in some "A" transmitters it may be necessary to nibble or file the opening a bit larger. The "K" transmitters seem to be about the same in opening size with the prototype, so probably no alterations will be necessary. For those who doubt that the unit really fits, see the photos!

This month the "Technical Talk" is a class C transistorized final amplifier for use with the 10 watt output class f.m. units. The project was originally published in the *World of FM* bulletin of the WA2SUR repeater group in New York City. The author is Miguel Santana, WA2AZX (now /6). The unit takes an average transistorized 8-10 watt unit and kicks it up to 30-40 watts out. Now the original text:

Increased Range For Your 2 Mtr Mobile Rig

The amplifier was built in a 3 × 5 × 2 inch chassis with a large Delco heat sink mounted on top to dissipate the heat. Connections on the r.f. amplifier should be as short as possible, no hook-up wire was used on the r.f. portion of the unit. All parts are soldered to each other. RG-174 coax was used on the unit.

The switcher wiring is not critical, only capacitor C_1, diode CR_1 and resistor R_1 are mounted next to the input connector.

The choke *RFC* was made by using a ¼" diameter hexagon slug taken from a coil and winding 1 turn of #20 hook-up wire through the hex hole. Coil T_1 was made by twisting two #20 enamel wires together with 14 twists per inch, then a ⅜" diameter loop was formed, connecting the start of one loop to the finish of the other one. This joint is soldered to the collector of Q_4. One free end is connected to the B+ and the other is connected to the capacitor C_{10}. The transmitter B+ was connected to the input voltage through a five turn coil of #20 hook-up wire ½" diameter with a ferrite bead (or a ¼" hexagon coil slug) at the transmitter end.

After construction of the unit, check the circuit very carefully and then:

1. Connect a wattmeter to antenna connector and the driver unit to the input connector.

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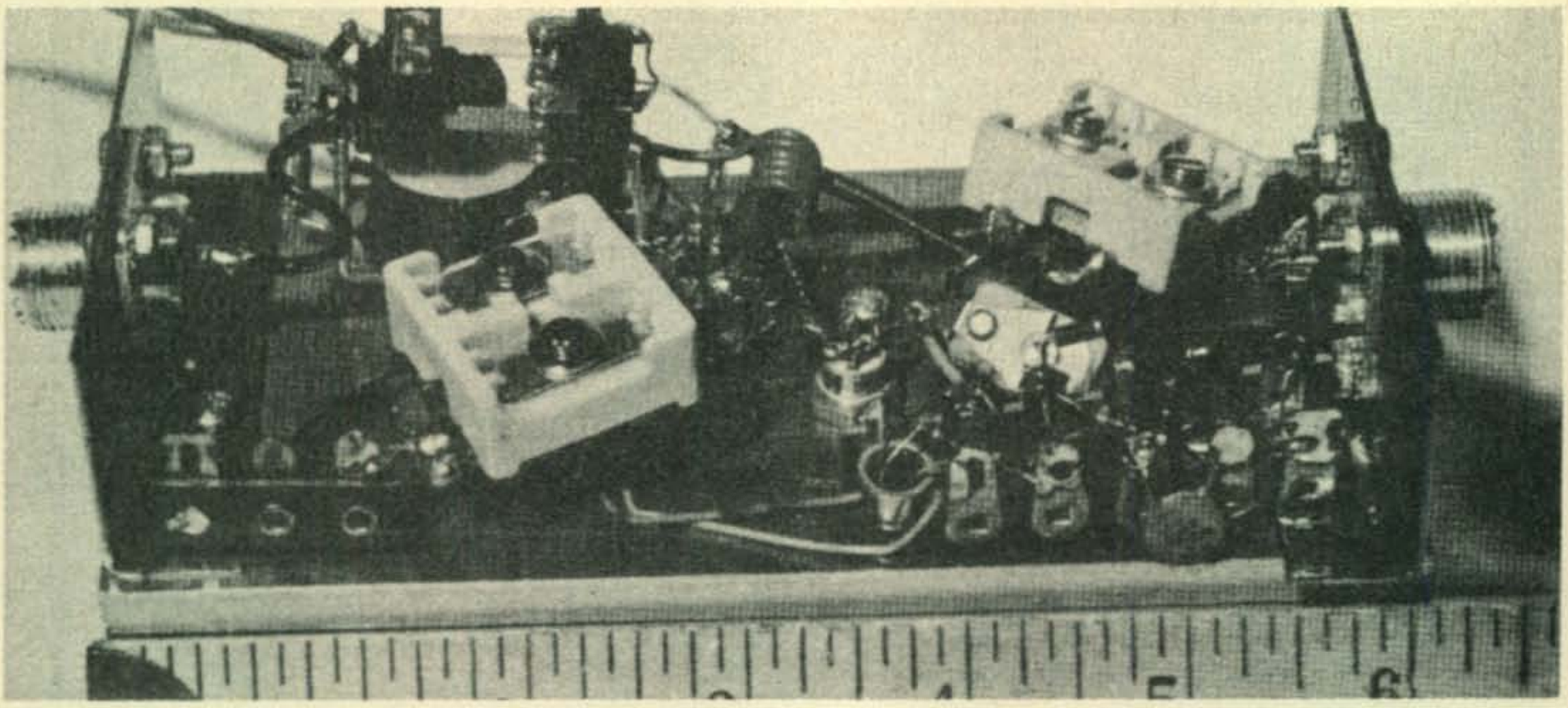


A view of the amplifier. The unit was built and described by Miguel Santana, WA2AZX for the WA2SUR Bulletin.

2. With booster off, key driver unit, the wattmeter should read 8-10 watts (into a dummy load).

3. Turn booster "on" and key driver unit. The relay should operate.

4. With the driver unit keyed adjust C_5, C_6, C_9, C_{10}, and C_{11} to maximum output. All tuning should be repeated at least three times. The output after tuning should be 30-40 watts.

Thus concludes the original test.

Correspondence with Miguel produced some additional information. First of all, best results can be obtained with a section of coax 36" long connecting the transceiver to the amplifier (length based on coax with 0.66 velocity factor such as RG-58/U; not polyfoam). Also, the newer 2N5591 transistor works quite well as the amplifier. Next, the switching circuit is more complex than actually required for switching. However, the more complex circuit takes less power from the r.f. provided by the transceiver, resulting in more drive and about 4 watts more output from the amplifier. Although not pointed out by WA2AZX, the circuit can probably be built on a piece of copper clad board with grounds soldered directly to the copper. This in turn could be mounted in a Mini-box with required heat sink.

Thanks very much to Miguel for his help and permission to reprint the article.

CQ Visits Gregory

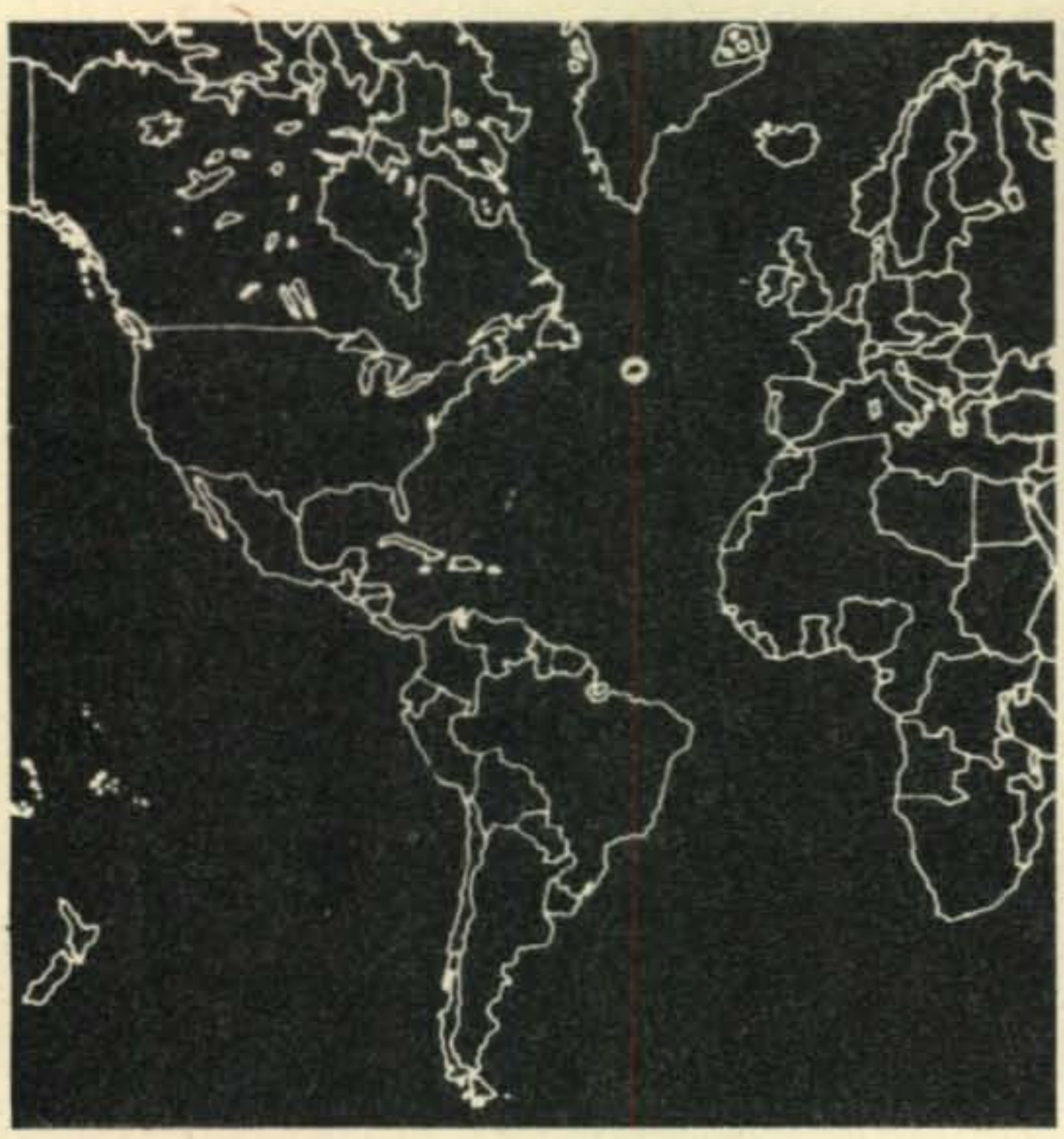
As some readers know, this columnist visited the New York City area during the early summer. The primary reason for going was to see what Dick Ross, Bill Scherer, Alan Dorhoffer, and the rest of the gang really look like. I'll not relate my trials and tribulations at Laguardia Airport, but meeting the gang was a happy time. While in the area I decided to drive out and see what Gregory Electronics had in stock. Since Gregory is one of the few major outlets of obsolete and surplus commercial f.m. rigs in the country many readers may be interested in my visit.

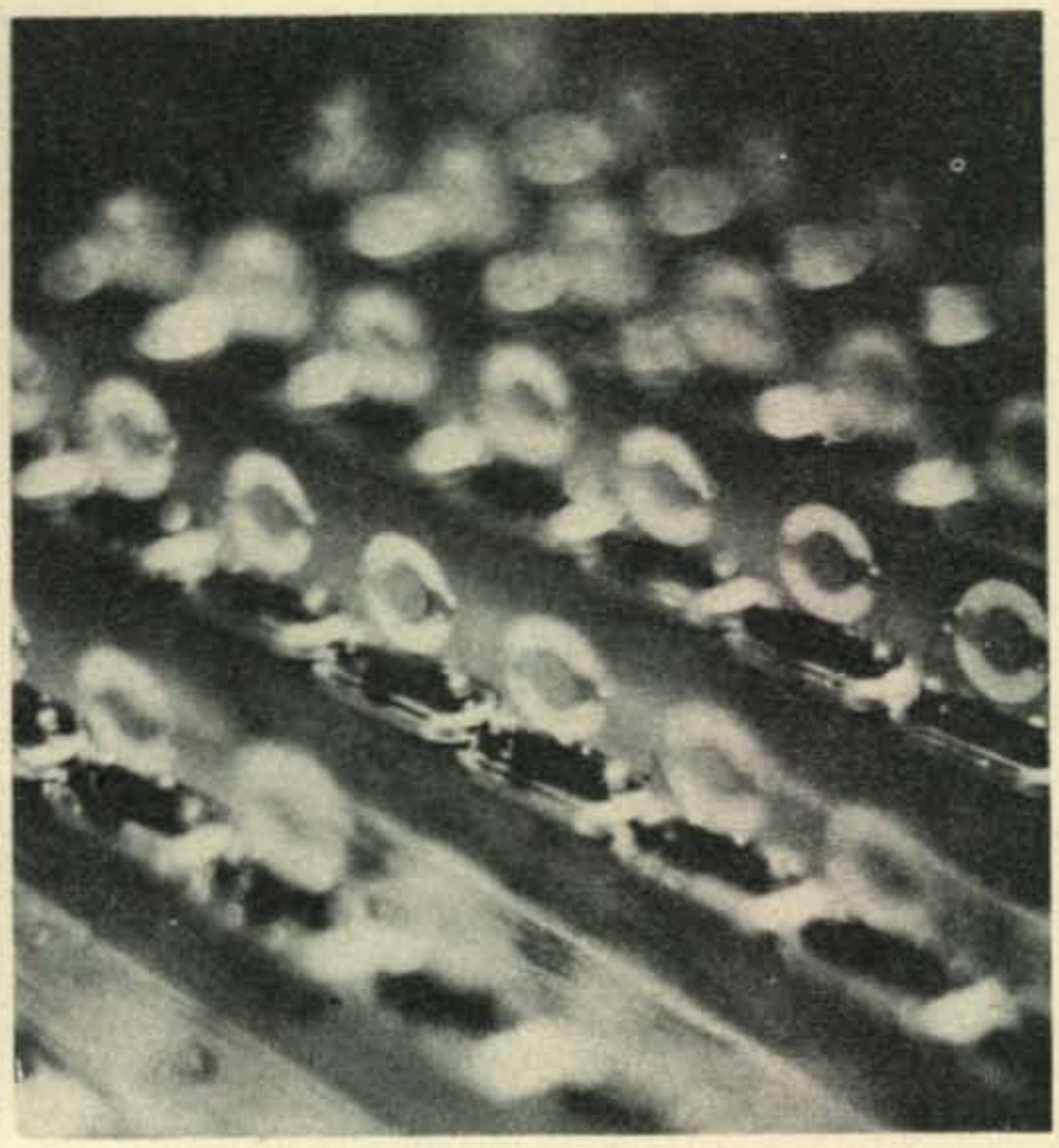
Driving a strange car in a strange city using those maps the car rental places give you is a real experience. At least the drivers in the NYC area don't have gun sights instead of hood ornaments like they do here in Dallas (at least it seems so). After meander-

A few of the tube-type mobiles stacked in Gregory Electronics' showroom.

For those who have spoken to Dave Pearlstone, but never met him in person.

People who know about quality know about Sentry





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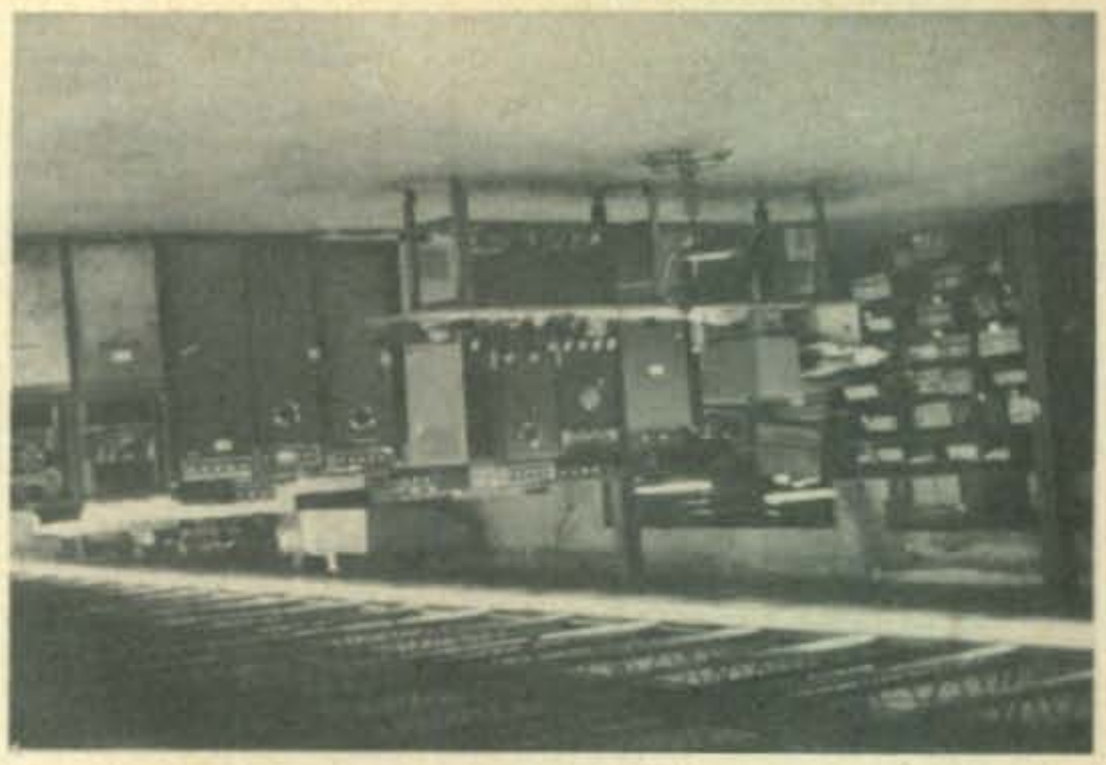
The service and checkout area at Gregory. The test unit is a Gertsch FM10. The area looks well "lived in."



Base Stations anyone?

ing around for about an hour Gregory Electronics was sighted, and the rental auto was parked. After a quick look at the goodies in the main show-room, this columnist was met by Dave Pearlstone, President of Gregory. Dave gave me a complete tour of the facility including warehouse and service areas. The only places where I have seen as many f.m. units are at Motorola Chicago, and in my own warehouse (I think Dave had more units on hand than my own). It is almost impossible to describe everything which I saw. Therefore, going along with the old proverb that "one picture is worth a thousand words" and since Dick Cowan pays by the page, I'll save Dick many bucks and tell the story with photographs, rather than with several thousand words. All in all, the visit was both entertaining and informative.

News

The news section of this column has required less space for several months. This is due primarily to the quarterly updating of the repeater directory instead of publishing repeater frequencies as text each month. However, other items of interest to f.m.'ers including public service, etc. are still carried. Also, when ever any photos are received, a description of that repeater system appears. Keeping with this, here's the scoop on the Genoa, Illinois, 146.130/.730 machine. The system is a split site machine with an output of 310 watts. The receiving site is about 12 miles south of Genoa at Dekalb, Illinois, and the transmitting antenna is on the water tower in Genoa.

Illinois Repeater Council

An organization of repeater organizations in the state of Illinois has been formed. At present the Illinois Repeater Council has member organizations representing over 1500 active f.m. operators. Additional repeater groups are invited to join to facilitate cooperation among repeater groups around the state. For further information have the President or Trustee contact Ray Thill, WA9EXP, P.O. Box 455, Arlington Heights, Illinois 60006, or at 312 253-2058.

Public Service

The disasterous storms and flooding around the United States during late June provided opportunities for amateurs to show their communities what amateur radio is about. Of course we all don't want disasters to happen, but amateurs must be prepared. Although many groups participated in emergency

[*Continued on page 124*]

Attenuation Table for coaxial cable. See F.M. Q & A page 124.

	db Attenuation per 100'				
Type	**50 mHz**	**100 mHz**	**200 mHz**	**300 mHz**	**400 mHz**
RG-8/U & A/U		2.10	3.30		4.50
RG-11/U & A/U		1.90	2.85		4.35
RG-58/U		4.10	6.20		9.50
RG-58A/U & C/U		5.30	8.20		12.60
RG-59/U & B/U	3.75	5.60		8.30	
RG-8/U polyfoam	1.20	1.80	2.60	3.30	3.80
RG-58/U Polyfoam	3.60	4.80	7.60	8.50	10.10
RG-174/U		8.80	13.00		20.00
RG-213/U	Same as	RG-8/U			
RG-214/U	Same as	RG-8/U			
½" foam Heliax	0.48	1.00*			1.95**
⅞" foam Heliax	0.28	0.60*			1.20**
⅞" air Heliax	0.25	0.50*			0.88**

* at 150 mHz. ** at 450 mHz

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Solid State
6 Meter FM
Transceiver

Model HR 6
$239.00
Amateur Net

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Complete dash mount operation . . . does not require black box power hog in your trunk

25 Watts Out

Long Range Signal Capability

12 T and R Channels Independently Switched

144 Frequency Combinations

5 Watts Audio output

Compact for Dash Mount.

SPECIFICATIONS

Power Output:	25 watts Min. @ 13V DC
Frequency Range:	52-54 MHz
Channels:	12 with independent switching
Sensitivity:	.35mv (nom) 20db quieting
Selectivity:	6db ± 16KHz
Audio Output:	5 watts max.
Size:	2⅝" x 6½" x 9½"

State of the art receiver utilizes MOSFET mixer for superior front end overload and intermodulation performance.

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CQ Reviews:

The Heathkit SB-650

Digital Frequency Display

BY WILFRED M. SCHERER,* W2AEF

A NUMBER of digital frequency counters have recently been made available within a price range that will fit the purse of many radio amateurs.[1] Unfortunately, however, these instruments cannot be used as is to provide a direct readout of receiver or s.s.b.-transmitter frequencies without involving the construction of an outboard accessory unit for appropriately combining the equipment oscillator frequencies in order to obtain the necessary readout. This has been a disappointment to those who had contemplated such use for a frequency counter.

Happily, however, the Heath Company has now come up with "just the ticket," at least for users of Heath gear, with the introduction of their Model SB-650 Digital Frequency Display which requires no additional equipment for the job at hand. This unit is designed specifically for use with the Heath equipment such as the SB-series and the 5-Band HW-series. As will be explained later, operation can be had with other gear under certain specific conditions. In addition, the SB-650 can be employed as a conventional counter between 2 and at least 40 mHz.

The unit displays up to six digits for a readout in kHz up to within 100 Hz, ±1 count. Although much of the up-to-date amateur gear is calibrated in 1 kHz increments, the tolerance therewith usually is in the order of 400-1000 Hz due to deviations in the linearity of the equipment's v.f.o. Even use of crystal control throughout a piece of gear is no assurance that the operating frequency is right on the nose, unless adjustments have been made and checked against an accurate frequency indicator.

The electronic digital frequency display thus can be a valuable aid for more precise and rapid frequency indications.[2] Its desirability is even greater with equipment having a non-linear tuning range or calibrations in only 5 or 10 kHz steps. This also should be a boon to the homebrewer where difficulties may be encountered in setting up a linear tuning range (which usually is the case) or making accurate calibrations.

When used with a transceiving setup, the SB-650 automatically indicates the operating frequency of both the receiving and transmitting sections, as the case may be. Where incremental tuning or a c.w.-frequency offset is in use, close check may be easily kept on the transmitting frequency, an especially desirable feature during operation near a band edge.

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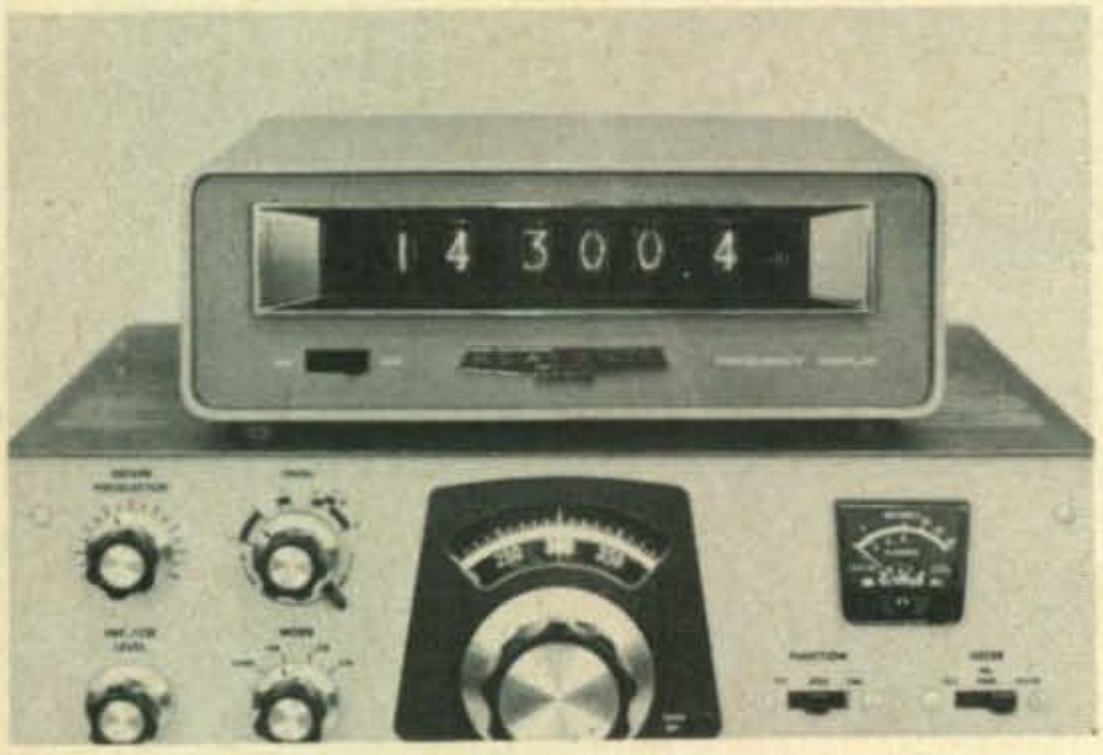
*Technical Director, *CQ*.

[1]Such as the Heath IB-101. See "*CQ* Reviews the Heath Model IB-101 Frequency Counter," *CQ*, July 1971, p. 47.



The Heathkit Model SB-650 Digital Frequency Display shown with an HW-100 Transceiver.

[2]Because of the direct readout, frequencies from a switch position and two dial readings need not be mentally added together by the user.

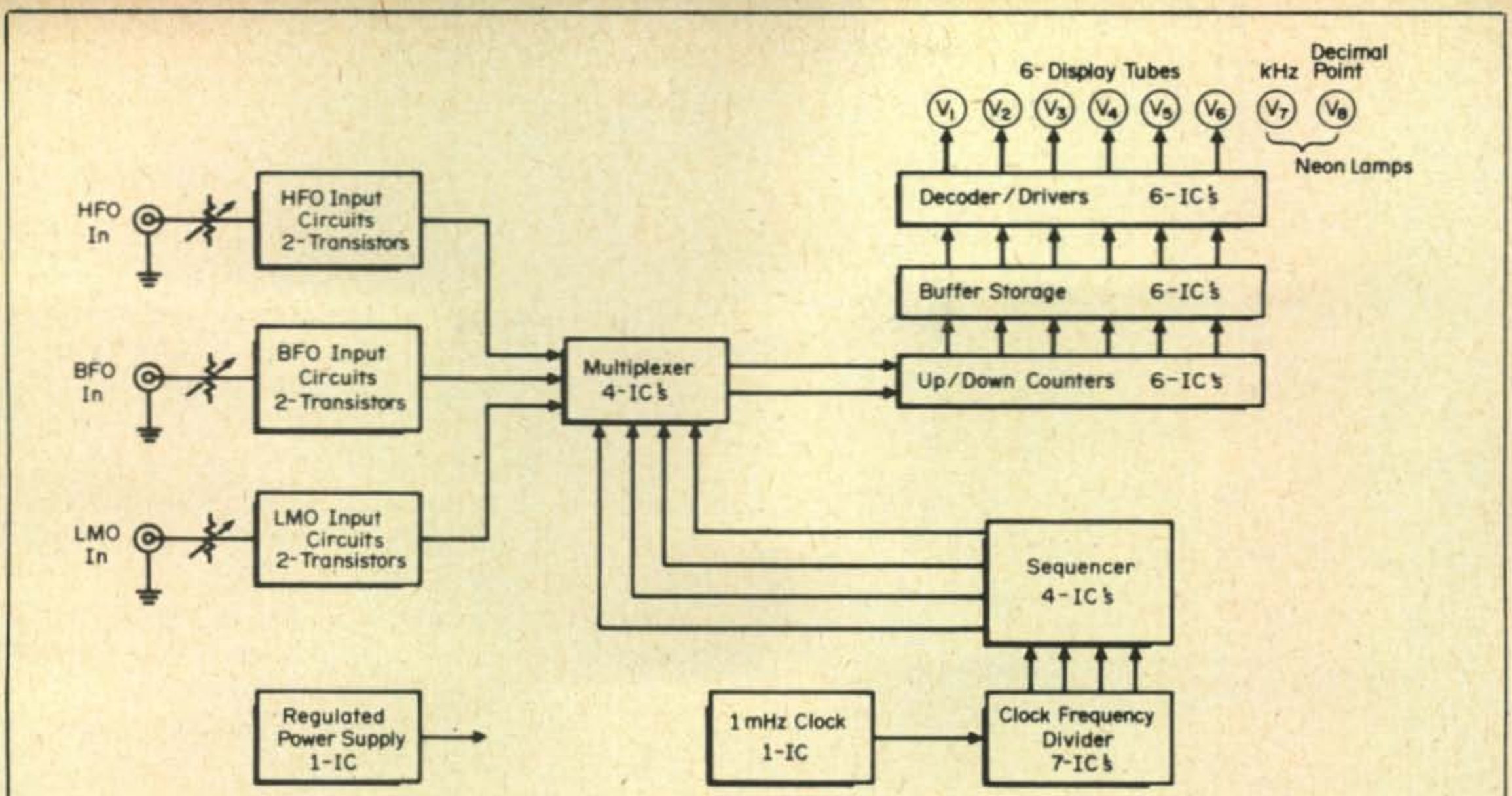


Fig. 1 — Block diagram for the SB-650. General details are explained in the text.

Technical Details

Counters heretofore set up to produce the frequency readout of amateur gear made use of outboard mixers (requiring switching of individually tuned circuits for the various bands) for combining the frequencies of the equipment oscillators, using the sum or difference frequencies as the need dictates, to produce a resultant-frequency output to the counter equivalent to the overall operating frequency to which the gear is tuned.

The Heath unit accomplishes the job in a different manner by the employment of a digital system that counts *up* the frequency of the h.f.o. and counts *down* that of the l.m.o. (or v.f.o.) and the b.f.o. The count-downs of the l.m.o. and b.f.o. are then subtracted from the frequency of the h.f.o. signal which, with the conversion scheme used on the Heath gear, produces an indication of the operating frequency for the equipment.

An example of how this works out with a Heath transceiver tuned to 14325.2 kHz is as follows:

H.f.o.	22,895.0 kHz
B.f.o.	— 3,393.6 kHz
	19,501.4 kHz
L.m.o.	— 5,176.2 kHz
	14,325.2 kHz

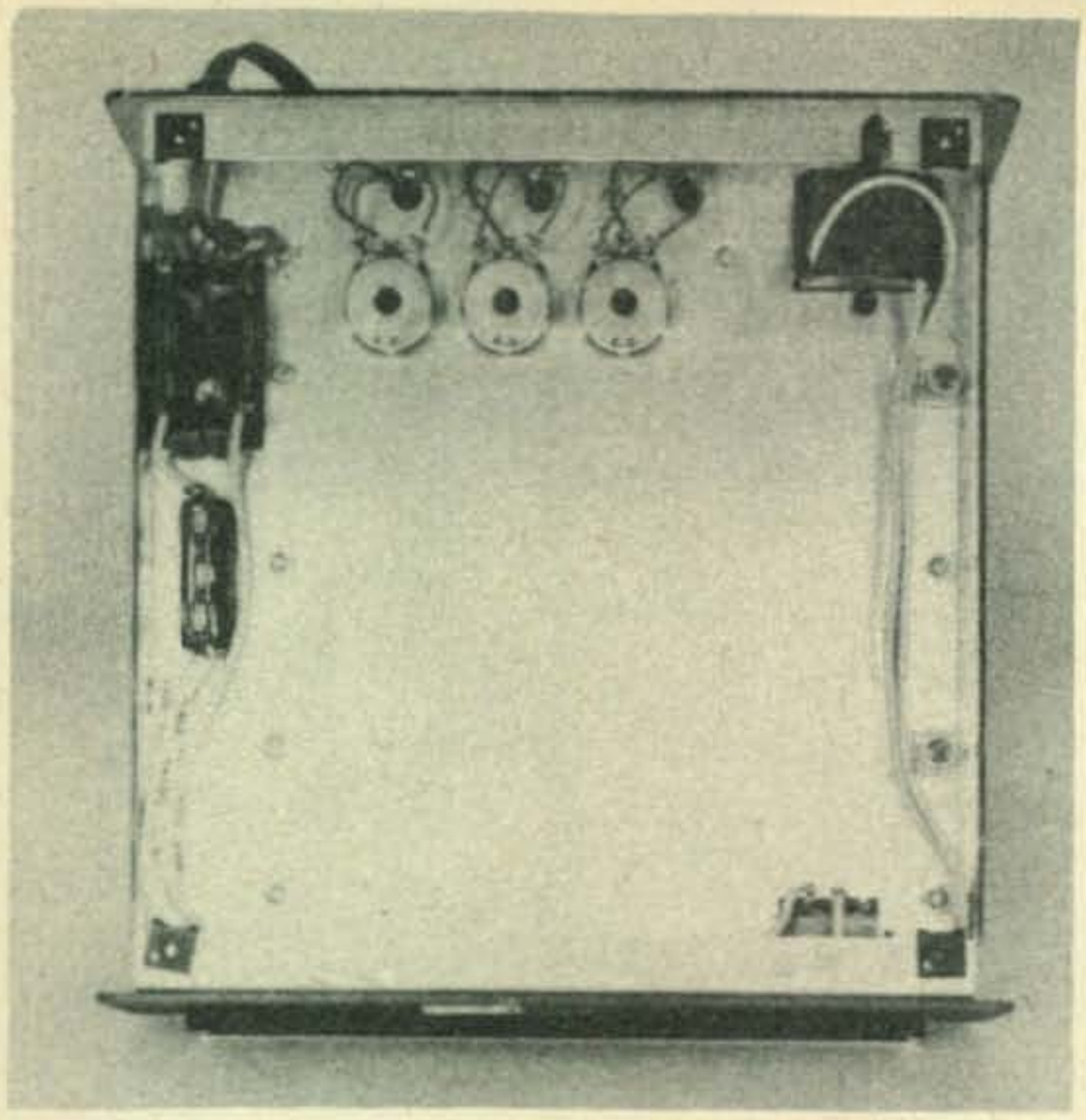
The way this is accomplished is represented by the block diagram at fig. 1. Briefly, the output from each oscillator in the receiving or transmitting equipment is individually amplified by an FET at the SB-650 input circuits where they also are interfaced to digital-logic levels and shaped in a transistor stage. A multiplexer selects each of these signals in the required sequence and routes them through the proper channel to the up/down counters.

Timing is controlled by a 1 mHz crystal-controlled clock-oscillator that drives a frequency-divider chain that has four 6.25 Hz outputs of 40 milliseconds length each. These are applied to the multiplexer through the sequencer which sets up the necessary timing cycles. The first three periods are used for counting each of the h.f.o., l.m.o. and b.f.o. signals up or down, as may be the case. During the last period the summation of these is transferred from the register (where they have been stored) to the usual decoder-drivers and hence to the Nixie display tubes. The total time for each counting cycle is 160 milliseconds, resulting in an updated frequency count of six times per second.

A completely detailed and instructive description of the "workings" is given in the manual.

Construction

The SB-650 employs 6 transistors, 35 IC's, 6 Nixie display tubes and a number of diodes.



Bottom interior view of the SB-650. The three potentiometer controls at the top are used to adjust the drive to the individual inputs.

Neon lamps are used to illuminate a "KHZ" sign and to provide a fixed decimal point at the left of the right-hand digit that indicates the 100 Hz increment.

The unit is assembled on a double-faced printed-circuit board much in the same manner as employed with other Heath digital units, except for one main difference in that assembly and the installation of the IC's is made easier by the employment of actual sockets for the IC's instead of the strips of terminal pins used in the other models.

The circuit board is installed in a frame-type chassis and is subsequently completely enclosed with shielding before installation in a wrap-around case which is styled to match the Heath line of amateur equipment. The size of the unit is 4" x 10" x 10¼" (H.W.D.) and it weighs 4½ lbs. The line cord is attached and the instrument may be wired for 105-125 or 210-250 v.a.c. operation. Power drain is 15 watts.

No particular problems were encountered in putting the job together in a matter of 6½ hours.

Installation

Slight modifications must be made to the receiving or transmitting gear before the display unit is connected. These mostly involve running small-size coax leads from the oscillator-output sections to existing phono jacks at the rear of the related gear, to new jacks to be installed or by bridging such jacks to existing oscillator-output jacks through 100-ohm resistors. In some instances an r.f. choke may have to be installed in a transmitter. All the required material for any of the above modifications for the Heath units is supplied with the SB-650 kit along with complete instructions for doing the job.

Adjustment

After this work has been done and initial tests have been made, the unit is first connected to the l.m.o. output and the related input of the SB-650 is adjusted for a level that produces a stable display. This is done through an access hole in the bottom of the inner shield.

At this time the readout may cause one to wonder, inasmuch as with the 5000-5500 kHz l.m.o. signal it will appear as one in the 94,500 kHz area. The reason for this is that the instrument is not counting up to this frequency, but instead is counting *down* from a zero reference.

The b.f.o. signal is next added at the SB-650 input circuit which is adjusted in a similar manner. Here again a count-down takes place with the indication's appearing as one in the 91,000 kHz region (the sum of the l.m.o. and b.f.o. signals is subtracted from the zero reference).

Finally, the h.f.o. input is set up and adjusted. The readout now indicates the true overall operating frequency of the equipment which is provided by the stored information that is now totalled and applied to the indicating setup.

The h.f.o. section appears to be somewhat dependent on the purity of the input waveform, which in the case of the SB-303 receiver may require a slight readjustment of the receiver's h.f.o. inductors in order to maintain a stable display within the ±1 count (±100 Hz).[3] This situation did not crop up with other models of the Heath amateur gear.

Accuracy also is dependent on that of the 1 mHz time base, the crystal-oscillator circuit for which may be adjusted to frequency against a known standard such as WWV.

Although the photo herewith shows the SB-650 set on top of an HW-100, this is not the recommended location for the device. It should not be placed on top of heat-producing equipment, unless a heat buffer is used underneath it that will not otherwise restrict the airflow around the setup.

Because of the ±1 count reading, during operation the last digit (100 Hz indicator) may thus tend to alternately show up by a differ-

[3]On page 37 of the manual it is stated "NOTE: Be sure to keep the 50-ohm load for later use with your equipment." This implies that the l.m.o. load for the SB-303 has been removed. However, this should not be done, since without the load the l.m.o. stability can be impaired.

DRAKE
MODEL
DSR-1

COMMUNICATIONS RECEIVER

FEATURING . . .

- **Continuous coverage 10 kHz to 30 MHz**
- **Digital synthesizer frequency control**
- **Frequency displayed to 100 Hz**
- **All solid state**
- **AM, SSB, CW, RTTY, ISB**
- **Series balanced gate noise blanker**
- **Price $2195.00**
- **Accessories available to accommodate specific requirements**

SPECIFICATIONS • **Frequency Range:** 10 kHz to 30.0 MHz • **Modes of Operation:** USB, LSB, CW, RTTY, AM, ISB. • **Frequency Readout:** Complete to 100 Hz on six NIXIE tubes. • **Frequency Selection:** 10 MHz, 1 MHz, 0.1 MHz switch selected. 0 to 0.1 MHz continuously variable. • **Frequency Stability:** Frequency drift less than 200 Hz in any 8 hour period at constant ambient temperature between 0° to 40° C and constant line voltage after 1 hour warm up. • **BFO:** Derived from 5 MHz standard oscillator or variable ±3 kHz from front panel. • **Sensitivity: 0.01 - 0.5 MHz:** Less than 4 μV for 10 dB SINAD at 2.4 kHz SSB mode. Less than 25 μV for 10 dB SINAD at 6 kHz AM mode with 30% modulation. **0.5 - 30 MHz:** Less than 0.3 μV for 10 dB SINAD at 2.4 kHz SSB mode. Less than 2.0 μV for 10 dB SINAD at 6 kHz AM mode with 30% modulation. • **Image Rejection:** Greater than 70 dB relative to 1 μV below 10 MHz. Greater than 60 dB relative to 1 μV above 10 MHz. • **Blocking:** Greater than 100 dB relative to 1 μV. • **Crossmodulation:** 70 dB relative to 1 μV. • **Intermodulation:** 70 dB relative to 1 μV. • **Opposite Sideband Suppression:** Greater than 60 dB at 500 Hz into the opposite sideband. • **I.F. Band-width:** 6 kHz, 2.4 kHz, 1.2 kHz, 0.4 kHz; Selectivity @ -6 dB: 6 kHz, 2.4 kHz, 1.2 kHz, 0.4 kHz; @ –60 dB: 11.5 kHz, 4.3 kHz, 2.4 kHz, 0.8 kHz; Optional filters available for other bandwidths. • **Automatic Gain Control:** Audio output rises less than 3 dB for RF input change of 1 μV to 100 mV. Attack Time: 100 μs Release Time: 750 ms (slow AGC), 25 ms (fast AGC) • **Antenna Input Impedance:** 10 kHz to 500 kHz 1000 ohms, 500 kHz to 30 MHz 50 ohms • **Audio Output:** 2 watts at 5% max. distortion into 4 ohm load. 4 ohm unbalanced and two 600 ohm balanced outputs. ISB output is one of the two 600 ohm balanced outputs. • **Audio Hum and Noise:** Greater than 60 dB below rated output. • **Power:** 115/230 volts ±10% single phase 50-420 Hz 15 watts. • **Dimensions:** 5.25 in. H x 19 in. W. x 15 in. D (13.3 cm H x 48 cm W x 38 cm D) 17 lbs. (7.7 kg)

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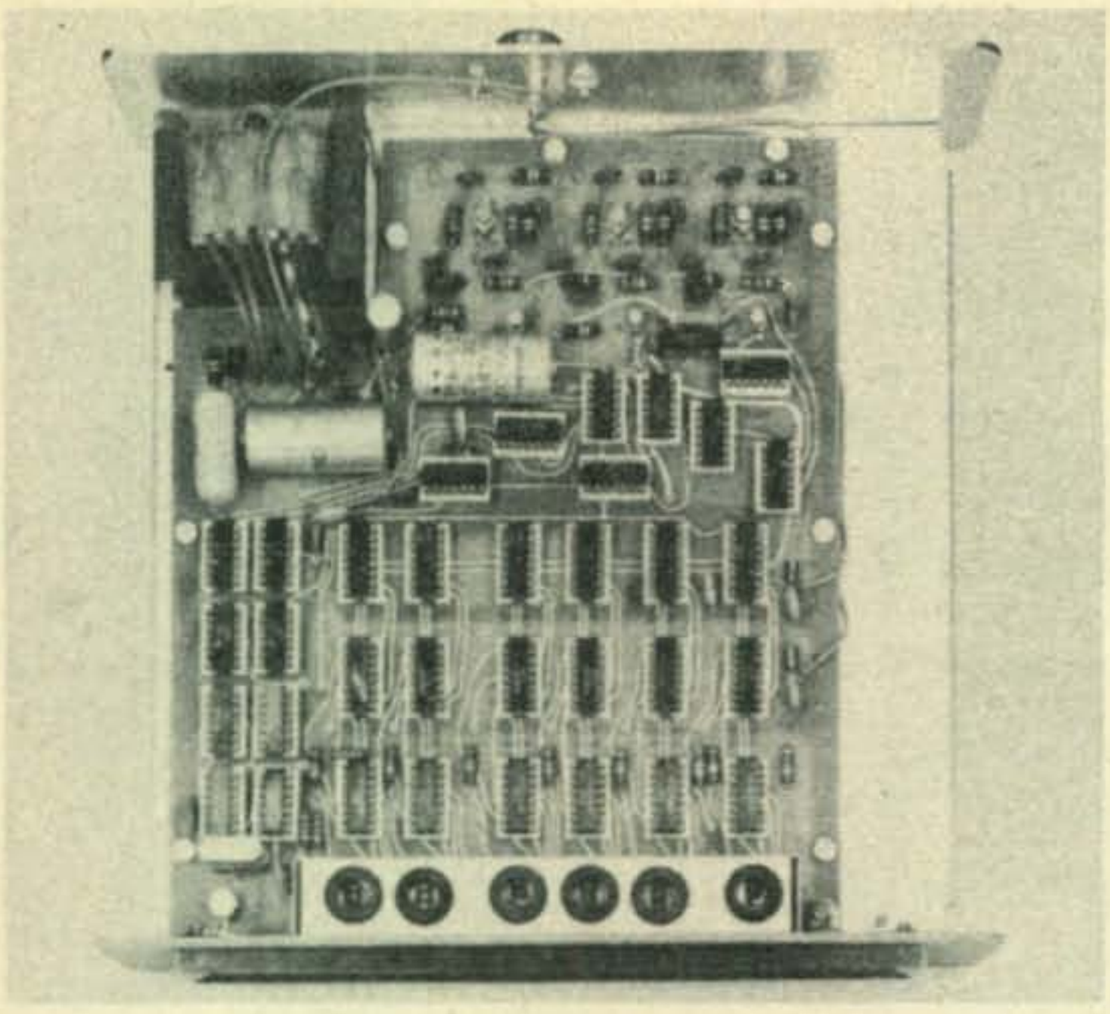


Top interior view of the SB-650. Rubber grommets at the top of a metal shield in the foreground press down on the top of the display tubes and thus maintain them in a neat upright position. The job otherwise mainly consists of the 35 IC's.

ence of the 1 count.[4] Also, it should be noted that the readout indicates the frequency to which the receiver is tuned, in which case a received signal will be of the same frequency; provided, the receiver is tuned to zero beat with the signal. This is relatively easy to do with an s.s.b. signal that is tuned in for natural voice quality. Due to the drop in low frequency a.f. response when a sharp filter is used for c.w., zero beat therewith may be more difficult to ascertain. The frequency of an a.m. signal must be determined by the zero-beat method with the b.f.o. on; otherwise, with the b.f.o. off, the frequency readout will be high by an amount equal to the frequency of the last i.f.[5]

The imput impedance is 2000 ohms with a maximum allowable input-signal level of 5 v. r.m.s. Frequency range is specified as 3-40 mHz. Internally generated spurious frequencies are rated as approximately 0.25μv equivalent level, none of which showed up in the related equipment during tests.

Use With Other Gear

The manual states that no information is available on engaging the SB-650 with equipment other than the Heath line. Nevertheless, for those interested in such a procedure, it should be possible to accomplish this with single-or double-conversion gear[6] where the frequency of the h.f.o. is *higher* than that of the signal frequency and where the frequency of the h.f.o. *minus* the sum of that of the other oscillators equals that of the signal frequency. For single-conversion units this is $f_{hfo} + f_{bfo} = f_{sig}$; for double conversion it is: $f_{hfo} - (f_{vfo} + f_{bfo}) = f_{sig}$.

Another requisite is that provisions be made to obtain sufficient output from the various oscillators and that they not be loaded down or otherwise affected by the input circuits to the SB-650. This may require buffer or cathode-follower stages.

Operation thus should be possible with Collins[7] gear and the Drake R4B Receiver. Use with Swan units would be limited to only the 3.5 mHz band. Although the conversion setup with the Swan jobs is okay for 7 mHz use with the SB-650, it will not work out because the 2nd harmonic of the h.f.o. is used for heterodyning on this band and the fundamental signal is stronger than the harmonic at the required output point, causing the display unit to count the fundamental frequency instead of the heterodyning harmonic. On the other bands the h.f.o. is on the low side of the signal frequency, in which case the summation of the oscillator frequencies will be incorrect. The conversion scheme of the Yaesu-Musen gear is not suitable for use with the display unit.

Where the h.f.o. is a 5-5.5 mHz v.f.o. used with a 9 mHz i.f. for single conversion on the 3.5 and 14 mHz bands, the display will indicate correctly for only the 3.5 mHz band, because on the 14 mHz band the v.f.o. is *lower* in frequency than the signal. A similar situation exists with a 9 mHz v.f.o. and a 5 mHz i.f.[8]

In cases where the last i.f. is at 50 kHz, the 50 kHz b.f.o. output level to the SB-650 would have to be a matter of *volts*, since only 47 mmf coupling capacitors are used at the b.f.o.-input

[*Continued on page 126*]

[4] When the frequency of the equipment is well within the 100 Hz tolerance, the last digit for this usually will remain fixed.

[5] When the b.f.o. is on in conjunction with a product detector, the receiver may readily be set on the nose with an a.m. signal by tuning it in for natural voice quality as with s.s.b.

[6] As is, the unit cannot be employed with triple-conversion gear.

[7] In the Collins gear on bands above 12 mHz the 2nd harmonic of the h.f.o. crystals is used. Care thus must be taken to ensure that only the harmonic will be applied to the SB-650 in order to eliminate the possibility of an erroneous count due to the fundamental frequency.

[8] This rules out use of the SB-650 on 14 mHz with the Drake TR-4 Transceiver and the Hallicrafters SX-146 Receiver. Operation with these pieces of gear should be otherwise possible on the other bands.

Rules: 1972 *CQ* World-Wide DX Contest

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

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

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

III. TYPE OF COMPETITION: 1 Single Operator. Single Band & All Band.

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

NOTE CHANGE

a. Single Transmitter (only one transmitter and one band permitted during the same time period (defined as 10 minutes). *Exception:* Stations may be worked on different bands during the same time period only if they are new multipliers.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

IX. TROPHIES & PLAQUES: Handsome trophy awards will be made to the highest scoring stations in the following categories.

Single Operator, Single Band Trophy Donors

1. World—Phone *(Dr. Harold Megibow, K2HLB Memorial — North Jersey DX Assoc.)*
2. World—C.W. *(Earl Lucas, W2JT Memorial —North Jersey DX Assoc.)*
3. Canada—Phone *(Gene Krehbiel, VE6TP)*
4. Carib./C.A.—Phone *(G. Kuether, HR2GK)*
5. So. America—Phone *(Brazil DXers)*

Single Operator, All Band Trophy Donors

6. World—Phone *(Bill Leonard, W2SKE)*
7. World—C.W. *(Larry LeKashman, W9IOP)*
8. USA—Phone *(Potomac Valley Radio Club)*
9. USA—C.W. *(Frankford Radio Club)*
10. Canada—Phone *(Jack Baldwin, VE3BS)*
11. Europe—Phone *(W4BVV Operators)*
12. Europe—C.W. *(W3AU Operators)*
13. Carib./C.A.—Phone *(Harold Fox, W3AA)*
14. Carib./C.A.—C.W. *(Harold Fox, W3AA)*
15. Africa—Phone *(Gordon Marshall, W6RR)*
16. Africa—C.W. *(Gordon Marshall, W6RR)*
17. Asia—Phone *(Japan CQ Magazine)*
18. Asia—C.W. *(Japan CQ Magazine)*
19. Oceania—Phone *(No. Calif. DX Club)*
20. Oceania—C.W. *(Maui A.R.C.)*

Multi-Operator, Single Trans. Trophy Donors

21. World—Phone *(John Knight, W6YY)*
22. World—C.W. *(Anthony Susen, W3AOH)*
23. Canada—Phone *(Calgary A.R.A.)*

Multi-Operator, Multi Trans. Trophy Donors

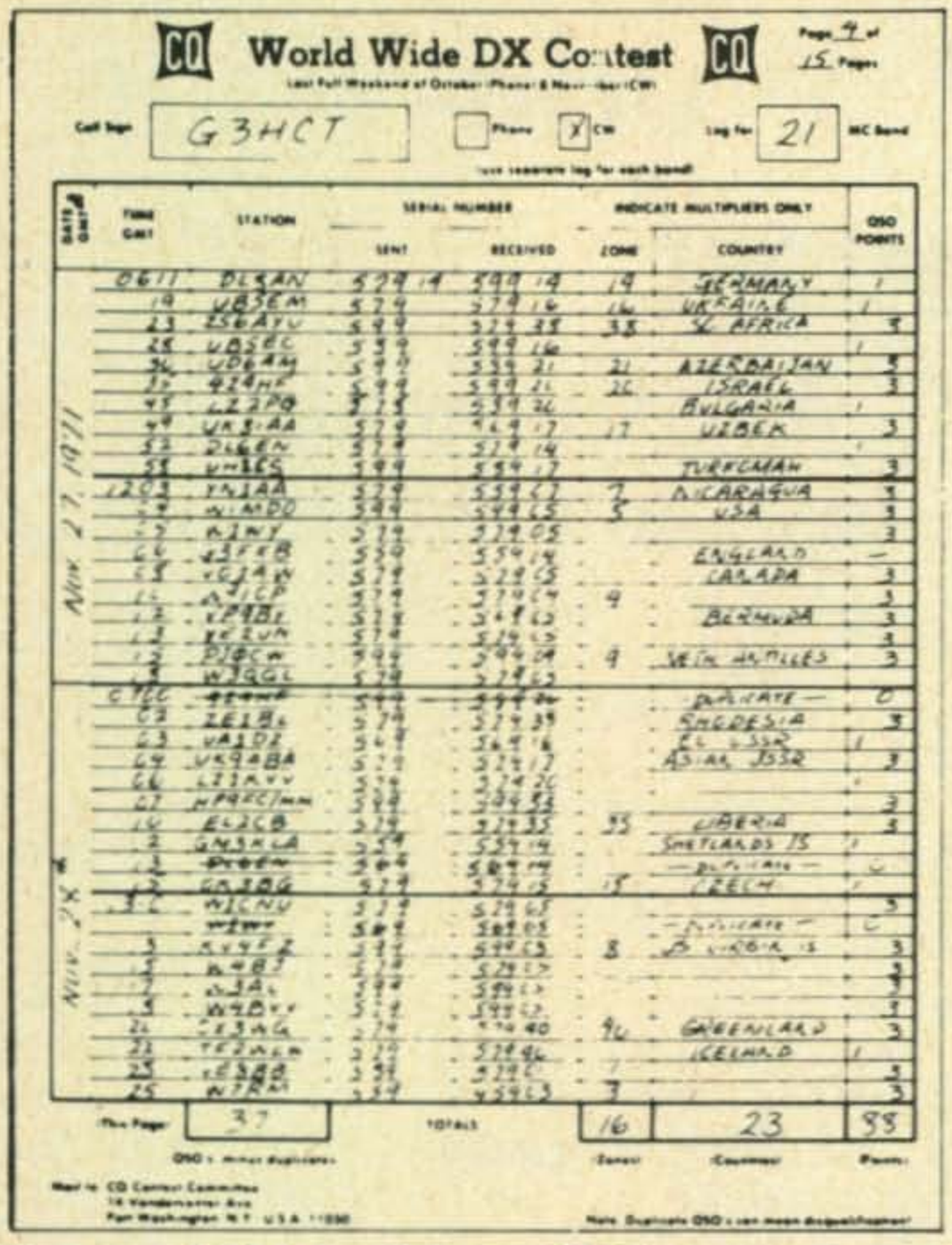
24. World—Phone *(Radio Club Venezolano)*
25. World—C.W. *(Hazard Reeves, K2GL)*

Contest Expedition Trophy Donors

26. World—Phone *(Stuart Meyer, W2GHK)*
27. World—C.W. *(Donald Miller, W9WNV)*

CQ will award championship plaques to stations ineligible for a trophy.

Trophy winners may win the same trophy



CQ World Wide DX Contest CQ

Page 4 of 15 Pages

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

Call Sign G3HCT ☐ Phone ☒ CW Log for 21 MC Band

Use separate log for each band

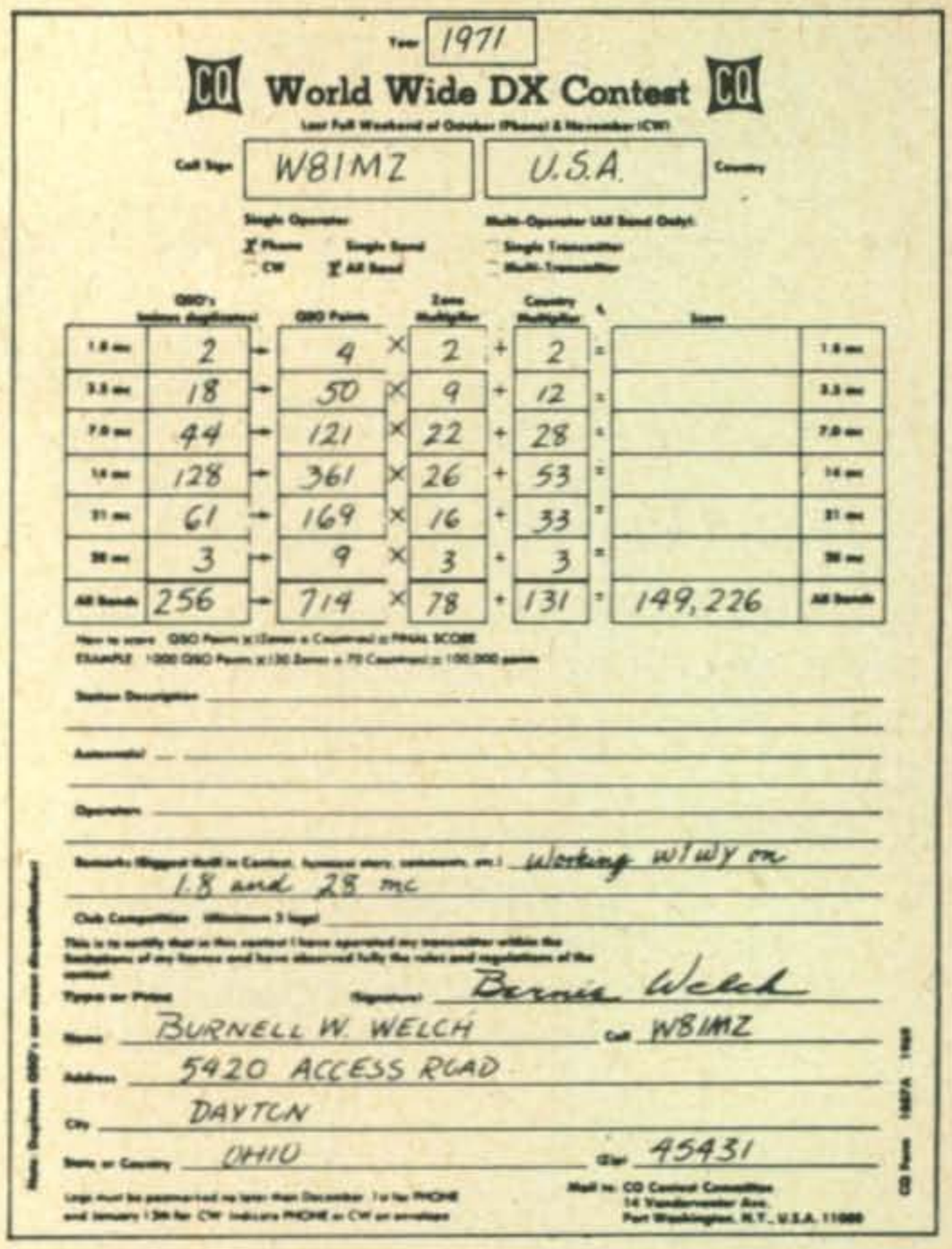
DATE GMT	TIME GMT	STATION	SERIAL NUMBER SENT	SERIAL NUMBER RECEIVED	INDICATE MULTIPLIERS ONLY ZONE	INDICATE MULTIPLIERS ONLY COUNTRY	QSO POINTS
	0611	DL8AN	579 14	599 14	14	GERMANY	1
	19	UB5EM	579	579 16	16	UKRAINE	1
	23	ZS6AYU	599	579 33	38	S. AFRICA	3
	28	UA9EC	599	599 16			1
	34	UD6AM	599	599 21	21	AZERBAIJAN	3
	35	4X4HF	599	599 21	20	ISRAEL	3
	45	LZ2PO	579	599 26		BULGARIA	1
	49	UA9AA	579	569 17	17	UZBEK	3
	52	DL6EN	579	579 14			1
	55	UM8CS	599	599 17		TURKOMAN	3
	1203	YN1AA	579	559 07	7	NICARAGUA	3
	09	W1MDO	599	599 05	5	USA	3
	12	W2NY	579	579 05			3
	16	G3FEB	559	559 14		ENGLAND	—
	18	VE1AW	579	579 05		CANADA	3
	21	W1CP	579	579 04	4		3
	23	KP4BL	579	569 03	4	BERMUDA	3
	23	KE2UN	579	579 03			3
	25	PI4CM	599	599 09	9	NETH. ANTILLES	3
	8	W3QGL	579	579 03			3
	0900	[illegible]	599	599 [illegible]		[illegible]	0
	03	ZE1BG	579	579 39		RHODESIA	3
	23	UA1DZ	569	569 16		EU-USSR	1
	24	UK9ABA	579	579 17		ASIAN USSR	3
	26	LZ1AYV	579	579 26			1
	27	HP1CC/mm	599	599 53			3
	14	EL2CB	579	579 35	33	LIBERIA	3
	2	GM3KLA	559	559 14		SHETLANDS IS	1
	3	[illegible]	569	589 19		— DUPLICATE —	0
	12	OK1DG	579	579 15	15	CZECH	1
	12	W1CNU	579	579 05			3
		W1MK	589	589 05		— DUPLICATE —	0
	3	KV4FZ	599	599 03	8	B. VIRGIN IS	3
	5	W4BJ	579	579 17			3
	7	W3AL	599	599 13			3
	8	W4BVY	579	599 13			3
	24	OZ3HG	579	579 40	14	GREENLAND	3
	27	TF2WGB	579	579 04		ICELAND	1
	25	VE3BR	599	579 [illegible]	7		3
	25	W1RM	599	599 03	3		3
		This Page: 37		TOTALS	16	23	99

QSO's (Minus Duplicates) — Zones — Countries — Points

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

Note: Duplicate QSO's not counted/signed/signed

A *sample log page*—40 QSO's to a page. You may work your own country for multiplier credit, but receive NO QSO points. Logs must be checked for correct point credit and duplicate QSO's.



Year 1971

CQ World Wide DX Contest CQ

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

Call Sign W81MZ U.S.A. Country

Single Operator — Multi-Operator (All Band Only)

☒ Phone ☐ CW — Single Band ☒ All Band — ☐ Single Transmitter ☐ Multi-Transmitter

	QSO's (minus duplicates)		QSO Points		Zone Multiplier		Country Multiplier		Score	
1.8 mc	2	→	4	×	2	+	2	=		1.8 mc
3.5 mc	18	→	50	×	9	+	12	=		3.5 mc
7.0 mc	44	→	121	×	22	+	28	=		7.0 mc
14 mc	128	→	361	×	26	+	53	=		14 mc
21 mc	61	→	169	×	16	+	33	=		21 mc
28 mc	3	→	9	×	3	+	3	=		28 mc
All Bands	256	→	714	×	78	+	131	=	149,226	All Bands

How to score: QSO Points x Zones x Countries = FINAL SCORE

EXAMPLE: 1000 QSO Points x 30 Zones x 70 Countries = 100,000 points

Station Description: _____

Antenna(s): _____

Operators: _____

Remarks (Biggest Rush in Contest, humorous story, comments, etc.): Working W1WY on 1.8 and 28 mc

Club Competition (Minimum 3 logs): _____

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

Typed or Print — Signature: Burnie Welch

Name: BURNELL W. WELCH Call: WB1MZ

Address: 5420 ACCESS ROAD

City: DAYTON

State or Country: OHIO Zip: 45431

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

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

CQ June 1972

A *sample summary sheet*. Free summary sheets, log pages and zone maps may be obtained upon receipt of a large s.a.s.e. or, if outside the U.S., sufficient IRC's. When you send in your score... include photos.

only once within a three year period. (This does not apply to any of the *CQ* plaque awards).

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

X. CLUB COMPETITION: *CQ* will award a handsome plaque to the club submitting the highest aggregate score of the phone and c.w. scores submitted by its members.

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

2. Participation is limited to members operating within a local geographic area, (except for DX-peditions especially organized for operation in the contest and manned by members.

3. To be listed, a minimum of 3 logs must be received from a club and an officer of the club must submit a list of participating members and their scores, both on phone and c.w.

4. Participating members must indicate the name of their club on their Summary Sheets.

XI. LOG INSTRUCTIONS: 1. All times must be in GMT.

2. Indicate zone and country multiplier only the FIRST TIME it is worked on each band.

3. Logs must be checked for duplicate contacts, correct QSO points and multipliers, and recopied logs must be in their original form with corrections clearly shown.

4. Use a separate sheet for each band.

5. Each entry must be accompanied by a Summary Sheet showing all scoring information, category of competition, contestant's name and address in BLOCK LETTERS and a signed declaration that all contest rules and regulations for amateur radio in the country of operation have been observed.

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

If official forms are not available, make up your own by following the samples shown, 40 contacts to the page on 8½" × 11" paper.

XII. DISQUALIFICATION: Violation of amateur radio regulations in the country of the contestant, or the rules of the contest, unsportsmanlike conduct; taking credit for duplicate contacts; incorrect QSO's or incorrect multipliers will be deemed sufficient cause for disqualification.

Disqualification can also result in the disqualified operator(s) being barred from competition in all *CQ* contests for a period of up to three years.

Actions and decisions of the *CQ* Contest Committee are official and final.

NOTE CHANGE

XIII. DEADLINE: All entries must be postmarked NO LATER than December 1, 1972 for the Phone section and January 15, 1973 for the C.W. section. In rare isolated areas the deadline will be made more flexible. Indicate phone or c.w. on envelope. Logs go to:

CQ WW Contest Committee
14 Vanderventer Avenue,
Port Washington, L.I., N.Y. USA 11050

(Please circulate this information to your DX friends and radio clubs)

GREGORY ELECTRONICS CORP.

The FM Used Equipment People.

249 Route 46, Saddle Brook, New Jersey 07662/(201) 489-9000

GREGORY ELECTRONICS CORP.

249 Route 46, Saddle Brook, N.J.07662
(201) 489-9000

1973 CATALOG

Headquarters for quality-certified used two-way mobile communications equipment.

Hours: Mon.-Fri. 8:30 A.M.-5 P.M., Sat. 9 A.M.-1 P.M. Closed legal holidays.

Is there anything you need - and do not see in this catalog? Call Mike Dolgas at (201) 489-9000 for personalized service.

All radio units where sales price exceeds $45 operationally checked on our test benches. Equipment under $45, not subject to check out or tuning but will be physically complete.

We'll refund purchase price (less freight charges) within 5 days of receipt of merchandise, if not satisfactory - except for crystals and tuning.

TERMS: 25% with order, balance on delivery. Prices are F.O.B. Saddle Brook, N.J., all equipment subject to prior sale .

SPECIAL 5% DISCOUNT on purchases of $500 or more.

Note: Accessories consist of speaker, microphone, cables and control head. Fuse block relay will be included if available. No crystals or antenna included. Base Stations and Remote Control units are sold MINUS microphones.

Add $50 to the basic price of a high band or UHF unit for tuning to desired frequency, including new antenna.

Add $55 to the basic price of a low band unit for tuning to desired frequency, including new antenna.

For 250 watt units, add $100 for crystals and tuning.

MINIMUM ORDER (exc. manuals).....$10.
NEW SHIPMENTS ARRIVE WEEKLY.

Gregory Electronics does not install equipment. All sales are subject to acceptance in the State of New Jersey and are deemed to be made in the State of New Jersey.

INDEX PAGE

GREGORY ELECTRONICS CORP.

GREGORY ELECTRONICS EQUIPMENT CHECKED OUT ON OUR BENCHES

GENERAL ELECTRIC PROGRESS LINE
2-WAY MOBILE UNITS 30-50 MHz
Specify frequency range when ordering.

14" or 17" case, complete accessories, fully narrow banded

MA/E13, 6/12 volt, 30 watts, vibrator power supply . . . $68.

MA/E16, 6/12 volt, 60 watts, vibrator power supply. . . $98.

MD/Y16 6/12 volt, 60 watts, dynamotor power supply..... $78.

MT/13 12 volt, 30 watts, transistor power supply $118.

MT/16 12 volt, 60 watts, transistor power supply.....$178.

MT/17 12 volt, 100 watts, transistor power supply.....$218.

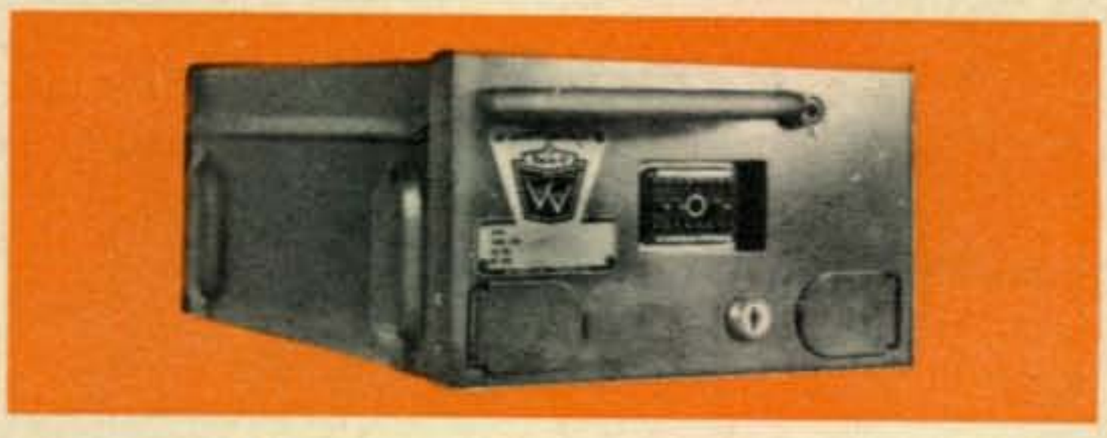
GE Pacers 25-50 MHz
Front mount transistor power
15-18 watt, 12 volt complete..... $98.

General Electric FE52 series TPL, 12 volt, 35 watts, front mount..... $198.

General Electric Pre-Progress 4ER6
Receiver ET5 or ET6
Transmitter 30 watts - 50 watts (as available)
6 or 12 volts, 40-50 MHz,
with available accessories .....$25.

30-50 MHz MOBILE UNITS
MOTOROLA
Specify frequency range when ordering.

Motorola T41GGV 30-50 MHz
6/12 volt, 30 watts, vibrator power supply, fully narrow band, complete with accessories.....$88.
Same as above, T41G series..... $78.



D41GGV, front mount. 40-50 MHz, fully narrow band, 30 watts.....$78.

Motorola U41GGT, 40-50 MHz, 12 volt, 30 watt transistorized power supply, narrow band, complete with accessories..... $168.
Private line, if available, add..... ..$35.

Motorola U51GGT, 40-50 MHz, 12 volt, 60 watts transistorized power supply. narrow band, complete with accessories.....$188.
Private line, if available, add..... ....$35.

GREGORY ELECTRONICS CORP.

SEE GREGORY ELECTRONICS PROGRESS LINE STRIPS IN THIS CATALOG!

MOTOROLA MOTRAC UNITS
(Subject to availability.)
Specify frequency range when ordering.

Motorola Motrac, 25-50 MHz
U41HHT, 12 volt, 30 watt transistorized
power and receiver supply.
Complete with accessories..... $288.
With "Private Line", less reeds. if
available, add.....$45.

Motorola Motrac U51HHT, 25-50 MHz,
12 volt, 60 watts, fully transistorized
receiver and power supply, with
complete accessories..... $308.
With "Private Line", less reeds. if
available. add..... $45.

Motorola Motrac U71HHT, 25-50 MHz,
12 volt, 100 watts, fully transistorized
receiver and power supply, with
complete accessories..... $388.
With "Private Line", less reeds. if
available, add..... $45.

Motorola X41GGV special, consists of
regular T41GGV, narrow band transmitter
and wide band receiver plus 150-170 MHz
narrow band receiver in 15" case,
including accessories.....$108.

Motorola T31BAT 30-50 MHz Motorcycle
Dispatcher, transistorized receiver and
power supply, 6 volt, 12 watt, complete
with accessories, including
metal housing..... $78.
T31AAT (same as above)..... $58.

Motorola T51G Series,
40-50 MHz, vibrator
power supply
TX narrow band
RX wide band. ..... $68.
fully narrow band
(TX and RX)..... $78.

Motorola T51GGV 40-50 MHz
vibrator power supply,
TX narrow banded
RX wide band ..... $78.
Fully narrow band
(TX and RX)..... $88.

Above prices include
accessories. (Less access-
ories, deduct $20.)

Motorola FMTR140D, 6 or 12 volt,
60 watt, wide band,
dynamotor power supply..... $34.
Transmitter narrow band..... $44.
Fully narrow band..... $54.
Complete with accessories. (Less
accessories, deduct $10.)

Motorola T61GJD 40-50 MHz, 100 watt,
complete with accessories TX narrow
band, RX wide band,
dynamotor power supply..... $88.
Less accessories..... $68.

GREGORY ELECTRONICS CORP.

SEE GREGORY ELECTRONICS
ANTENNA SYSTEMS IN THIS CATALOG!

25-54 MHz MOBILE UNITS
RCA

RCA CMF40, 25-54 MHz, 6/12 volt, vibrator power supply, fully narrow banded, complete accessories..... $88.

RCA CMF100, 25-54 MHz, 6/12 volt, dynamotor power supply, complete accessories, fully narrow banded.....$88.

RCA CMFT50, 25-54 MHz, 12 volt, 50 watt, transistorized power supply, partially transistorized RX, fully narrow band with accessories..... $168.

RCA Supercarfone CMFA50 25-54 MHz 12 volt, 50 watts, all solid state except for final tubes, with integrated accessories and handset..... $268.
With quiet channel, less reeds..... $45.

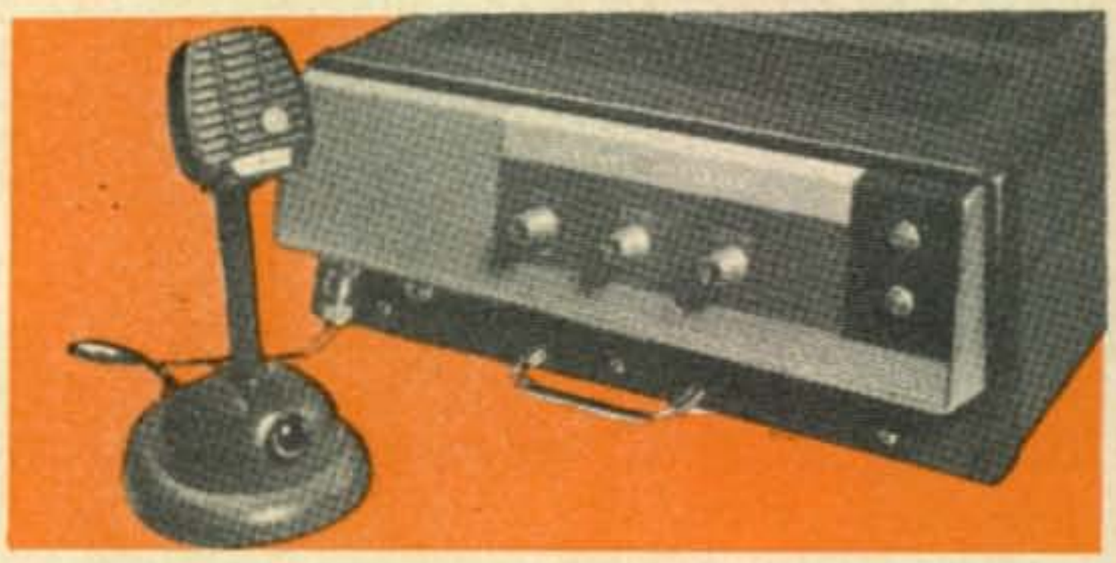
RCA Supercarfone CMFA100 25-54 MHz 12 volt, 100 watts, All solid state except for final tubes, complete accessories..... $348.
With quiet channel, less reeds add... $45.

30-50 MHz BASE STATIONS
GENERAL ELECTRIC

Specify frequency range when ordering.

FI/13N Progress Line, 110 volt, AC, table top, 30 watt base, fully narrow band.....$228.

FI/16N Progress Line, 110 volt, AC, table top, 60 watt, fully narrow band..... $258.



TI/13N Progress Line, 110 volt, AC, table top, 30 watt, fully narrow band.....$258.

TI/16N Progress Line, 110 volt, AC, table top, 60 watt, fully narrow band.....$288.

DO16 Progress Line, 110 volt, AC, Desk-Mate, 60 watt, fully narrow band.... $298.

DO17 Progress Line, 110 volt, AC, Desk-Mate, 100 watt, fully narrow band... $338.

VO17 Progress Line, 110 volt, AC, 100 watts, upright, fully narrow band..... $318.

PO17 Progress Line, 110 volt, Pole Mount, 100 watt, fully narrow band.. $318.

VO18 Progress Line, 110 volt, AC, upright 250 watt, fully narrow band..... $388.

NOW...SEE OUR PROGRESS LINE STRIPS...IN THIS CATALOG

GREGORY ELECTRONICS CORP.

GREGORY ELECTRONICS EQUIPMENT CHECKED OUT ON OUR BENCHES

MOTOROLA 30-50 MHz BASE STATIONS

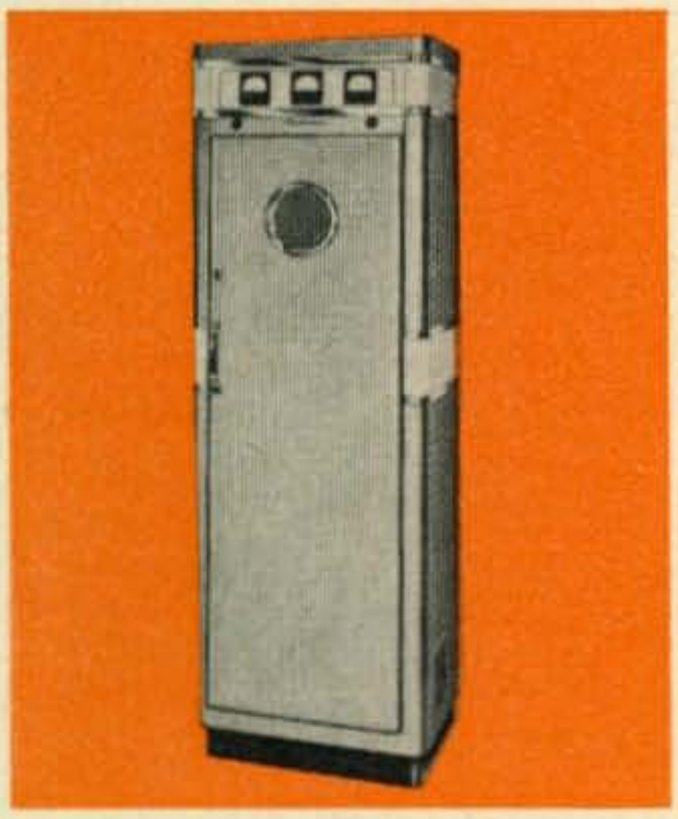
Specify frequency range when ordering.

Motorola FMTR41B, 40-50 MHz,
110 volt, 10 watt..... $48.

FSTR140, 40-50 MHz,
110 volt, 60 watt,
weatherproof cabinet,
fully narrow band..... $158.

J51AAB, 40-50 MHz,
110 volt, AC, 50 watt, weatherproof
cabinet, fully narrow band..... $188.

B-61AAB, 40-50 MHz,
110 volt, AC, upright cabinet, 250 watt,
fully narrow band..... $388.



FSTR520BR, 40-50 MHz, 110 volt, AC,
upright cabinet, 250 watt,
TX narrow band..... $298.

150-170 MHz MOBILE UNITS GENERAL ELECTRIC PROGRESS LINE

14" or 17" case, complete accessories,
fully narrow banded

MA/E33
6/12 volt, 30 watts,
vibrator power
supply..... $98.

MU33 24 volt, 30 watt, narrow band mobile,
for 24 volt primary
power application..... $88.

FA/E33, 6/12 volt, 30 watts, vibrator
power supply, front mount.....$88.

MA/E36, 6/12 volt, 60 watts,
vibrator power supply.. $128.

MT/33, 12 volt, 30 watts,
transistor power supply..... $178.

MT/36, 12 volt, 60 watts,
transistor power supply.....$208.

G. E. Transistorized Progress Line
TPL FE53JA6, 12 volt, 35 watt, front
mount mobile,
with accessories..... $198.

148-174 MHz MOBILE UNITS MOTOROLA

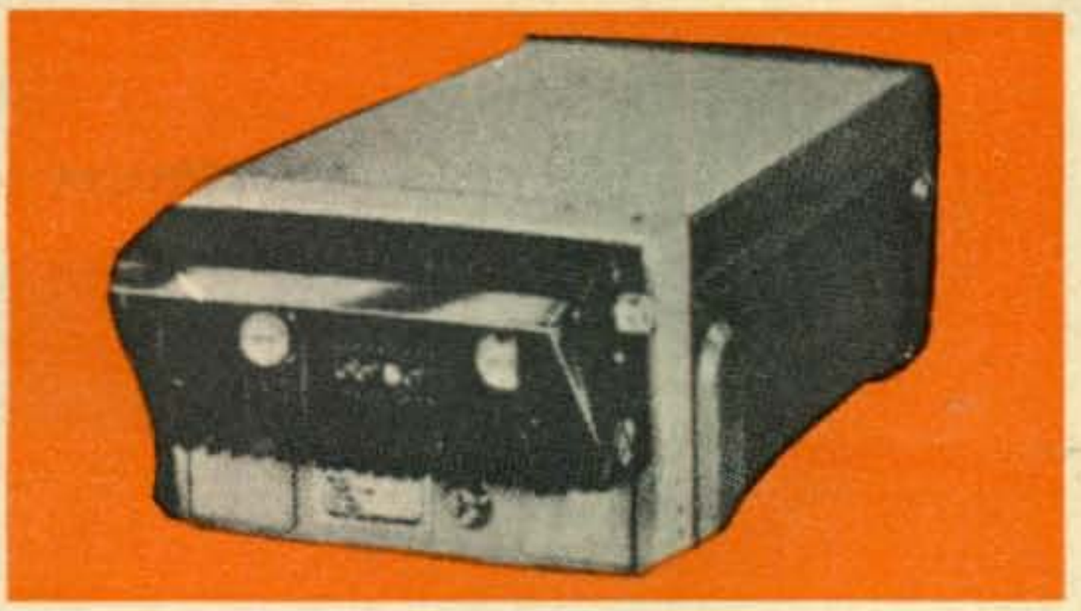
GREGORY ELECTRONICS CORP.

SEE GREGORY ELECTRONICS PROGRESS LINE STRIPS IN THIS CATALOG!

T33GGV, 6/12 volt, 10 watt, complete with accessories, less crystals and antenna fully narrow band..... $78.

Motorola 148-174 MHz, T43GGV, 30 watt, vibrator power complete with all accessories, less crystal and antenna, 6/12 volt, fully narrow band..... $98.
Transmitter narrow band, wide receiver band..... $88.
Same as above T43G series, fully narrow band..... $78.
Transmitter narrow band, receiver wide band..... $68.

D43GGV front mount, fully narrow band..... $88.



Motorola U43GTT, 150-170 MHz, 12 volt, 30 watts, transistorized power supply, fully narrow band, complete accessories.....$188.

Motorola U53GGT, 150-170 MHz, 12 volts, 50 watts, transistorized power supply, fully narrow band, complete accessories..... $218.

Motorola X43GGV
Special Model in 10" case, 150-170 MHz, 30 watts, transmitter narrow band, receiver wide band, vibrator powered, 2 freq., transmitter, and transistor powered 2 freq. "Private Line" receiver (single squelch), less reeds, complete accessories.....$88.
In quantities of 10.....$78.
This unit may be converted to dual squelch by installing Motorola Kit T.K.-568S.

Motorola T33AAT or T33BAT motorcycle units, 6 volts, 8 watts, complete with housing and accessories.....$58.

MOTOROLA MOTRAC UNITS SUBJECT TO AVAILABILITY

Motorola Motrac U43HHT, 150-170 MHz 12 volts, 30 watts, fully transistorized receiver and power supply with complete accessories.....$288.
With "Private Line", less reeds, if available, add.....$45.

Motorola Motrac U53HHT, 150-170 MHz, 12 volts, 60 watts, fully transistorized receiver and power supply, with complete accessories.....$308.
With "Private Line", less reeds, if available.....$45.

Motorola Motrac U63HHT, 150-170 MHz, 12 volts, 80 watts fully transistorized receiver and power supply, with complete accessories..... $398.
With "Private Line" less reeds if available, add.....$45.

R.C.A. CMC-20, 12 volts 20 watts, vibrator power supply, fully narrow band, with accessories 10" case..... $78.
Less cables..... $68.

RCA CMC25, 148-172 MHz, 12 volt, 25 watts, transistorized power supply, fully narrow band, with accessories, 10" case.....$108.
Less cables..... $98.

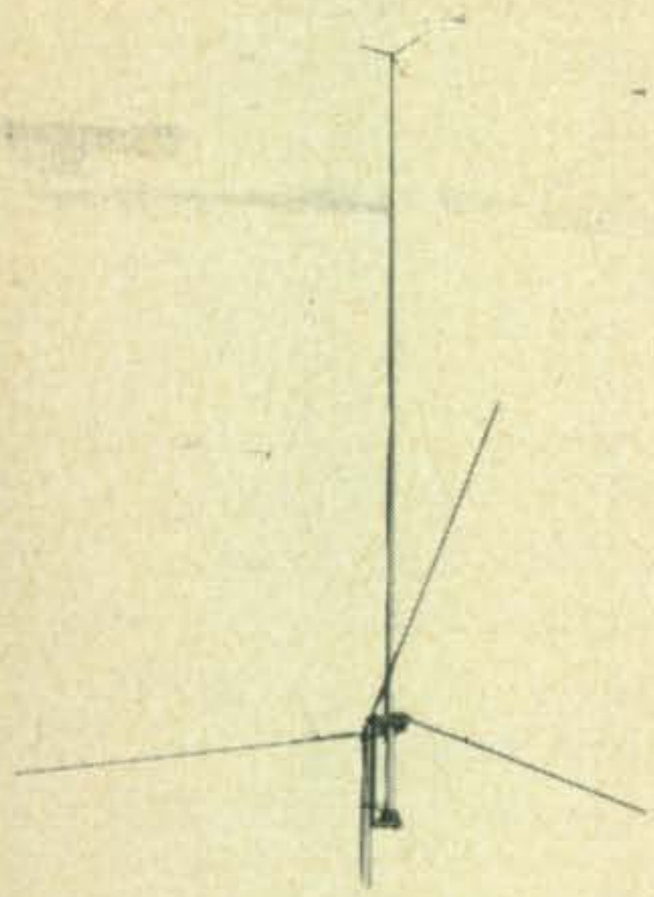
RCA CMC60B, 150-170 MHz, 6/12 volt, 60 watts, receiver has vibrator, transmitter dynamotor power supply, with accessories..... $68.

Complies with EIA RS-329

hy-gain Deluxe Quality

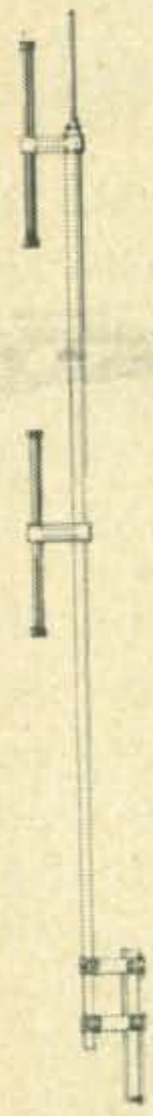
Base Station Antennas

Low Band
30-50 MHz
3 db Gain



Heavy duty. 5/8 wave. 250 watts.
Model 736 — 30-35 MHz
Model 739 — 35-40 MHz
Model 737 — 40-50 MHz
List $45.00

VHF
148-174 MHz
6 db offset gain
3 db omnidirectional gain



Phased and stacked dipole.
550 watts.
Model 726 — 148-158.5 MHz
Model 727 — 153-164 MHz
Model 728 — 163-174 MHz
List $100.00

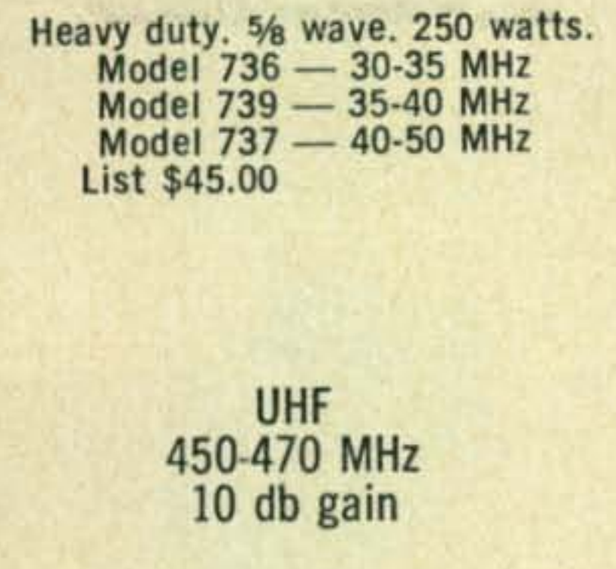
VHF
144-174 MHz
9 db offset gain
6 db omnidirectional gain

Stacked dipole. 600 watts.
Model 725 — 144-159 MHz
Model 722 — 159-174 MHz
List $180.00

VHF
148-174 MHz
3.4 omnidirectional gain

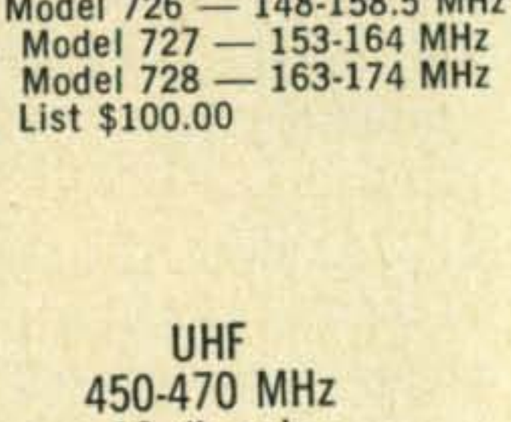
5/8 wave coaxial. 500 watts.
Model 731 — 148-163 MHz
Model 732 — 163-174 MHz
List $55.00

UHF
450-470 MHz
10 db gain



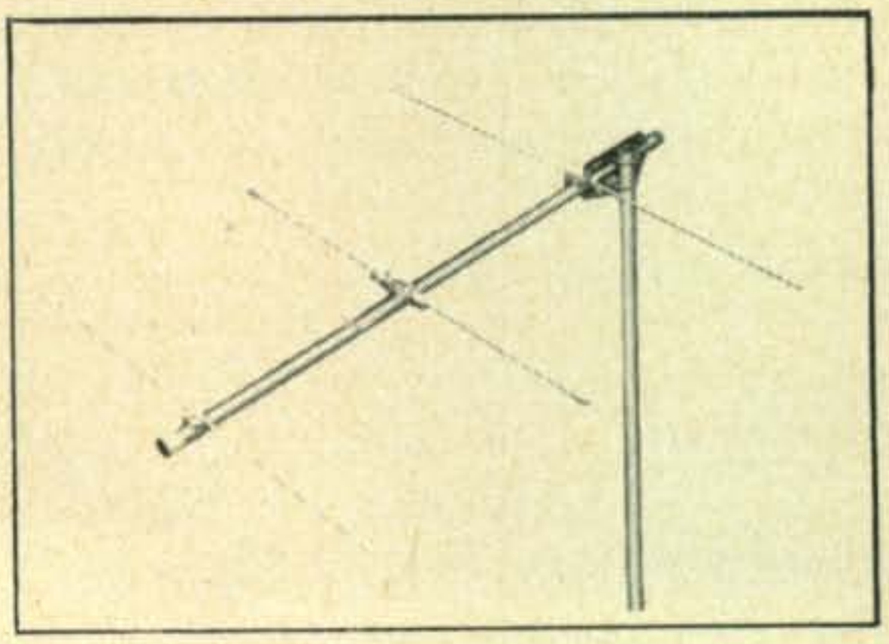
Corner reflector. 300 watts.
Model 753 — 450-470 MHz
List $85.00

UHF
450-470 MHz
10 db gain



Unidirectional log periodic.
250 watts.
Model 721 — 450-470 MHz
List $65.00

2 meter HAM



3 Element 9 db gain
Model #340
List — $9.95

8 element
14.5 db gain

Staggered, optimum spaced elements on 14′ beam. Unique pretuned VHF Beta Match and coaxial balun. Unidirectional pattern. 1 KW power input.

No. 341 — List $19.95

Base and Mobile Antenna Systems

Mobile Antennas

Low Band VHF
25-50 MHz

Roof or deck mount. 125 watts.
Base loaded.
Model 760 — 24-30 MHz
Model 761 — 30-33 MHz
Model 767 — 33-36 MHz
Model 762 — 36-40 MHz
Model 763 — 42-50 MHz
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High Band VHF
130-174 MHz
3 db gain

Special 5/8 wave. No-hole trunk lip mount. 125 watts. Model 707.
List $19.00

High Band VHF
130-174 MHz
3 db gain

5/8 wave roof or deck mount. Covers entire VHF mobile frequency. Heavy duty construction. Field adjustable for lowest VSWR. 125 watts. 50 ohms. 55" height. Stainless steel whip.

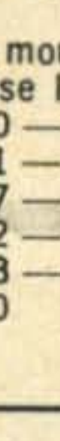
SPECIFICATIONS:

- Gain ..... 3 db (Preliminary EIA)
- Frequency .... 130-174 MHz
- Power ..... 125 watts
- Impedance .... 50 ohms
- VSWR ..... Less than 1.5 to 1
- Lightning Protection .... DC ground
- Mounting ..... Patented stainless steel claw mount fits any size hole 3/8" to 3/4"
- Height ..... 55" maximum
- Coax ..... 22' RG-58U with PL-259 connector
- Weight ..... 1.3 lbs.
- Model 764

List $28.50

UHF 450-470 MHz
5 db gain

Roof, deck or trunk mount with optimum spaced ½ wave elements. Coil loaded. Outperforms other UHF mobile gain antennas by at least 1 db. Only 38". Fully tuned at factory. Heavy duty stainless steel whip. 125 watts.

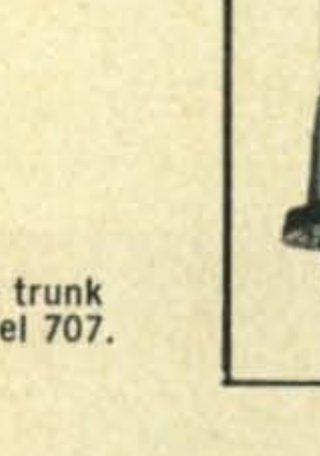


SPECIFICATIONS:

- Gain ..... 5 db (Preliminary EIA)
- Frequency .... 450-470 MHz
- Power ..... 125 watts
- Impedance .... 50 ohms
- VSWR ..... Less than 1.5 to 1
- Lightning Protection .... DC ground
- Mounting ..... Patented stainless steel claw mount fits any size hole 3/8" to 3/4"
- Height ..... 38"
- Coax ..... 22' RG-58U with PL-259 connector
- Weight ..... 1.4 lbs.
- Model 765

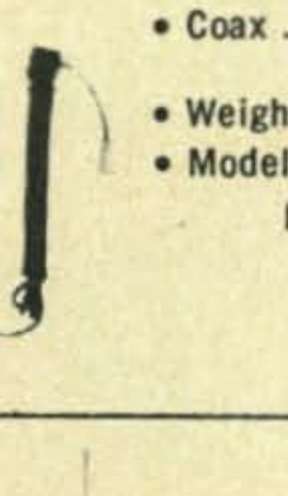
List $28.50

High Band VHF
150-174 MHz
3 db gain

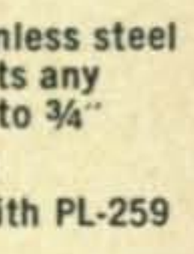


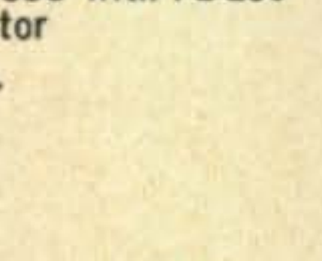
Cowl mount disguise antenna. AM/FM.
110 watts. Model 712.
List $26.00

High Band VHF
108-470 MHz
Unity gain



Super portable magnetic mount ¼ wave. 125 watts.
Model 759
List $16.00





Low band 30-50 MHz heavy duty mobile antenna with **tapered** stainless steel whip, chrome plated, heavy duty spring and low profile ball mount.
Model No. 738.
List $22.00

Complete antenna catalog upon request.
Base Station antennas drop shipped by manufacturer prepaid.
Mobile antennas shipped FOB. Saddle Brook, N. J.

WRITE FOR DISCOUNTS

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SEE GREGORY ELECTRONICS ANTENNA SYSTEMS IN THIS CATALOG!

CMCT30, 148-174 MHz, 12 volt, 30 watt, transistorized power supply, fully narrow band with accessories..... $158.

CMCT60, 148-174 MHz, 12 volt, 60 watt, transistorized power supply, fully narrow band with accessories.....$198.

RCA "E" Line CMCE30, 148-174 MHz, 12 volt, 30 watt, transistor power supply mobile, with accessories..... $68.

CMCA30, RCA SuperCarfone
148-174 MHz, 30 watt, fully transistorized except final tubes,
with accessories.....$288.
CMCA60, 60 watt, same as above.... $318.

CMCB30, RCA Super Fleetfone
148-174 MHz, 30 watt, fully transistorized
with accessories.....$318.
Same unit with 4 frequency deck..... $338.

150-170 MHz BASE STATIONS
General Electric Progress Line

DO36 Progress Line, 110 volt, AC, Desk Mate, 60 watt,
fully narrow band..... $308.

DO37 Progress Line, 110 volt, AC, Desk Mate, 80 watt,
fully narrow band.....$348.

VO38 Progress Line, 110 volt, AC, upright, 250 watt, fully narrow band..... $395.

F. I. 33 Progress Line, 110 volt, AC,
30 watt, narrow band,
Table Top base..... $228.

T. I. 33 Progress Line, 110 volt, AC,
30 watt, narrow band,
table top base..... $258.

F. I. 36 Progress Line, 110 volt, AC,
60 watt, narrow band,
table top base..... $258.

T. I. 36 Progress Line, 110 volt, AC,
60 watt, narrow band,
table top base.....$288.

PO36 Progress Line, 110 volt, AC,
pole mount, 60 watt, narrow
band base..... $288.

Motorola
FSTRU80BY, 110 volt, AC, Desk Top,
30 watt, fully narrow band..... $148.

Motorola
J53AKY outdoor, upright, remote panel,
50 watt base, TX 150-170 MHz,
RX 40-50 MHz..... .....$128.

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GREGORY ELECTRONICS EQUIPMENT CHECKED OUT ON OUR BENCHES

RCA CSC60B, 110 volt, AC, 60 watt,
fully narrow band,
table top base..... $188.

450-470 MHz MOBILE UNITS
GENERAL ELECTRIC

450-470 MHz, 14" case complete
accessories

MA/E42
6/12 volt, 15 watt, vibrator
power supply..... $58.

MT-42, 12 volt, 15 watt,
transistor power supply..... $98.

ACCENTS

General Electric Progress
Line, 450-470 MHz, 10 watts,
12 volts, transistor power
supply, front and rear mount.
Complete accessories.
Model EG48S. Narrow band
meets LATEST FCC TYPE
APPROVAL
REQUIREMENTS..... $78.
Wide band..... $58.

Motorola 450-470 MHz, T44A, A6 or A6A
with accessories..... $28.
less accessories..... $18.

Motorola T44AAV, 450-470 MHz, 6/12 volt
15 to 18 watt,
complete accessories.....$38.
With "Private Line" minus reeds..... $53.

Motorola U44BBT, 450-470 MHz, 12 volt,
15 watt, transistor power supply,
complete with accessories.....$88.
Less accessories, deduct $30.

RCA CMUE15, 12 volts, 15 watts, trans.
power supply, w/access..... $58.

RCA CMU15B 6/12 volt, 450-470 MHz,
less accessories..... $28.
accessories (sold separately)..... $20.

RCA, G. E. UHF BASES
RCA CSUE15. 110 volt, 15 watt, table
top base station. .....$128.

FI/42 Progress Line, 110 volt, AC, table
top, 15 watt..... $158.

TI/42 Progress Line, 110 volt, AC, table
top, 15 watt..... $188.

DO42 Progress Line, 110 volt, AC,
Desk Mate, 15 watt..... $188.

ZI48S Accent Line, 110 volt, AC, table
top, 10 watt..... $158.

GREGORY ELECTRONICS CORP.

SEE GREGORY ELECTRONICS PROGRESS LINE STRIPS IN THIS CATALOG!

MOTOROLA UHF BASES

L44AAB, 110 volt, AC, Desk Top. 15 watt, with private line..... $188.

J44AAB, 110 volt, AC, weatherproof cabinet, 15 watt, with private line.... $168.

REMOTE CONTROLS
Subject to availability

Motorola P8270.....$55.

Motorola TA1200 series..... $95.

GE Telemote Mark-60 transistorized remote, telephone style.....$65.

TECHNICIANS SPECIALS

Offered at reduced prices on as-is basis. Repairs are necessary and/or parts may be missing. Less accessories unless specified.

RCA CMV2, 30-50 MHz, 12 volt, 30 watts, less accessories, less case..... $10.

G. E. Pre-Progress, 40-50 MHz, 250 watt, upright cabinet base..... $75.

G. E. Pre-Progress, 40-50 MHz, 60 watt, desk mate base..... $68.

G. E. Pre-Progress, 40-50 MHz, 60 watt, pole mount base.....$58.

G. E. Pacers, EG43S, high band, 12 volt, "T" power, 15 watt, front mount, less accessories.....$48.

G. E. Pacers, EG42S, low band, 12 volt, "T" power, 15 watt, front mount, less accessories.....$48.

G. E. Progress Line, 30-50 MHz, MDY13, 30 watt, dynamotor power..... $28.

G. E. MD/Y17, 6/12 volt, 100 watt, dynamotor power supply..... $28.

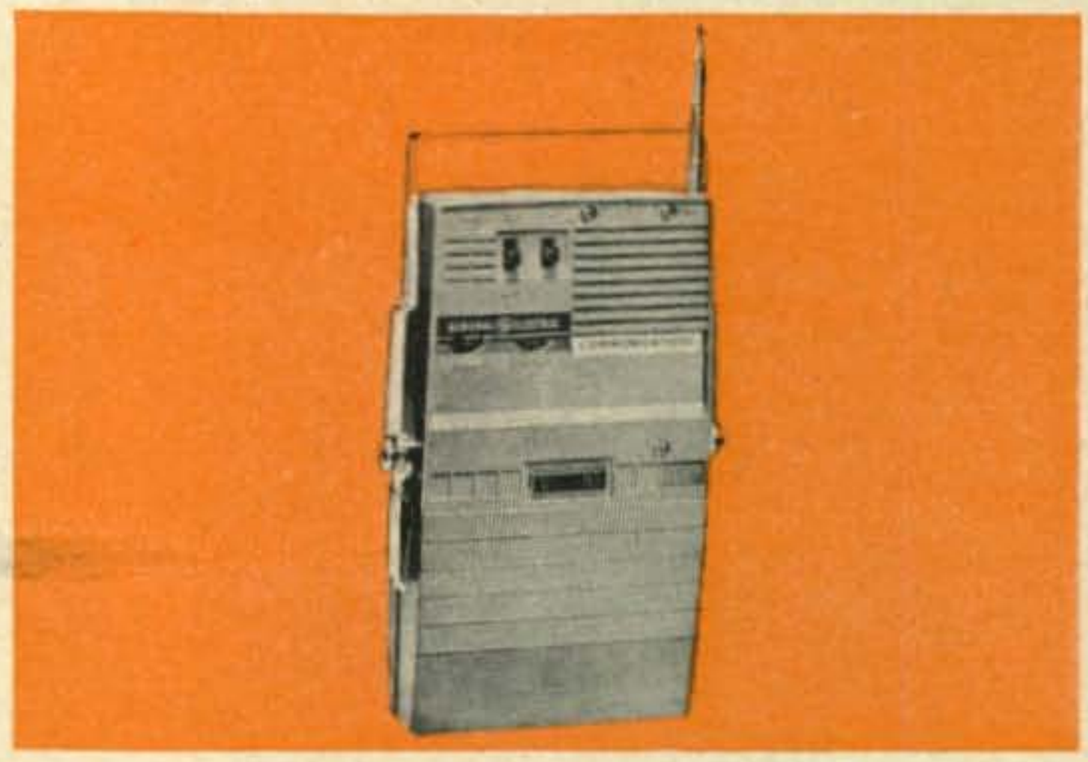
Motorola FMTR41V, 30-50 MHz, front or rear mount, 10 watt, 6 volt or 12 volt.....$28.

G. E. RC-4, Remote less case..... $35.

G. E. Pre-Progress 4ER6-4ET6, 40-50 MHz, TX & RX combination, less accessories..... $10.

Motorola FMTR140D, 40-50 MHz, 12 volt, 60 watt..... $20.

TECHNICIAN SPECIAL



Voice Commander No. 1, 132-150 MHz band, 1 watt hand-held portable Not In Working Condition but physically complete, less batteries, with bottom housing and power supply board..... $35.
Charger for above unit..... $5.
Leather carrying case..... $2.

Voice Commaner No. II, 150-170 MHz, 1 watt, all transistorized, hand-held portable Not In Working Condition but physically complete, less batteries, with bottom housing..... $50.
Charger for above unit..... $7.50
Leather carrying case..... $2.

Voice Commander Parts and Accessories

V. C. No. 1, 150-170 MHz Band Transmitter Boards, 1 watt, F. M., fully tubed.....$5.
Audio and squelch boards..... $5.
Power supply boards..... $5.

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SEE GREGORY ELECTRONICS
ANTENNA SYSTEMS IN THIS CATALOG!

Motorola T33G, 150-170 MHz, 12 volt,
10 watts, less accessories..... $48.

Motorola U44BBT, 450-470 MHz, 12 volt,
15 watt, "T" power supply,
less accessories..... $38.

PARTS AND ACCESSORIES

F.O.B. Orange, California

New! New!
(solid state)

Silent Sentry

Continuous Tone Squelch, replaces
Motorola Private Line, GE Channel Guard,
and RCA Quiet Channel, including
mounting bracket.....$74.95

add $3 for shipping

General Electric Dynamotors
30 watt, 12 volt..... $4.
30 watt, 6 volt..... $3.
60 watt, 6 volt..... $5.
60 watt, 6 volt..... $4.

New G.E. "T" power, 30 watt, heat sinks
with transistors and wiring.....$10.

Old Motorola, G.E., RCA, etc.
control heads.....$1.
6 for.....$5.

Low band base and spring combinations.. $1.
6 for.....$5.

Motorola receiver selective call units
P8629, some with reeds..... $15.

Motorola pack set "P" series,
canvas carrying case.....$3.

G.E. Pre-Progress Housing for
4ET6-4ER6 TX and RX..... $2.

RCA "E" line series combination control
head and power supply.....$30.

G.E. channel guard tone units,
decks RC type..... $15.

G.E. Pacer Channel guard units,
less reeds..... $15.

RCA RC plug-in type, quiet channel.... $5.

Motorola P9301. A single tone
burst oscillator.....$6.

RCA cases for carfone desk type bases,
less front panel..... $10.

Motorola 15" mobile cases..... $5.

RCA mobile cases for CMU15B
or CMC60B..... $5.

Secode digital decoded MOD1835G..... $5.

G.E. Schematic Outline and Interconnection
Diagrams for GE Pre-Progress 2-Way FM
radios. Shipped prepaid.
Vol. 1, Pre-Progress Line (1949-55)
25-50 MHz, 72-76 MHz.
Vol. 2, Pre-Progress Line (1949-55)
150-170 MHz, 405-425 MHz, 450-470 MHz
Each volume..... $5.

NEW REVISED EDITION! Motorola FM
Schematic Diagrams, up to and including
Motran - shipped prepaid.....$7.

Reeds - Private Line or
Channel guard. Misc. CPS..... $5.

PORTABLES

G.E. Pocket Mate, 150-170 MHz, fully
transistorized, high band, 1 watt, hand-
held portable with leather case,
less charger.....$198.

TEK Products Hi-Band, 10-8, multi-
frequency with rechargeable nickel
cad. batteries..... $125.
Physically complete. Not subject to
bench check or tuning.

General Electric H-31 series, 1.7 watt,
all transistorized receiver, with microphone,
less antenna, as is, 150-170 MHz,
with dry battery.....$65.
With Ni-cad.....$85.

GREGORY ELECTRONICS CORP.

GREGORY ELECTRONICS EQUIPMENT CHECKED OUT ON OUR BENCHES

ODD LOT CORNER

4ET6 General Electric, 6 volt, 30 watt, 40-50 MHz transmitter..... $4.

12 volt, 30 watt, 40-50 MHz trans..... $6.

4ET6 General Electric, 6 volt, 60 watt, 40-50 MHz transmitter.....$5.
12 volt, 60 watt.....$7.

AM Receiver strip on 2.5 MHz..... $10.

National Electronic Laboratory Utilifone, model NEL200, AM, 12 volt, 1½ watt, tuned on 121.9 MHz, with accessories, ideal for monitor receiver..... $18.

PYE model PTC113, 12 volt, AM, 121.9 MHz..... $10.

PROGRESS LINE STRIPS

These strips are physically complete, but are sold on an as-is basis only.

	MA/E13	MA/E16	MA/E33	MA/E36	MA/E42
Power supply, 30 watts, less vibrator	$20.	—	$20.	—	$20.
Power supply, 60 watts, less vibrators	—	$25.	—	$25.	—
TX narrow band less final tubes Note: MA/E42 wide band	$18.	$25.	$25.	$30.	$12.
RX wide band less ovens	$18.	$18.	$18.	$18.	$12.

14" Progress Line Case, consisting of front basket and front plate with lock....$10.

Low band dual front end, 2 frequency. RX strip.....$20.

High band TPL RX w/TX exciter less speaker, as is, missing parts.....$25.

NINIC FM POCKET RECEIVER
With dry battery..... $48.

Add $20 for crystals and tuning to your frequency. 150-170 MHz. All units new. Solid state modular construction. Adjustable squelch. Sensitivity 0.3 microvolts to break squelch. Dual conversion crystal controlled. With dry cell battery. Wgt. - 1 lb. 6 5/8" x 2½" x 1¼".

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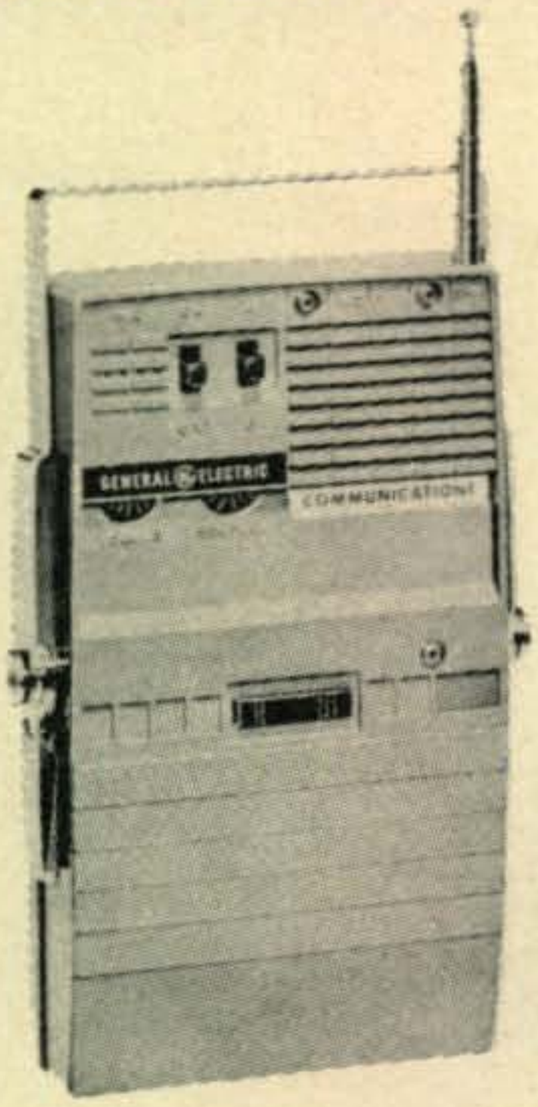
SEE GREGORY ELECTRONICS
PROGRESS LINE STRIPS IN THIS CATALOG!

GENERAL-ELECTRIC
VOICE COMMANDER III
FULL SOLID STATE FM
TRANSMITTER-RECEIVER

132-150 and 150-174 MHz

Size: 9.5" x 5.3" x 1.7"

1 WATT OUTPUT
1/2 MICRO-VOLT SENSITIVITY



High performance, completely self-contained two-way FM radio. Compact, lightweight, easily operated and hand-carried. Housed in high-impact 2-section case. All external hardware polished stainless steel.

Top section has transmitter and receiver modules, built-in mike and speaker, antenna, carrying handle, all switches and controls. Bottom section has battery power supply. Power connections to top section made by plug and jack connection.

Proper chargers available separately.

Each **$15.00**

Includes rechargeable nickel cadmium battery pack and charger.

$148.00

(Crystals and tuning, add $50.)

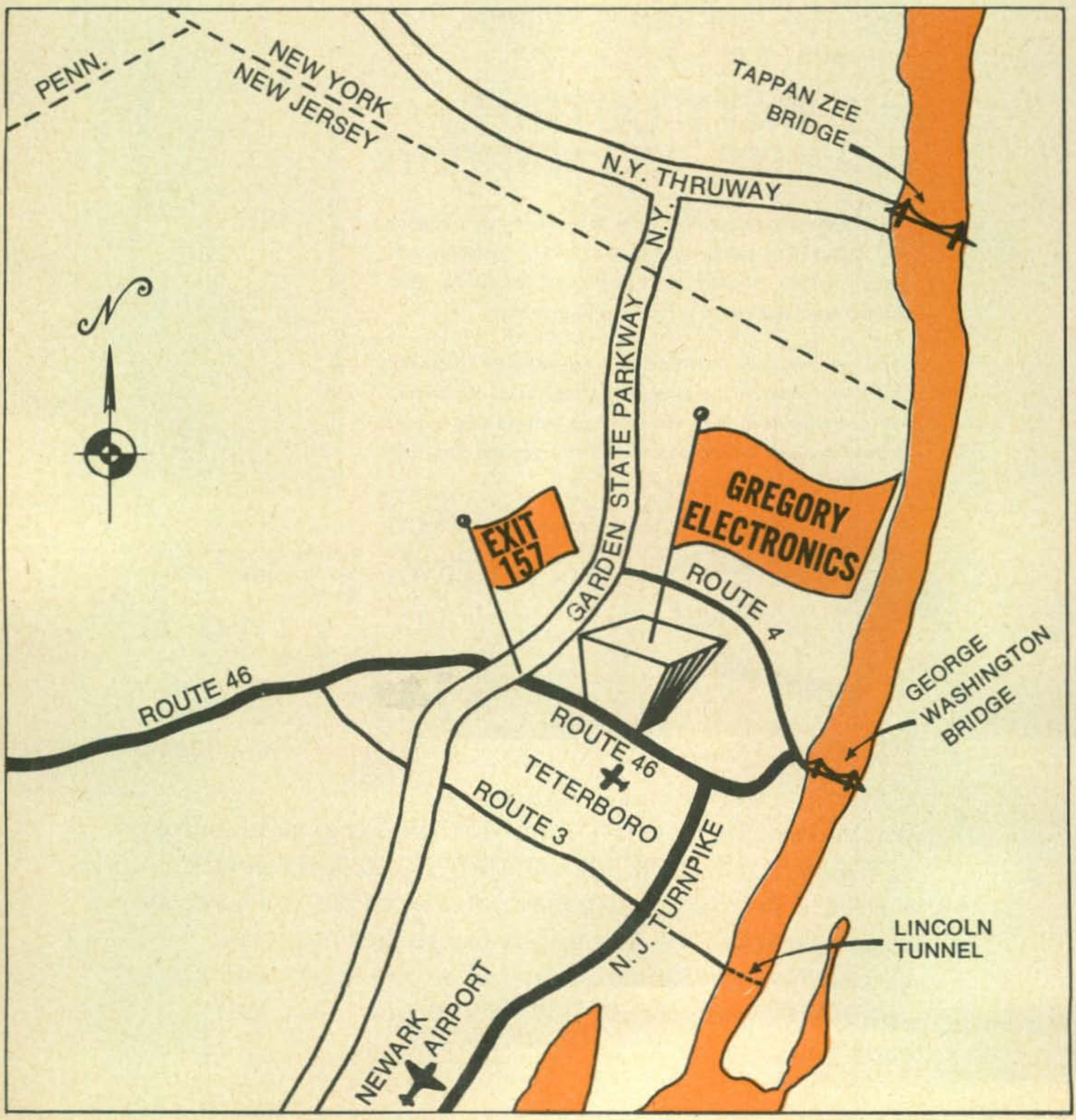
Lots of 5 less 10% – $133.20
Lots of 10 less 15% - $125.80

15,000 2-way FM Mobile units in stock!

We believe we now have the world's largest inventory of FM 2-WAY MOBILE COMMUNICATIONS EQUIPMENT. If it is at all possible, we invite you to come in and browse. It is impossible to list our vast inventories in this catalog, but we're fairly certain you'll find many miscellaneous items, odds and ends you've been looking for.

GREGORY ELECTRONICS CORP.
249 Route 46, Saddle Brook, N.J.07662

FIRST CLASS MAIL



These Things We Call Countries What Are They?

BY JOHN A. ATTAWAY,* K4IIF

At one time or another most DXers have been faced with the problem of explaining to a non-ham, or even a non-DXer, how he has managed to work something like 300 "countries" when that's about twice as many countries as there are on this old globe of ours. The going can get rough, because despite the great interest in ARRL's DXCC and the *CQ* C.W. and S.S.B. DX Awards, no detailed fact sheet on amateur radio countries has ever been published. It's time this situation was remedied.

An objective consideration of the amateur radio countries is rendered all the more difficult by the wide disparity between the individual entities. In area they vary all the way from the nearly 5,000,000 square miles of the Asiatic Russian Soviet Federated Socialist Republic (Siberia) to the few square feet of exposed rock at Geyser Reef, and in population from the 772,000,000 of China to the zero inhabitants of the several unoccupied rocks and reefs. As a consequence, we have arbitrarily subdivided the amateur radio countries into five classes, based on the degree to which each of them possesses the attributes of area, population and governmental system which the world community requires of a country. A sixth class was added as a repository for those countries which have been deleted from the list. These six classes are defined as follows:

Class 1 Country — Generally recognized as a complete and independent country by the world community.

Class 2 Country — A fully developed entity with most of the characteristics of a Class 1 Country. Most Class 2 Countries may be described as either states, associated states, provinces, departments or as Soviet Socialist Republics.

Class 3 Country — An entity with the necessary area and population to become a Class 1 or 2 Country after it matures economically and/or politically. Many Class 3 Countries have Territorial type governments with varying degrees of local rule.

Class 4 Country — An entity with sufficient area and/or population to become a Class 1 or 2 Country, but which has very little potential to actually move up the ladder. Many Class 4 Countries are islands too barren and inhospitable to support a permanent population.

Class 5 Country — No potential to become a Class 1 or 2 Country in its present form. Most Class 5 Countries are partially submerged rocks and reefs which are incapable of sustaining a population on even a temporary basis. (The phrase "in its present form" was added because of the news stories regarding a projected dredge and fill operation designed to convert Minerva Reef into an island.)

Class 6 Country — An entity which has ceased to exist as a country and has been deleted from the country list.

As the DXCC Country List is the widely accepted authority on country status, and in fact is recognized by the *CQ* DX Awards Advisory Committee as the basis for the *CQ* DX Awards, it is well to summarize for you the criteria used by the ARRL DX Committee in determining if an entity qualifies for separate DXCC country status. These criteria were furnished to us by Mr. R. L. White, Assistant Communications Manager for the League, and we quote directly as follows:

"Any land area in the world can be placed in one or more of the following categories. Where the area in question meets at least one of the points in the criteria it may be considered a separate entity, *i.e.* a country, for our Countries List:

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

1. *Government/Administration:* An area by reason of Government or a distinctively separate administration constitutes a separate entity.
2. *Separation By Water:* An island, or a group of islands not having its own government of distinctively different administration, is considered as a separate entity under the following conditions:

2(a). Islands situated off shore from their governing or administrative area, must be geographically separated by a minimum of 225 miles of open water. This point is concerned with islands off shore from the mainland *only*. This point *is not* concerned with islands which are part of an island group or are geographically located adjacent to an island group.

2(b). Islands forming part of an island group or which are geographically located adjacent to an island, or island group, which have a common government or administration, will be considered as separate entities provided there is at least 500 miles of open water separation between the two areas in question.

3. *Separation By Foreign Land:* In the case of a Country, such as that covered by point 1, which has a common government or administration but which is geographically separated by land which is foreign to that Country, if there is a complete separation of the Country in question by a minimum of 75 miles of foreign land, the Country is considered as two separate entities. This 75 miles of land is a requirement which is applicable to land areas *only*. In cases of areas made up of a chain of islands, there is no minimum requirement concerned with the separation by foreign land.

In the preamble to the criteria it is pointed out that "the specific mileages in Point 2(a) and Point 3 have been used in considerations made April, 1960 and after. The specific mileage in Point 2(b) is being used in considerations made in and after April, 1963." Therefore the full list does not conform to these specific criteria, some countries being traditionally listed since before World War II. Examples are Corsica and the Balearic Islands, a Department of Metropolitan France and a Province of Spain respectively, which are considered separate entities even though they are much less than 225 miles off shore as required by 2(a).

In the following table we have attempted to add to your knowledge of the amateur radio countries by furnishing data on locations, forms of government, estimated area, estimated permanent population, Class of Country by the *CQ* definitions and Zone for WAZ. For island countries, latitude and longitude has been added to help you pinpoint them on your maps. Footnotes have been used generously to provide further information on interesting points without unduly complicating the tables. We do not consider ourselves to be political scientists and have relied on standard encyclopedias for information on forms of government, area and population. Maps published by the National Geographic Society were indispensable in locating countries, and in some cases were our best source of estimates of country area. A dash in the area or population column indicates that figures were not available from any of our sources.

Our final tally shows 156 entities which definitely are countries (Class 1), 56 economically and politically developed entities which are almost countries (Class 2), 68 entities with a definite potential to become countries (Class 3), 32 entities with only slight potential to become countries (Class 4), 14 entities with virtually no possibility of becoming countries (Class 5) and 29 entities which have lost country status and have been deleted from the list (Class 6).

Country Listings begin on the facing page and continue through page 88. For convenience, all footnotes have been grouped, beginning below, and continuing on page 114.

Footnotes

[1] Government in exile. Now administered as an "autonomous region of China."
[2] Status uncertain pending final settlement of India-Pakistan war.
[3] Described by references as government without elected representatives, or where if a legislative body exists it is totally subservient to Communist Party leadership. Governmental policy is dictated by Communist Party officials and tight police control is maintained to eliminate or suppress political opposition.
[4] Nominal allegiance to President of France and Spanish Bishop of Urgel as "Co-Princes."
[5] Scientists and military personnel rotated on a regular basis are not counted.
[6] Overseas Province of Portugal. Inhabitants are Portuguese citizens.
[7] Districts of Portuguese India for 450 years. Annexed to India by force of arms in 1961.
[8] The Country List does not recognize the establishment of separate governments for East and West Germany.
[9] The Spanish throne has been vacant for over 30 years and the country ruled as a Military Dictatorship. Restoration of the monarchy is contemplated.
[10] The Balearic Islands are a Province of mainland Spain about 60 miles off-shore.
[11] The Canary Islands make up two Provinces of Spain.
[12] Rio de Oro was originally the southern half of Spanish Sahara.
[13] Two Spanish enclaves just across the Straits of Gibraltar in N.W. Africa.
[14] Overseas Territory of France.
[15] About 180-360 scientists are rotated annually through the French Southern and Antarctic Territories.
[16] A Department of Metropolitan France, 100 miles from the mainland.
[17] Overseas Department of France.
[18] The correct name for this country is the French Territory of the Afars and Issas.

[*Continued on page 114*]

Prefix	Country	Continent	Form of Government	Area in Square Miles	Permanent Population	Class of Country	Zone
A2, ZS9	Botswana	AF	Republic	231,805	668,000	1	38
A35	Tonga	OC (21°S, 175°W)	Constitutional Monarchy	270	92,000	1	32
A5, AC5	Bhutan	AS	Monarchy	18,147	798,000	1	22
AC3	Sikkim	AS	Monarchy (Indian Protectorate)	2,744	198,000	1	22
AC4	Tibet	AS	Theocracy[1]	471,660	1,274,000	1	23
AP	E. Pakistan or Bangladesh	AS	In dispute[2]	55,126	74,000,000	1 or 2	22
AP	W. Pakistan	AS	Republic	310,403	63,000,000	1	21
BV	Formosa (Taiwan)	AS	Republic	13,885	14,992,000	1	24
BY	China	AS	Communist[3] Dictatorship	3,691,523	772,000,000	1	23, 24
C2, VK9	Nauru	OC (0°, 166°E)	Republic	8	7,000	1	31
C3 PX	Andorra	EU	Co-Principality[4]	175	24,000	1	14
C9	Manchuria (Deleted)	AS	Now part of China	360,000	51,500,000	6	24
CE	Chile	S A	Republic	292,258	10,271,000	1	12
CE9, FB8, KC4, LA, LU, OR4, UA1, VK0, VP8, ZL5, ZS1, 8J	Antarctica	Antarctica	12 Nation Treaty	5,100,000	0[5]	3	12, 13, 38, 39, 29, 30, and 32
CE0	Easter Island	S A (27°S, 109°W)	Administered by Chile	63	1,598	3	12
CE0	Juan Fernandez Island	S A (33°S, 79°W)	Administered by Chile	56	615	3	12
CE0	San Felix & San Ambrosia Islands	S A (26°S, 80°W)	Administered by Chile	3	0	4	12
CM, CO	Cuba	N A	Communist Dictatorship	44,218	8,807,000	1	8
CN2	Tangier (Deleted)	AF	Now part of Morocco	135	220,000	6	33
CN	Morocco	AF	Constitutional Monarchy	172,414	15,941,000	1	33
CP	Bolivia	S A	Republic	424,163	4,766,000	1	10
CR3, 5	Portuguese Guinea	AF	Provincial[6]	13,948	533,000	2	35
CR4	Cape Verde Islands	AF (16°N, 24°W)	Provincial[6]	1,557	259,000	2	35
CR5	Principe & Sao Thome	AF	Provincial[6]	372	70,000	2	35
CR6	Angola	AF	Provincial[6]	481,354	5,574,000	2	36
CR7	Mozambique	AF	Provincial[6]	302,330	7,584,000	2	37
CR8	Damao & Diu	AS	Now part of India[7]	225	100,000	6	22
CR8	Goa	AS	Now part of India[7]	1,394	650,000	6	22
CR8	Portuguese Timor	OC (10°S, 125°E)	Provincial[6]	5,763	598,000	2	28
CR9	Macao	AS (22°N, 114°E)	Provincial[6]	6	268,000	2	24
CT1	Portugal	EU	Corporative Republic	34,309	9,793,000	1	14
CT2	Azores Islands	EU (38°N, 28°W)	Provincial[6]	893	327,500	2	14
CT3	Madeira Islands	AF (33°N, 17°W)	Provincial[6]	308	268,900	2	33
CX	Uruguay	S A	Republic	72,173	2,929,006	1	13
DA, DJ, DK, DL	West Germany[8]	EU	Republic	95,961	62,602,000	1	14
DM	East Germany[8]	EU	Communist Dictatorship	41,767	17,157,000	1	14
DU, DX	Philippines	OC	Republic	115,830	39,906,000	1	27
EA	Spain	EU	Monarchy[9]	194,984	33,195,000	1	14
EA6	Balearic Islands	EU (39°N, 4°E)	Provincial[10]	1,936	522,044	2	14
EA8	Canary Islands	AF (28°N, 16°W)	Provincial[11]	2,208	944,448	2	33
EA9	Ifni (Deleted)	AF	Now part of Morocco	579	56,000	6	33
EA9	Spanish Sahara (Rio de Oro)	AF	Provincial[12]	102,703	61,000	2	33
EA9	Cueta & Melilla	AF	Part of Metropolitan Spain[13]	82	152,768	3	33
EI	Ireland	EU	Republic	27,136	3,000,000	1	14
EL	Liberia	AF	Republic	43,000	1,200,000	1	35
EP	Iran	AS	Constitutional Monarchy	623,293	28,400,000	1	21
ET2	Eritrea (Deleted)	AF	Now a province of Ethiopia	47,876	1,400,000	6	37
ET3, 9E, 9F	Ethiopia	AF	Constitutional Monarchy	471,776	25,000,000	1	37
F	France	EU	Republic	211,207	51,000,000	1	14
FB8W	Crozet Islands	AF (46°S, 52°E)	Territorial[14]	60	0[15]	4	39
FB8X	Kerguelen Islands	AF (49°S, 70°E)	Territorial[14]	2,700	0[15]	3	39
FB8Z	Amsterdam & St. Paul Islands	AF (38°S, 78°E)	Territorial[14]	38	0[15]	4	39
FC	Corsica	EU	Departmental[16]	3,368	275,465	2	15
FF8	French West Africa (Deleted)	AF	Now parts of 8 African Republics	1,831,079	—	6	35
FG7	Guadeloupe	N A (16°N, 61°W)	Departmental[17]	687	343,000	2	8
FH8, FB8	Comoro Islands	AF (12°S, 45°E)	Territorial[14]	838	303,000	3	39
FI8	French Indochina (Deleted)	AS	Now Vietnam, Laos & Cambodia	—	—	6	26
FK8	New Caledonia	OC (22°S, 166°E)	Territorial[14]	7,300	100,000	3	32

Prefix	Country	Continent	Form of Government	Area in Square Miles	Permanent Population	Class of Country	Zone
FL8	French Somoliland[18]	AF	Territorial[14]	8,494	125,000	3	37
FM7	Martinique	N A (15°N, 61°W)	Departmental[17]	425	357,000	2	8
FN9	French India (Deleted)	AS	Now part of India	—	—	6	22
FO8	Clipperton Island	N A (10°N, 109°W)	Administered from French Oceania	2	0	4	7
FO8	French Oceania	OC (18°S, 148°W)	Territorial[14]	1500	110,000	3	32
FO8M (?)	Maria Theresa Reef	OC (37°S, 152°W)	Unclaimed	0	0	5	32
FP8	St. Pierre & Miquelon Islands	N A (47°N, 56°W)	Territorial[14]	93	5,000	3	5
FQ8	French Equatorial Africa (Deleted)	AF	Now parts of 4 African Republics	969,111	—	6	36
FR7	Glorioso Islands	AF (12°S, 47°E)	Administered from Reunion Is.	1	0	4	39
FR7	Juan de Nova Island	AF (16°S, 43°E)	Administered from Reunion Island	1	0	4	39
FR7	Reunion Island	AF (21°S, 55°E)	Departmental[17]	969	472,000	2	39
FR7	Tromelin Island	AF (16°S, 54°E)	Administered from Reunion Island	—	0	4	39
FS7	St. Martin	N A (18°N, 63°W)	Administered from Guadeloupe	20	5,000	3	8
FW8	Wallis & Futuna Islands	OC (13°S, 177°W)	Territorial[14]	106	9,900	3	32
FY7	French Guiana & Inini	S A	Departmental[17]	35,135	43,000	2	9
G	England[19]	EU	Constitutional Monarchy	50,332	46,937,000	1	14
GC	Guernsey Island & Dependencies	EU (49°N, 3°W)	Self-governing Dependency of U.K.	24	45,000	2	14
GC	Jersey Island[20]	EU (49°N, 2°W)	Self-governing Dependency of U.K.	45	63,345	2	14
GD	Isle of Man	EU (54°N, 5°W)	Self-governing Dependency of U.K.	227	50,000	2	14
GI	Northern[19] Ireland	EU	Constitutional Monarchy	5,462	1,539,000	1	14
GM	Scotland[19]	EU	Constitutional Monarchy	30,514	5,280,000	1	14
GW	Wales[19]	EU	Constitutional Monarchy	8,016	2,774,000	1	14
HA, HG	Hungary	EU	Communist Dictatorship	35,919	10,348,000	1	15
HB	Switzerland	EU	Federal Republic	15,941	6,353,000	1	14
HBØ, HE	Liechtenstein	EU	Principality	61	23,000	1	14
HC	Ecuador	S A	Republic	109,484	6,511,000	1	10
HC8	Galapagos Islands	S A	Administered by Ecuador	2,869	3,000	3	10
HH	Haiti	N A	Republic	10,714	4,960,000	1	8
HI	Dominican Republic	N A	Republic	18,816	4,480,000	1	8
HK	Columbia	S A	Republic	439,737	21,790,000	1	9
HKØ	Bajo Nuevo	N A (16°N, 79°W)	Administered by Columbia	0[21]	0	5	8
HKØ	Malpelo Island	S A (4°N, 81°W)	Administered by Columbia	1[22]	0	5	9
HKØ	San Andres & Providencia Islands	N A (13°N, 82°W)	Administered by Columbia	[21]	8,000	3	7
HL, HM	North Korea[23]	AS	Communist Dictatorship	46,540	14,323,000	1	25
HL, HM	South Korea[23]	AS	Republic	38,022	33,524,000	1	25
HP	Panama	N A	Republic	29,209	1,512,000	1	7
HR	Honduras	N A	Republic	43,277	2,811,000	1	7
HS	Thailand	AS	Constitutional Monarchy	198,457	36,925,000	1	26
HV	The Vatican	EU	Theocracy	1/6[24]	1,000	1	15
HZ, 7Z	Saudi Arabia	AS	Monarchy	830,000	7,478,000	1	21
I, IT	Italy & Sicily	EU	Republic	116,304	54,026,000	1	15
I1	Trieste (Deleted)	EU	Free Territory[25]	298	272,723	6	15
I5	Italian Somaliland (Deleted)	AF	Now part of Somali Republic	178,200	1,500,000	6	37
IS, IM	Sardinia	EU	Regional	9,301	1,448,000	2	15
JA, JE, JH, JR, KA	Japan	AS	Constitutional Monarchy	142,813	105,785,000	1	25
JD, KG6I, KA1	Ogasawara Islands	AS (25°N, 140°E)	Administered by Japan	42	200+	3	27
JD, KG6I, KA1	Minami Torishima Island	OC (25°N, 154°E)	Administered by Japan	1	0	4	27
JT	Mongolia	AS	Communist Dictatorship	604,250	1,332,000	1	23
JW, LA/P	Svalbard	EU (78°N, 17°W)	Administered by Norway	23,957	1,200	4	40
JX, LA/P	Jan Mayen	EU (71°N, 8°W)	Administered by Norway	150	0	4	40
JY	Jordan	AS	Constitutional Monarchy	37,738	2,374,000	1	20
JZ4	Netherlands New Guinea (Deleted)	OC	Now part of Indonesia	160,618	750,000	6	28
K, W	United States of America	N A	Republic	3,615,221	209,521,265	1	3, 4, 5
KB6	Baker and Howland Islands	OC (0°, 177°W)	Administered by US	1	0	4	31
KC4	Navassa Island	N A (19°N, 75°W)	Administered by US	0.5[29]	0	5	8
KC6	Eastern Caroline Islands	OC (8°N, 145°E)	UN Trust Territory Under US Administration	215	40,000	3	27

Prefix	Country	Continent	Form of Government	Area in Square Miles	Permanent Population	Class of Country	Zone
KC6	Western Caroline Islands	OC (8°N, 136°E)	UN Trust Territory Under US Administration	232	19,000	3	27
KG4	Guantanamo Bay	N A	US Naval Base in eastern Cuba[32]	—	—	5	8
KG6	Guam	OC (13°N, 144°E)	Territorial[33]	212	126,000	2	27
KG6R, S, T	Marianas Islands	OC	UN Trust Territory under US administration	184	10,000	3	27
KH6	Hawaiian Islands	OC	State	6,450	769,913	2	31
KH6	Kure Island	OC (28°N, 178°W)	Administered by US[35]	1	0	5	31
KJ6	Johnston Island	OC (17°N, 170°W)	Administered by US	1	156	4	31
KL7	Alaska	N A	State	586,412	302,173	2	1
KM6	Midway Island	OC (28°N, 177°W)	Administered by US	2	2,356	3	31
KP4	Puerto Rico	N A	Commonwealth[36]	2,435	2,700,000	2	8
KP6	Palmyra & Jarvis Island	OC (5°N, 162°W)	Administered by US	6	0	4	31
KR6, 8	Ryukyu Islands (Deleted)	AS	Now under Japanese Administration	1,803	1,000,000	6	25
KS4B, & HKØ	Serrana Bank & Roncador Cay	N A (14°N, 80°W)	Administered by US and Columbia	1/2	0	5	7
KS4	Swan Islands	N A (17°N, 84°W)	Administered by US[37]	1.5	20	4	7
KS6	American Samoa	OC (14°S, 170°W)	Territorial[38]	76	26,000	3	32
KV4	US Virgin Islands	N A (18°N, 65°W)	Territorial[39]	133	80,000	2	8
KW6	Wake Island	OC (19°N, 166°E)	Administered by US	3	1,097	3	31
KX6	Marshall Islands	OC (10°N, 170°E)	UN Trust Territory under US Administration[40]	70	18,925	3	31
KZ5	Panama Canal Zone	N A	Administered by US[41]	553	60,000	4	7
LA, LG	Norway	EU	Constitutional Monarchy	125,182	3,911,000	1	14
LU	Argentina	S A	Republic	1,072,073	24,696,000	1	13
LX	Luxembourg	EU	Constitutional Monarchy	998	344,000	1	14
LZ	Bulgaria	EU	Communist Dictatorship	42,823	8,547,000	1	20
MP4B	Bahrein	AS (26°N, 51°E)	Sheikdom[42]	231	220,000	1	21
MP4Q	Qatar	AS	Sheikdom	8,500	100,000	1	21
MP4M, VS9O	Sultanate of Muscat and Oman	AS	Sultanate	82,030	565,000	1	21
MP4D, T	Trucial States	AS	Sheikdoms[43]	32,000	141,000	1	21
OA	Peru	S A	Republic	496,225	13,997,000	1	10
OD5	Lebanon	AS	Republic	4,015	2,778,000	1	20
OE	Austria	EU	Republic	32,374	7,460,000	1	15
OH, OF	Finland	EU	Republic	130,120	4,773,000	1	15
OHØ	Aland Islands	EU (60°N, 20°E)	Provincial[44]	570	21,000	2	15
OJØ	Market Reef	EU[45] (60°N, 19°E)	Administered by Finland	1	0	5	15
OK	Czechoslovakia	EU	Communist Dictatorship	49,371	14,635,000	1	15
ON	Belgium	EU	Constitutional Monarchy	11,781	9,822,000	1	14
OX	Greenland	N A	Provincial[46]	840,000	54,000	2	40
OY	Faeroe Islands	EU (62°N, 7°W)	Territorial[47]	540	39,000	2	14
OZ	Denmark	EU	Constitutional Monarchy	16,629	4,988,000	1	14
PA, PD, PE, PI	Netherlands	EU	Constitutional Monarchy	13,961	13,246,000	1	14
PJ	Netherlands Antilles[48]	S A	Territorial[49]	337	200,000	3	9
PJ	St. Maarten, Saba, & St. Eustatius	N A	Territorial[49]	34	20,000	3	8
PK1, 2, 3	Java (Deleted)	OC	Now part of Indonesia	51,032	60,000,000	6	28
PK4	Sumatra (Deleted)	OC	Now part of Indonesia	182,859	20,000,000	6	28
PK5	Netherlands Borneo (Deleted)	OC	Now part of Indonesia	190,000	—	6	28
PK6	Celebes & Molucca Island (Deleted)	OC	Now part of Indonesia	72,986	—	6	28
PY	Brazil	S A	Republic	3,286,488	96,388,000	1	11
PYØ	Fernando de Noronha	S A (4°S, 32°W)	Territorial (Brazilian)	10	3,000	3	11
PYØ	St. Peter & St. Paul Rocks	S A (1°N, 29°W)	Administered by Brazil	1/100	0	5	11
PYØ	Trinidade & Martin Vaz Islands	S A (20°S, 29°W)	Administered by Brazil	4	0	4	11
PZ	Surinam	S A	Territorial[50]	63,039	416,000	3	9
SK, SL, SM	Sweden	EU	Constitutional Monarchy	173,666	8,171,000	1	14
SP, 3Z	Poland	EU	Communist Dictatorship	120,665	33,183,000	1	15
ST2	Sudan	AF	Republic	967,500	16,093,000	1	34
SU	Egypt	AF	Republic	386,662	35,000,000	1	34
SV	Crete	EU	Departmental (Greek)	3,217	483,258	2	20
SV	Dodecanese Islands, Inc. Rhodes	EU	Departmental (Greek)	1,028	123,021	2	20
SV	Greece	EU	Constitutional Monarchy	50,944	9,022,000	1	20

Prefix	Country	Continent	Form of Government	Area in Square Miles	Permanent Population	Class of Country	Zone
TA	Turkey	EU & AS	Republic	301,382	36,144,000	1	20
TF	Iceland	EU	Republic	39,769	210,000	1	40
TG	Guatemala	N A	Republic	42,042	5,495,000	1	7
TI	Costa Rica	N A	Republic	19,575	1,808,000	1	7
TI9	Cocos Island	N A (6°N, 87°W)	Administered by by Costa Rica	10	0	4	7
TJ	Cameroun	AF	Republic	183,569	5,920,000	1	36
TL	Central African Republic	AF	Republic	240,535	1,635,000	1	36
TN	Congo Republic	AF	Republic	132,047	907,000	1	36
TR	Gabon Republic	AF	Republic	103,347	495,000	1	36
TT	Chad Republic	AF	Republic	495,755	3,670,000	1	36
TU	Ivory Coast	AF	Republic	124,504	4,389,000	1	36
TY	Dahomey	AF	Republic	43,484	2,876,000	1	35
TZ	Mali Republic	AF	Republic	478,767	5,065,000	1	35
UA, UK, UV, UW, UN1, 3, 4, 6	European Russian SFSR	EU	Communist Dictatorship	1,544,632	95,000,000	1	16
UA1	Franz Josef Land	EU	Administered by Russia	8,000	0	4	40
UA2, UK2F	Kaliningradsk	EU	Regional	5,361	610,000	3	16
UA, UK, UV, UW9.Ø	Asiatic Russian SFSR	AS	Regional	4,956,868	25,000,000	3	17, 18, 19 & 23
UB, UK, UT, Y5	Ukranian SSR	EU	Communist SSR[52]	233,090	45,966,000	2	16
UC2, UK2C	Belorussian SSR (White Russia)	EU	Communist SSR[52]	80,155	8,744,000	2	16
UD6, UK6D	Azerbaidzhan	AS	Communist SSR[52]	33,436	4,802,000	2	21
UF6, UK6F	Georgia	AS	Communist SSR[52]	26,911	4,611,000	2	21
UG6, UK6G	Armenia	AS	Communist SSR[52]	11,500	2,253,000	2	21
UH8, UK8H	Turkmenistan	AS	Communist SSR[52]	188,456	1,966,000	2	17
UI8, UK8I	Uzbek	AS	Communist SSR[52]	173,592	10,896,000	2	17
UJ8, UK8J	Tadzhikstan	AS	Communist SSR[52]	55,251	2,654,000	2	17
UL7, UK7L	Kazakstan	AS	Communist SSR[52]	1,048,306	12,413,000	2	17
UM8, UK8M	Kirghizia	AS	Communist SSR[52]	76,641	2,749,000	2	17
UN1	Karelo-Finnish Republic (Deleted)	EU	Now part of European Russian SFSR	66,679	615,000	6	16
UO5, UK5O	Moldavia	EU	Communist SSR[52]	13,012	3,425,000	2	16
UP2, UK2P	Lithuania	EU	Communist SSR[52 53]	25,174	3,026,000	2	15
UQ2, UK2Q	Latvia	EU	Communist SSR[52 53]	24,595	2,285,000	2	15
UR2, UK2R	Estonia	EU	Communist SSR[52 53]	17,413	1,294,000	2	15

Prefix	Country	Continent	Form of Government	Area in Square Miles	Permanent Population	Class of Country	Zone
VE, VO	Canada	N A	Constitutional Monarchy[54]	3,851,809	22,248,000	1	1, 2, 3, 4, 5
VK, AX	Australia (Inc. Tasmania)	OC	Constitutional Monarchy[54]	2,967,909	12,730,000	1	29, 30
VK	Lord Howe Island	OC (32°S, 159°E)	Administered by Australia[55]	5	265	3	30
VK4	Willis Island	OC (16°S, 150°E)	Administered by Australia	1	3	4	30
VK9X	Christmas Island	OC (10°S, 106°E)	Administered by Australia	55	3000	3	29
VK9Y	Cocos Islands (Cocos-Keeling)	OC (12°S, 97°E)	Administered by Australia	5	1000	3	29
VK9N	Norfolk Island	OC (29°S, 168°E)	Administered by Australia	13	1000	3	32
VK9	Papua Territory	OC	U.N. Trust Territory Administered by Australia	86,100	685,000	3	28
VK9	Territory of New Guinea	OC	U.N. Trust Territory Administered by Australia	92,160	1,663,000	3	28
VK9	Northern Solomon Islands	OC (5°S, 155°E)	UN Trust Territory[65]	4,100	72,490	3	28
VK9	Mellish Reef	OC	None	0	0	5	30
VKØ	Heard Island & McDonald Island	AF (54°S, 74°E)	Administered by Australia	140	0	4	39
VKØ	Macquarie Islands	OC (56°S, 159°E)	Administered by Australia[56]	42	0[57]	4	30
VO	Newfoundland & Labrador (Deleted)	N A	Now part of Canada	—	—	6	2
VP1	British Honduras	N A	British Crown Colony	8,867	127,000	2[58]	7
VP2E, K	Anguilla	N A (18°N, 63°W)	Constitutional Monarchy[59]	35	5,500	2	8
VP2A	Antigua + Barbuda and Redonda	N A (17°N, 61°W)	Constitutional[60] Monarchy	172	67,000	2	8
VP2V	British Virgin Islands	N A (18°N, 64°W)	British Crown Colony	59	10,000	3	8
VP2D	Dominica	N A (15°N, 61°W)	Constitutional[60] Monarchy	290	78,000	2	8
VP2G	Grenada & Dependencies	N A (12°N, 61°W)	Constitutional[60] Monarchy	133	110,000	2	8
VP2M	Montserrat	N A (16°N, 62°W)	British Crown Colony	38	15,000	3	8
VP2K	St. Kitts & Nevis	N A (17°N, 62°W)	Constitutional[60] Monarchy	101	70,000	2	8
VP2L	St. Lucia	N A (14°N, 61°W)	Constitutional[60] Monarchy	238	117,000	2	8
VP2S	St. Vincent & Dependencies	N A (13°N, 61°W)	Constitutional[60] Monarchy	150	99,000	2	8
VP5	Turks & Caicos Islands	N A (22°N, 72°W)	British Crown Colony	166	6,000	3	8
VP7	Bahama Islands	N A	Self-Governing British Territory	4,403	161,000	2	8

Prefix	Country	Continent	Form of Government	Area in Square Miles	Permanent Population	Class of Country	Zone
VP8, LU	Falkland Islands (Islas Malvinas)	S A (52°S, 59°W)	British Crown Colony (Claimed by Argentina)	4,700	2,172	3	13
VP8, LU-Z	South Georgia Islands	S A (55°S, 37°W)	British Administration[61] (Claimed by Argentina)	1,450	1,329	3	13
VP8, LU-Z	South Orkney Islands	S A (61°S, 45°W)	Part of British Antarctic Territories (Claimed by Argentina)	400	0	4	13
VP8, LU-Z	South Sandwich Islands	S A (57°S, 27°W)	British Administration[61] (Claimed by Argentina)	130	0	4	13
VP8, LU-Z	South Shetland Islands	S A (63°S, 60°W)	Part of British Antarctic Territories (Claimed by Argentina)	—	0	4	13
VP9	Bermuda	N A (32°N, 64°W)	British Crown Colony	21	53,000	3	5
VQ1	Zanzibar	AF	Now part of Tanzania	1,026	57,923	2[62]	37
VQ6	British Somaliland (Deleted)	AF	Now part of Somali Rep.	—	—	6	37
VQ8, 3B6, & 3B7	Agalega & St. Brandon	AF (10°S, 57°W & 16°S, 60°W)	Dependencies of Mauritius	27.5	55	4	39
VQ8, 3B8	Mauritius	AF (20°S, 57°E)	Constitutional Monarchy[54]	720	853,000	1	39
VQ8, 3B9	Rodriguez Island	AF (20°S, 63°E)	Dependency of Mauritius	40	13,333	3	39
VQ9	Aldabra Island	AF (9°S, 46°E)	Territorial[64]	60	100	3	39
VQ9	Chagos Island	AF (7°S, 72°E)	Territorial[64]	60	1048	3	39
VQ9	Desroches Island	AF (6°S, 56°E)	Territorial[64]	2	50	3	39
VQ9	Farquhar Island	AF (9°S, 51°E)	Territorial[64]	1.5	40	3	39
VQ9	Seychelles Islands	AF (4°S, 56°E)	British Crown Colony	145	52,000	3	39
VR1	British Phoenix Islands	OC (5°S, 172°E)	Joint US and British Administration	34	1000	3	31
VR1	Gilbert, Ellice & Ocean Islands	OC (0°, 174°E)	British Crown Colony	342	62,000	3	31
VR3	Christmas and Fanning Islands	OC (2°N, 157°W)	Claimed by US and Britain	200	376	3	31
VR4	Southern Solomon Islands	OC (10°S, 160°E)	British Protectorate[66]	11,500	159,000	3	28
VR6	Pitcairn Island	OC (25°S, 130°W)	Territorial[67]	2	90	3	32
VS1, 9M & 9V	Singapore	AS	Republic	224	2,128,000	1	28
VS4	Sarawak (Deleted)	OC	Now part of E. Malaysia	47,071	700,000	6	28
VS5	Brunei	OC	Sultanate	2,226	129,000	1	28
VS6	Hong Kong	AS	British Crown Colony	398	4,204,000	3	24
VS9K	Kamaran Island	AS	Part of Southern Yemen	28	2,200	3	21
VS9H	Kuria Muria Island (Deleted)	AS	Part of Muscat & Oman	28	78	6	21
VU	Andaman & Nicobar Islands	AS (10°N, 95°E)	Territorial[68]	3200	54,000	3	26
VU	India	AS	Republic	1,261,817	578,272,000	1	22
VU	Laccadive Islands	AS (10°N, 73°E)	Territorial[68]	11	24,000	3	22
XE, XF, 4A, 6D	Mexico	N A	Republic	761,602	54,253,000	1	6
XF4, 6D4	Revilla Gigedo	N A (18°N, 112°W)	Administered by Mexico	320	0	4	6
XT	Voltaic Republic (Upper Volta)	AF	Republic	105,869	5,508,000	1	35
XU	Cambodia	AS	Republic	69,898	7,153,000	1	26
XW8	Laos	AS	Republic	91,429	3,106,000	1	26
XZ2	Burma	AS	Republic	261,790	28,087,000	1	26
YA	Afghanistan	AS	Constitutional Monarchy	250,000	16,716,000	1	21
YI	Iraq	AS	Republic	167,925	9,492,000	1	21
YJ, FU8	New Hebrides	OC (16°S, 168°E)	Condominium[69]	5,700	90,000	3	32
YK	Syria	AS	Republic	71,498	6,252,000	1	20
YN, HT	Nicaragua	N A	Republic	50,193	1,988,000	1	7
YO	Rumania	EU	Communist Dictatorship	91,699	20,858,000	1	20
YS	El Salvador	N A	Republic	8,260	3,642,000	1	7
YU, YT	Yugoslavia	EU	Communist Dictatorship	98,766	20,859,000	1	15
YV, 4M	Venezuela	S A	Republic	352,145	10,771,000	1	9
YVP	Aves Island	N A (16°N, 64°W)	Administered by Venezuela	1	0	4	8
ZA	Albania	EU	Communist Dictatorship	11,100	2,135,000	1	15
ZB2	Gibraltar	EU	British Crown Colony	2.3	26,000	3	14
ZC5	British North Borneo (Deleted)	OC	Now part of E. Malaysia	29,388	400,000	6	28
ZC6	Palestine (Deleted)	AS	Now part of Jordan & Israel	10,429	—	6	20
ZD3	The Gambia	AF	Republic	4,361	373,000	1	35
ZD4	Gold Coast (Deleted)	AF	Now part of Ghana	—	—	6	35
ZD7	St. Helena Island	AF (16°S, 6°W)	Territorial[70]	47	5,000	3	36
ZD8	Ascension Island	AF (8°S, 14°W)	Territorial	34	430	3	36
ZD9	Tristan de Cunha & Gough Islands	AF (37°S, 12°W)	Territorial	81	300	3	38
ZE	Rhodesia	AF	Republic	150,333	5,594,000	1	38
ZF1, VP5	Cayman Islands	N A (20°N, 81°W)	British Crown Colony	100	9,000	3	8
ZK1	Cook Islands	OC (10°S, 163°W)	Dependency[71]	93	21,000	3	32

Prefix	Country	Continent	Form of Government	Area in Square Miles	Permanent Population	Class of Country	Zone
ZK1	Manihiki Island	OC (10°S, 160°W)	Administered from the Cook Islands	2	1,000	3	32
ZK2	Niue Island	OC (19°S, 170°W)	Dependency of New Zealand	100	5,000	3	32
ZL	Auckland & Campbell Islands	OC (53°S, 168°E)	Administered by New Zealand	250	0	4	32
ZL	Chatham Islands	OC (44°S, 176°W)	Administered by New Zealand	400	500	3	32
ZL	Kermadec Islands	OC (30°S, 178°W)	Administered by New Zealand	13	8	4	32
ZL	New Zealand	OC	Constitutional Monarchy[54]	103,736	2,894,000	1	32
ZM7	Tokelau Islands	OC (9°S, 172°W)	Administered by New Zealand[72]	4	2,000	3	31
ZP	Paraguay	S A	Republic	157,048	2,452,000	1	11
ZS	South Africa	AF	Republic	471,445	20,580,000	1	38
ZS2	Prince Edward & Marion Islands	AF (47°S, 38°E)	Administered by South Africa	180	0	4	38
ZS3	Southwest Africa	AF	Dependency of South Africa[73]	318,261	638,000	2	38
1G[74]	Geyser Reef	AF	None (unclaimed)	0.001[75]	0	5	39
1M[74]	Minerva Reefs	OC (24°S, 179°W)	None (unclaimed)	0.001[75]	0	5	32
1S	Spratly Islands	AS (8°N, 112°E)	Claimed by China, Viet Nam & The Philippines[76]	1.5	0	4	26
3A	Monaco	EU	Principality	0.58	24,000	1	14
3C, EA0	Edquatorial Guinea[77]	AF	Republic	10,800	296,000	1	36
3C0	Annobon Island	AF (2°S, 6°E)	Administered by Equatorial Guinea	5.5	1400	3	35
3D2, VR2	Fiji Islands	OC (17°S, 178°E)	Constitutional Monarchy[54]	7,055	567,000	1	32
3D6, ZS7, & ZD5	Swaziland	AF	Constitutional Monarchy	6,704	448,000	1	36
3V8	Tunisia	AF	Republic	63,379	4,974,000	1	33
3W8, XV5	North Vietnam[78]	AS	Communist Dictatorship	61,294	22,685,000	1	26
3W8, XV5	South Vietnam	AS	Republic	67,108	18,808,000	1	26
3X, 7G	Republic of Guinea	AF	Republic	94,926	4,078,000	1	35
3Y, LA/G	Bouvet Island	AF (55°S, 3°E)	Administered by Norway	20	0	4	38
4S7	Ceylon	AS	Constitutional Monarchy[54]	25,332	13,143,000	1	22
4U1	ITU, Geneva	EU	Club[79]	1 room[79]	0	5	14
4W	Yemen	AS	Republic	75,290	5,700,000	1	21
4X, 4Z	Israel	AS	Republic	7,992	2,991,000	1	20
5A	Libya	AF	Republic	679,362	2,011,000	1	34
5B4, ZC4	Cyprus	AS	Republic	3,572	643,000	1	20
5H3, VQ3	Tanzania[80]	AF	Republic	362,821	13,566,000	1	37
5N2, ZD2	Nigeria	AF	Republic	356,669	68,580,000	1	35
5R8, FF8	Malagasy Republic	AF	Republic	226,658	6,979,000	1	39
5T	Mauritania	AF	Republic	397,956	1,210,000	1	35
5U7	Niger Republic	AF	Republic	489,191	3,946,000	1	35
5V	Togo	AF	Presidential Regime	21,622	1,908,000	1	35
5W1, ZM6	Western Samoa	OC	Parliamentary	1,097	149,000	1	32
5X5, VQ5	Uganda	AF	Republic	91,134	8,981,000	1	37
5Z4, VQ4	Kenya	AF	Republic	224,960	11,123,000	1	37
601, 2, 6	Somali Republic	AF	Republic	246,200	3,026,000	1	37
6W8	Senegal Republic	AF	Republic	75,750	4,305,000	1	35
6Y5, VP5	Jamaica	N A	Constitutional Monarchy[54]	4,232	2,103,000	1	8
70, VS9A	Southern Yemen	AS	Council	111,075	1,300,000	1	21
7P8, ZS8	Lesotho	AF	Constitutional Monarchy	11,720	991,000	1	38
7Q7, ZD6	Malawi	AF	Republic	45,483	4,642,000	1	37
7X, FA	Algeria	AF	Republic	919,595	13,663,000	1	33
8F, YB, & PK8	Indonesia	OC	Republic	735,272	122,043,000	1	28
8P, VP6	Barbados	N A (13°N, 59°W)	Constitutional Monarchy[54]	166	263,000	1	8
8Q, VS9M	Maldive Islands	AS (4°N, 73°E)	Constitutional Monarchy	115	113,000	1	22
8R, VP3	Guyana	S A	Republic	83,000	758,000	1	9
8Z4	Saudi Arabia-Iraq Neutral Zone	AS	Administered by UN	—	0	4	21
9A1, M1	San Marino	EU	Republic	24	19,000	1	15
9G1, ZD4	Ghana	AF	Republic	92,100	9,073,000	1	35
9H1, ZB1	Malta	EU	Constitutional Monarchy[54]	122	305,000	1	15
9J2, VQ2	Zambia	AF	Republic	290,586	4,442,000	1	36
9K2	Kuwait	AS	Empire	6,178	690,000	1	21
9K3, 8Z5	Kuwait/Saudi Arabia Neutral Zone (Deleted)	AS	Administered by UN	—	0	6	21
9L1,	Sierra Leone	AF	Constitutional Monarchy[54]	27,699	2,588,000	1	35
9M2	Malaya	AS	Now West Malaysia	50,700	9,500,000	6	28
9M2, 4	West Malaysia	AS	Parliamentary Federation[81]	50,700	9,500,000	1	28
9M6, 8	East Malaysia	OC	Parliamentary Federation	77,730	1,700,000	1	28
9N1	Nepal	AS	Constitutional Monarchy	54,362	11,110,000	1	22
9Q5, OQ5	Zaire (Formerly Republic of the Congo)	AF	Republic	905,568	17,859,000	1	36
9S4	Saar (Deleted)	EU	Now part of W. Germany	991	1,100,000	6	14
9U5	Burundi	AF	Republic	10,747	3,614,000	1	36
9U5	Ruanda-Urundi (Deleted)	AF		—	—	6	36
9X5	Rwanda	AF	Republic	10,169	3,734,000	1	36
9Y4, VP4	Trinidad/Tobago	S A	Constitutional Monarchy[54]	1,980	1,099,000	1	9
—	Abu Ail, Jabal at Tair	AS (16°N, 42°E)	None	—	—	4	21
—	Blenheim Reef	AF (4°S, 73°E)	None	0	0	5	39

DX

BY JOHN A. ATTAWAY,* K4IIF

IN the July issue we described the debate and subsequent vote by the *CQ* DX Awards Advisory Committee which resulted in the creation of a new program involving monoband WAZ certificates. These awards will be given for WAZ on single bands via each of the two major modes, phone and c.w. The phone certificate will include both s.s.b. and a.m. Contacts for the monoband certificates may be made starting at 0000 GMT, Jan. 1, 1973.

To add to the excitement, the first winner for each mode on each band will be awarded a plaque showing that he is number one. There will be ten plaques, one for each phone and each c.w. winner on each of the five major amateur bands, 80-10 meters. These will be beautiful plaques, and we anticipate that the competition for them will be formidable. We suggest that you pick your band with care and put up the best antenna possible in the space available to you.

Those competing for the plaques must send their cards directly to the DX Editor. Later applicants may take advantage of our checkpoints. Getting the cards will be almost as great a challenge as working the stations if you are competing for one of the top spots. It is possible that someone with superior QSLing techniques may edge out an operator who actually makes his contacts first. The winners will be determined by the earliest postmark on the envelope bearing the 40 QSLs to DX Editor, K4IIF. To insure a clear postmark it is suggested that the cards be Registered and a clear date stamped so that there can be no question.

In reply to those who have inquired, the addition of this new program will have *no* effect on our regular WAZ program. The s.s.b., phone and c.w.-phone certificates for multiband contacts will continue to be available.

Here and There

Hopefuls: The West Coast DX Bulletin reports that activity is possible from several very rare spots during the coming months. Details are:

Burma, XZ2 — 9M2IR and others are working on arrangements for this one.
Clipperton, FO8C — A group is trying to set up an operation in November.
Formosa, BV1 — A K4 is in Taiwan and hopes to operate an authorized station.
Guinea, 3X — DXers are seeking permission to enter 3X-land from a neighboring country and operate.
Iraq, YI — JY amateurs hope for possible action this fall. It is said to be essentially a political problem.
Kamaran, VS9K? — An operation could begin at any time.
South Sandwich, VP8 — Some of the Falkland Islands amateurs may make it to South Sandwich in the late fall or early winter.
Spratly, 1S — Could be on the air very shortly.
New NCDXC Officers: — Newly elected officers of the Northern California DX Club are Doug Murray, W6HVN, President; Iris Colvin, W6DOD, Vice President; Ron Daniels, K6DYQ, Secretary; and Al Burnham, K6RIM, Treasurer. *(Tnx WA6AOD).*
Intruders: A number of prominent DXers have expressed concern over massive intrusions into the 20 meter band by stations passing commercial, political and paramilitary traffic in the Arabic language. These intrusions normally occur from 0800 to 1300 **GMT** between 14280 and 14350 kHz. Suggestions regarding the best way to deal with these offending stations will be welcomed by Michael Hacker, WA2BVU, 64 Helen Marie Pl., Hauppauge, New York 11787. Amateurs complaining about this situation include DJ1HP, DJØRE, EP2WB, ET3USF, FL8MM, G3UAN, G3UML, KL7HFA, OH2BDP, OH2BW, SM1CNS, SM7DL, SV1GH, WA2BVU,

Ron, K9RJP/ZF1RL (left) and Mel, K9QFZ/ZF1ML (right) operating from Grand Cayman. Over 2200 contacts were made in about one week, with heavy emphasis on 10, 40 and 80 meters for the boys interested in 28 mHz and Low Band Endorsements for their *CQ* DX Award certificates.

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

The CQ DX Award Program

C.W. DX

94. . . .K2TKR

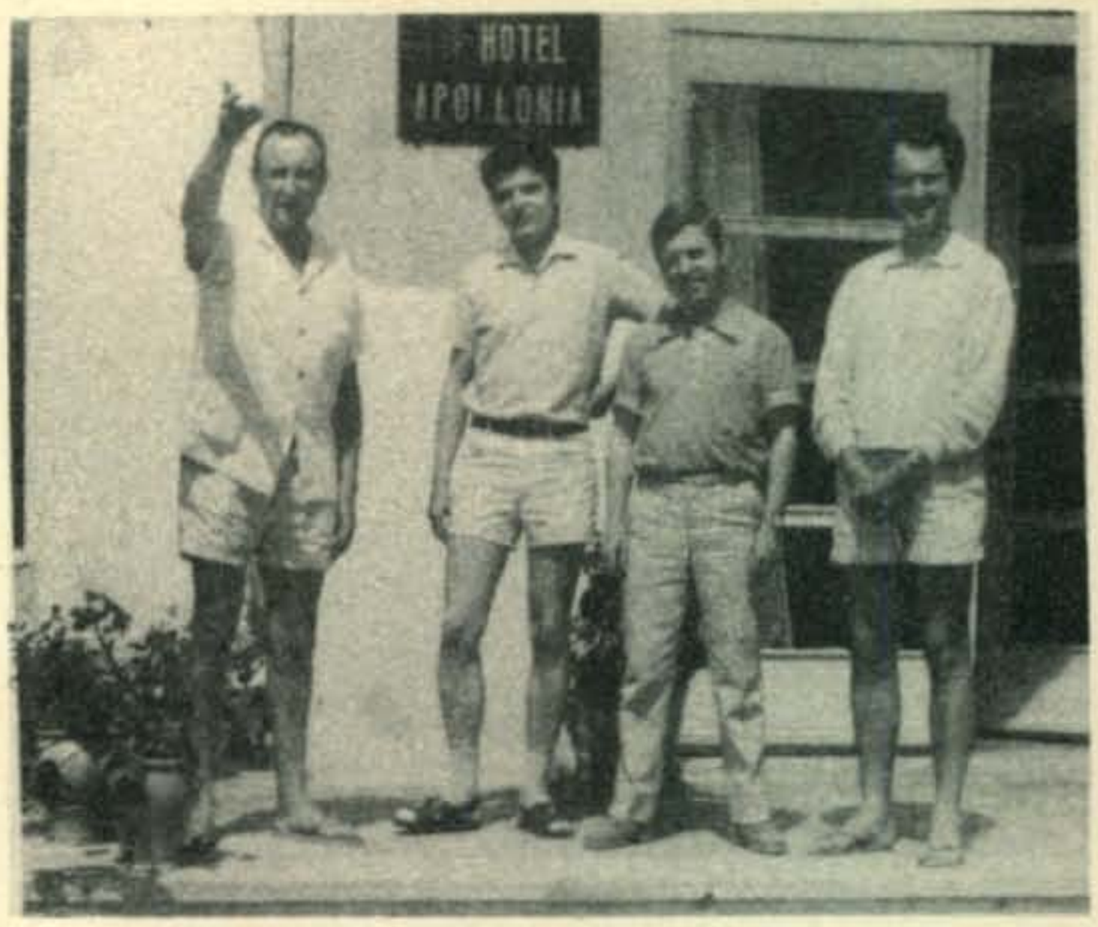
S.S.B. DX

220 .....K2TKR
221.....KC6RS
222 .....11WT
223....WB4DOY
224....WA5TYB

CQ DX Endorsements

S.S.B.: 11WT—250, W3YHR—200, WB4DOY—200 and CO2FA—200. WA6TAX—28 mHz

Complete rules for the *CQ* DX Award Program may be found on pg. 58 of the January, 1971 issue. Application blanks and copies of the rules may be obtained by sending a business size, self-addressed stamped envelope to the DX Award Manager, P.O. Box 1271, Covina, CA 91722, or to the DX Editor.



The ZA2RPS gang in front of their hotel in Albania. Left to right are Frank, DL7FT; Tom, DL7AU; Bahrit; and Klaus, DL7NS. Frank advises that cards are still available for those who have not yet QSLed. The proper route is via F. Turek, DL7FT, Petunienweg 99, 1 Berlin 47, Germany. *(Photo via W1WY)*

4S7AB, 4X4NJ, 4Z4DS, 5H3LV, 5N2ABG, and 9H3B.

Navassa Story: Copies of the US Air Force Medical Service Digest article on the Navassa activity in February, 1971 are available free of charge from Richard J. Brown, WØEXD/KC4, Pathology Bldg. 626A, NAMRL, Pensacola, FL 32512.

Inflation Fighters: In response to several letters we are happy to assure you that *CQ* plans no increase in its basic $1.00 certificate fee which has remained the same for 25 years. We will also continue to make no charge for endorsements other than an s.a.s.e. or IRC for postage. Expanding magazine sales and increased advertising revenues make this liberal approach possible.

FP8, St. Pierre — Larry, WAØGQI, and Ron, KØALL, are planning a DXpedition to this rare QTH for the s.s.b. weekend of the *CQ* Worldwide DX Contest in October.

FS7, St. Martin — Joe, W3HNK, will be active from Oct. 17-30, including the phone weekend of the *CQ* Worldwide DX Contest.

Rare and Unusual Prefixes for WPX

C29 — C29ED was a special call in Nauru. QSL to C21TL, Box 32. Nauru. South Pacific.

IH9 — IH9LAW operated from Pantelleria Island (Zone 33) in June. QSL to IT9GAI.

IMØ — IMØBUP was on Maddalene Island in the Mediterranean.

JF — This will be the next series to be used by Japanese amateurs.

KC2 — Cards for KC2GMF should go to Bill West, 7 Harbor Green, Red Bank, N.J.

KE4 — QSLs for KE4ITU may be sent via K4ZA.

LZ9 — LZ9OD was reported on 14180 and 21030 kHz.

PTØ — PTØMI was a call used on the St. Peter & St. Paul Rocks DXpedition by PY2MI and PY2ERS.

PQØ & PUØ — PQØMI and PUØWH were used by PY2MI and PY2ERS on their DXpedition to Fernando de Noronha.

S2, S3, & S21 — These are understood to be new prefixes for Bangladesh. Some uncertainty exists regarding whether they are official with ITU. S21IR and VE7IR/S2 QSLs go to VE7BWG.

WC4 — WC4BCC cards go to K4REL.

WE4 — QSL WE4ITU via K4ZA.

WG3 — Cards for WG3SFC may be sent to WA3NAN.

WM2 — WM2GK QSLs to K2NP.

WM3 — QSL WM3ARW c/o WA3ATP

WM4 — Send cards for WM4SFC to K4BFT.

WR5 — WR5OAR QSLs should be sent via WA5ZNY

WU3 — QSL WU3SNA to W3ADO

WX6 — Cards go via MARCO, Box 229, Manchester, CT 06040

XUØ — The call XUØIR was assigned to VE7IR.

WPX HONOR ROLL

The WPX Honor Roll is based on confirmed current prefixes which are submitted by separate application in strict conformance with the *CQ* Master Prefix List. Scores are based on the current Prefix total regardless of an operators all-time prefix count.

CW

W4OPM	Joe Hiller	950
W8LY	Michael A. Bakos	909
W8KPL	William W. Simpson	853
W2HO	W. Vollkommer	825
W2AIW	Charles W. Rogers	813
DL1QT	Helmut Baumert	810
VK3AHQ	Henry Denver	809
ON4QX	Bob Berge	804
W9FD	W. W. Johler	740
WB2FMK	Robert J. Rasche	720
OK2DB	Jaroslav Dufka	693
G2GM	F. D. Cawley	687
DJ7CX	Leonhard Poelt	680
K1SHN	Chuck Banta	673
YU1AG	Djura Borosic	663
SM5BNX	Ake Sundvik	652
W4IC	George A. Mack	652
K2AAC	J. O. Archibald	650
I6SF	Serafino Franchi	639
W6ISQ	John G. Troster	638
K1LWI	F. Wendell Boyden, Jr.	629
W8GMK	John Marhefka	628
VO1AW	Clarence Mitchell	605
VE4OX	D. E. McVittie	600

SSB

W4OPM	Joe Hiller	1075
W4NJF	Gay E. Milius, Jr.	1001
CT1PK	Manoel F. De Almeida	930
W9DWQ	Edward A. Goodbout	826
DL90H	Karl Muller	813
IØAMU	Alfonso Porretta	812
HP1JC	Juan G. Chen	800
WØYDB	W. C. "Bill" Higgins	760
PAØSNG	G. Mulder	758
DL1MD	Heribert Rechl	748
I8KDB	Giampaolo Nucciotti	743
K2POA	Arthur B. Johnson	733
G3DO	D.A.G. Edwards	719
I1ZV	Francesco Cherubini	716
F2MO	Michel Dort	711
W4IC	George A. Mack	702
K1SHN	Chuck Banta	697
W3DJZ	Arden B. Hopple	694
WA5LOB	James D. Edwards	692
ZL3NS	T. Ositis	685
W6RKP	James Chavarria	622
I4LCK	Franco Armenghi	608

MIXED

W4OPM	Joe Hiller	1162
VE3GCO	Garry V. Hammond	925
W2NUT	Howard Geberth	924
F9RM	Jean-Pierre Guillou	921
W8LY	Michael A. Bakos	912
ON4QX	Bob Berge	886
PAØSNG	G. Mulder	882
W8ROC	Frederick Riecks	882
DL1CF	Heinz Hildebrand	872
W3PVZ	Joseph Olnick	872
WA6MWG	"Pete" Billon	857
DL1MD	Heribert Rechl	844
K1SHN	Chuck Banta	835
W9WHM	John R. Leary	811
YU1AG	Djura Borosic	811
G3DO	D.A.G. Edwards	810
DJ7CX	Leonhard Poelt	808
W4IC	George A. Mack	803
W4CRW	Robert C. Sommer	798
W3GJY	John F. Wojtkiewicz	797
W4BQY	G. B. Fisher	791
W0AUB	Bill Bergmann	785
I6SF	Serafino Franchi	780
W6ISQ	John G. Troster	758
K8UDJ	Charles L. Hutchinson	750
CT1LN	Paulo J. S. Coelho Vieira	
W4WSF	John C. Kanode	745
KØBLT	Frank Cahoy	733
PY4AP	"Biu" Marra	715
WA5LOB	James Edwards	699
WA6EPQ	Larry Brockman	689
K2AAC	J. O. Archibald	686
K6SDR	Terry Baxter	686
W8GMK	John Marhefka	683
SM7TV	Boris Goransson	674
WAØCPX	Edward C. Gray	656
WB4KZG	Daniel K. Sullivan	651

ZA1 — The Long Island DX Association Bulletin reports that K6IC received a ZA1ZA QSL card via YU2BRO indicating that this Albanian station was not a pirate as had been reported by some.

ZM — ZM prefixes are being used by New Zealand amateurs to commemorate the Commonwealth games in 1973. Special QSLs will be used and special awards are planned for stations working certain numbers of ZMs. ZL3BJ will handle these awards.

4JØ — 4JØDI in the Kurile Islands has been worked on s.s.b. between 14215 and 14220 kHz. QSL to Box 88, Moscow, USSR.

The WAZ Program

S.S.B. Waz

3386 ..... HB9ANR
3386 ..... W6DH
338 ..... DK1QV
3389 ..... DL9WX
3390 ..... DL1IV
3391 ..... DK2RP
3392 ..... YU2QZ
3392 ..... JA2EG
3393 ..... 3B8DA
3394 ..... W4WRY
3395 ..... JA6ANT
3396 ..... W4DQD
3397 ..... W3BK

C.W.—Phone WAZ

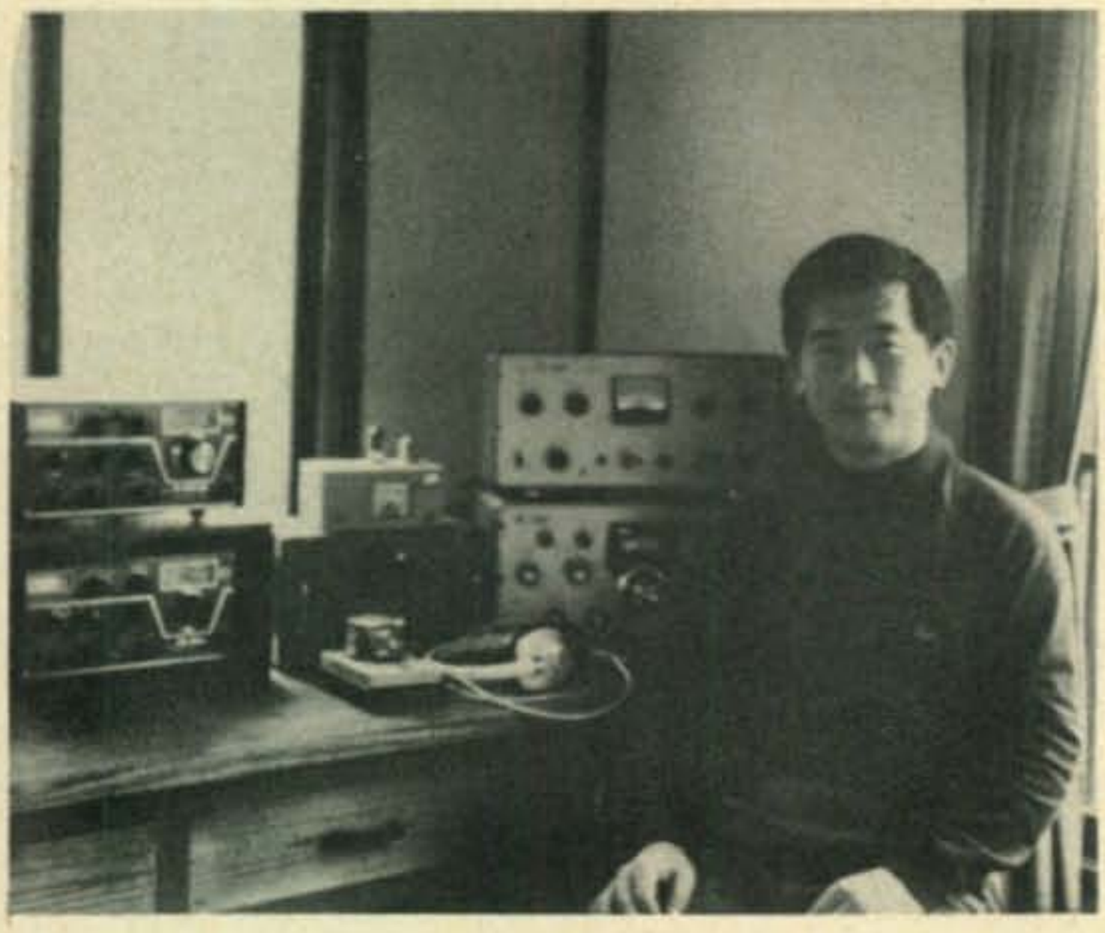
1005 ..... KP4CQB
1006 ..... DL8CM
1007 ..... VE1PL
1008 ..... W6AXH
1009 ..... WA6LLY
1010 ..... W1JMT
1011 ..... WA9IVL
1012 ..... CR4BS
1013 ..... W3BWZ
1014 ..... WA9VGY

Complete WAZ rules are shown on pgs. 64-66 of the June, 1970 issue of *CQ*. Application blanks and reprints of the rules may be obtained by sending a self-addressed, stamped envelope to DX Editor, P.O. Box 205, Winter Haven, FL 33880.

7XØ — 7XØGM has been active in the 21275-21300 kHz sub-band. QSLs go to P.O. Box 2, Algiers, Algeria.

7X7 — This special prefix was used by 14 Algerian stations during July, August and September, 1972 only. A special certificate is available if you worked five of them. QSL via P.O. Box 2, Algiers, Algeria.

9H3 — 9H3ITF was active during the International Trade Fair, July 1-14. QSL to 9H1E.



If autumn comes, can 160 be far behind? Above is Minekazu Sugiyama, JH1LKH, an active 160 meter DXer since 1968. His first stateside contact, using only 10 watts, was with W7DL/7. Now he works W6's and W7's regularly, and his goal is to work the east coast W's *(Photo via W1BB)*

The WPX Program

S.S.B. WPX

695 ..... F5JR
698 ..... W1COA
699 ..... PY2CAB
700 ..... CR4BS
701 ..... G3UVA

C.W. WPX

1187 ..... DL7CL
1188 ..... WA3MQJ
1189 ..... SM6BZE
1190 ... OK3CCC
1191 ..... WØIUB

Mixed WPX

340 ..... OK3EE
341 ..... W6TCQ
342 ..... 5H3LV
343 .... WA5RXT
344 .... WA0KDI

WPNX

49. . . . WN4VGZ

WPX Endorsements

S.S.B.: IØAMU—850, HP1JC—800, W1-COA—600, I4LCK—600, W3YHR—500, PY2CAB—500, WA5VDH—450 and WA2EAH—450.

C.W.: W8KPL—1000, G2GM—750, DL7MQ—550, W4KFB—400, DL7CL—400, OK3CCC—400, WA2EAH—350 and SM6BZE—350.

MIXED: W8ROC—900, W9IRH—700, W6TCQ—700, WAØKDI—700, WA2-EAH—600, 5H3LV—600, W3YHR—550, OK3EE—550 and JA1BN—550.

160 Meters: OK3EE and OK3CCC

80 Meters: W4WSF and OK3EE

40 Meters: I4ZSQ

20 Meters: W4WSF, WA5VDH and OK3-CCC.

15 Meters: WA5VDH

Africa: K2OLG, 5H3LV and I4ICK

Asia: W8GKM, OK3EE and I4LCK

Europe: W4KFB, WB2MQI, WA2E AH, F5JR, OK3EE, 5H3LV, DL7CL - and OK3CCC.

Oceania: WA5VDH, W4HHN and 5H3LV.

Complete rules for WPX, WPNX, and VPX may be found on pg. 67 of the February, 1972 issue. Application blanks and reprints of the rules may be obtained by sending a business size, self-addressed, stamped envelope to DX Award Manager, P.O. Box 1271, Covina. CA 91722, or to the DX Editor.

QTH's and QSL Managers

A35JH (Tonga) Via WB5BHN
A51KV To W6KNH
CR7GJ — Via W3HNK
CT2BG c o WA2BCK.
96 Fairhaven Drive. Cheektowaga. N.Y. 14225
EL2CY Via WA1KYW
EL9A To WA6TWG
EP2TW c o GI3HXV

[*Continued on page 116*]

Propagation

BY GEORGE JACOBS,* W3ASK

Contest Special

The 1972 *CQ* World Wide DX Contest will be held on the following dates:

Phone section: 0000 GMT October 28 — 2400 GMT October 29

C.w. section: 0000 GMT November 25 — 2400 GMT November 26

Continuing with the practice of the past 22 years, this month's PROPAGATION column contains a special forecast for use during the contest sections, both phone and c.w.

The stalled solar cycle should prove to be a bonus to participants in this year's DX contest. Solar activity is now running about 25% *higher* than originally expected. This means that solar activity during the contest period should be in the low 50's rather than the low 40's. Statistically, this difference may not seem to be very much, but it should be enough, for example, to keep the 10 meter band open for world wide DX, and produce good DX propagation conditions on most of the other h.f. amateur bands.

Solar Cycle

As mentioned in the previous paragraph, solar activity has remained at a considerably higher level than had been expected. The Swiss Federal Solar Observatory, the world's official keeper of sunspot records, reports a monthly mean sunspot number of 83 for June, 1972.

This results in a 12-month smoothed sunspot number of 70, centered on December, 1971.

Smoothed sunspot numbers of 51 and 50 are now forecast for October and November, 1972, respectively. A sunspot level of 67-68 was recorded during last year's contest period.

In short, while solar conditions during the 1972 *CQ* World Wide DX Contest should be considerably better than originally expected, they will be somewhat below the conditions experienced during last year's contest. Barring any sudden radio storm, however, generally good DX propagation conditions are expected on almost all of the h.f. amateur bands.

General Conditions, Band-by-Band

The following is a band-by-band summary of general DX propagation conditions that can be expected during the 1972 contest period.

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

LAST MINUTE FORECAST

Day-to-Day Conditions Expected For September, 1972

Propagation Index	Rating & Forecast Quality (4)	(3)	(2)	(1)
Date				
Above Normal: Oct. 1-2, 7, 20, 22, 29	A	A	C	C
Normal: Oct. 3, 6, 8-9, 11-12, 16, 18-19, 21, 24-26, 28, 30	B	C	D	E
Below Normal: Oct. 4-5, 10, 13, 15, 23, 27, 31	C	D	E	E
Disturbed: Oct. 14	D	D	E	E

Where *expected signal quality* is:

A—Excellent opening, exceptionally strong, steady signals.

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

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

D—Poor opening, signals weak with considerable fading and noise.

E—No opening expected.

HOW TO USE THIS FORECAST

1. Find *propagation index* associated with particular band opening from Propagation Charts appearing on the following pages.

2. With the *propagation index*, use the above table to find the expected signal quality associated with the particular opening for any day of the month. For example, all openings shown in the Charts with a *propagation index* of (3) will be excellent on Oct. 29, but only fair on Oct. 28, etc.

10 Meters: Perhaps not quite as good as last year, but some fairly good openings should still be possible to many areas of the world during the daylight and early evening hours. Openings to Europe and those in a generally easterly direction should peak an hour or two *before* noon, while those in South American and Africa are expected to peak during the early afternoon hours. Openings to the Far East, Australasia, Southeast Asia, etc., are most likely to occur during the later afternoon hours and the early evening.

15 Meters: Good-to-excellent DX propagation conditions are expected from shortly after sunrise through the early evening hours. Openings are forecast to almost all areas of the world, and exceptionally strong signal levels may occur during many of them. For each geographical area of the world, conditions on 15 meters should peak about an hour or two after they have peaked on 10 meters. During most of the daylight hours, this will probably be the optimum band for DX openings to most areas of the world.

20 Meters: Generally good-to-excellent openings are forecast to one area of the world or another on this band, almost around-the-clock. DX conditions should peak an hour or two following local sunrise, and again during the late afternoon and early evening hours. Excellent openings are also forecast to many southern and tropical areas well into the hours of darkness.

40 Meters: DX openings to Europe and in an easterly direction should begin during the late afternoon hours and steadily improve towards darkness, with signal levels exceptionally strong at times. Openings in a westerly direction are expected to peak shortly after sunrise, just before the band closes for DX

propagation. During most of the hours of darkness, 40 meters should be the optimum band for DX propagation to many areas of the world.

80 Meters: Some fairly good DX openings should be possible on this band to several areas of the world during the hours of darkness and the sunrise period. Peak conditions are expected around midnight on paths to the east, shortly before sunrise for paths to the north or south, and shortly after sunrise for openings in a westerly direction.

160 Meters

The 160 meter band presents a particular challenge for working DX. Of all the h.f. bands, DX propagation is poorest on 160 meters, antennas are least efficient for DX, and there are severe restrictions on the maximum power that can be used. Perhaps it is this challenge that accounts for the increasing popularity of this band among DXers. During the 13th Annual *CQ* 160 Meter C.w. contest held this past January there were participants from 43 countries and 50 states! Similar participation is expected on 160 meters during the *CQ* World Wide DX Contest. The following is a brief explanation of 160 meter propagation, and some tips that might prove useful in working DX during the contest.

As a radio wave enters the ionosphere, it is both *refracted* and *absorbed.* The amount of energy lost varies *directly as the square of the wavelength.* For example, the absorption on 160 meters during the daylight hours is 256 times greater than on 10 meters; 64 times greater than on 20 meters; and 4 times greater than on 80 meters, etc. All other radiation factors equal, expressed in decibel terms, it would take 36 db more power to produce a certain signal strength on a 160 meter opening than it would for the same signal level on 20 meters, during the daylight hours.

Due to this high level of solar absorption, 160 meter signals rarely traverse the ionosphere during the daylight hours, and openings are restricted to the groundwave component of the signal which can travel up to several dozens of miles, depending upon the terrain. During the hours of darkness, when solar absorption is not a factor, 160 meter signals can be reflected from the ionosphere.

To travel long distances by way of ionospheric reflection, for example, beyond 1200 miles, requires that the signal be launched from the transmitting antenna at "take off" angles below about 10 degrees. Since take off, or radiation angle is a function of an antenna's height above ground, the higher the antenna, the more efficient is its radiation at the low DX angles. To maximize radiation below 10 degrees requires an antenna to be placed at least ½ wavelength above ground, and preferably considerably higher than this, if physically possible. At 10 meters this is no problem, since a wavelength is equal to approximately 30 feet. Even at 40 meters, a ½ wavelength is approximately 60 feet. But at 160 meters, an efficient DX antenna is a problem, since a wavelength is 480 feet! During the hours of darkness, while the ionosphere may reflect a 160 meter signal, it is still very difficult to achieve efficient DX propagation.

Atmospheric noise, or static which originates in thunder storms, tends to be stronger on 160 meters than other amateur bands. The auroral zones also shield 160 meter signals more so than signals on other bands, often limiting DX openings to much smaller geographical areas than on other bands.

With all of these handicaps, however, DX *is possible* on 160 meters, and an increasing number of radio amateurs are building up impressive DX records on this band.

The most likely time for a DX opening on 160 meters is when a path is in *complete* darkness. Within this period, conditions are generally at their best just as the sun begins to rise at the most *easterly* point on the path. The best forecaster for 160 meter DX openings is a set of sunrise and sunset tables! For example, if the sun is expected to rise at 0600 GMT in western Europe, then this is the best time to look for a 160 meter opening between western Europe and the USA, plus and minus 15 minutes to a half hour. Conditions on 80 meters can often also serve as an indicator for 160 meter DX openings. The 160 meter band may open at those times when 80 meters seems to peak on a particular path.

How To Use The DX Propagation Charts

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

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

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

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

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

4. Times shown in the Charts are in the 24-hour system, where 00 is midnight; 12 is noon; 01 is 1 A.M.; 13 is 1 P.M., etc. Appropriate *standard* time is used, *not* GMT. To convert to GMT, *add* to the times shown in the appropriate Chart 8 hours in the PST Zone, 7 in the MST Zone, 6 in the CST Zone and 5 in the EST Zone. For example, 14 in Washington, D.C. is 19 GMT and 20 in Los Angeles is 04 GMT, etc.

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

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

With these tips and some patience, it should be possible to work several areas of the world on 160 meters during the contest period.

Contest Work Plans

The *Charts* on the following pages show the times that each amateur band from 10 through 160 meters is expected to open for DX from the United States to the major areas of the world. Instructions for the use of these *Charts* are given in the box following the "Last Minute Forecast" at the beginning of this column.

The information contained in the *Charts* can be easily reorganized into several different type of operational work plans, or schedules, to serve as propagation guides during the contest period. Experience gained during previous contests has shown that such plans can be extremely useful in piling up a large number of points with a minimum of wasted time.

The following is an example of one of the many type of plans that can be devised. It shows, for each three hour period throughout the day, the areas of the world for which, in this example, 20 meter propagation conditions are expected to be optimum (a rating of 3 or higher in the Charts[1]). An eastern USA QTH has been chosen for this example, but similar plans can be devised for central and western locations, and for other bands.

Sample 20 Meter Operating Schedule for Eastern USA QTH

Time (EST)	*Areas to which openings should be optimum*
00-03	A few northern and central South American openings, and perhaps to Antarctica, but not much else. Good time for some sleep.
03-06	Still not much except for some weak openings to Europe and Africa. If you didn't get some sleep in before, get it now!
06-09	Excellent period. Good openings in many directions; Europe, north and west Africa, Far East, Asia, New Zealand, South Pacific, Australasia and South America.
09-12	Fairly good period. Openings to most of Europe, the Middle East, northern South America and the Pacific area.
12-15	Fairly good period. Openings to most of Europe, the Middle East, some parts of Africa, northern areas of South America. Good time for lunch.
15-18	Fair openings to western and central Europe and the Middle East. Catch them now or you miss them. Good openings to most of Africa and South America.
18-21	Good period to pile up points. Openings to most of Africa and South America. Some also to the Far East and other Asiatic areas. Fairly good openings to the Pacific Islands, New Zealand, Australasia and Antarctica.
21-00	Fairly good period. Openings to the Pacific and Australasia, South America, the Far East and Antarctica.

The following is a typical *multi-band* operational work plan devised from the propagation *Charts* for an Eastern USA QTH. The plan shows the times and bands when propagation conditions are expected to be optimum to various areas of the world, for each two hour period throughout the day.

Sample Multi-Band Work Plan Eastern USA QTH

Time EST	Optimum Band (Meters)	*Areas to which band expected to be open*
00-02	40	Most of Europe and Middle East; most of South America; a few Africans and possibly Antarctica.
02-04	40	Not much on any band. A good time to eat and catch up on some sleep. Some openings possible to the South Pacific, Australasia, Far East and other Asian areas but generally not too good. Some fairly good openings to South America.
04-06	40	Still time to catch up on some sleep. Some openings to South Pacific, New Zealand, Australasia. Some also to northern and central areas of South America. A few Far Eastern and Asian, and perhaps Antarctica.
06-08	20	Good openings to most of Europe, Pacific area, Australasia, Asia and the Far East. Also to most of South America and parts of Africa.
08-10	15	Good openings to all of Europe and the Middle East, and most of South America. A possible opening to the Pacific, Australasia and perhaps parts of Asia.
10-12	10	Good openings to most of Europe, most of Africa, and most of South America. Catch them during this period or you will probably miss them!
12-14	15	Good openings to most of Africa and most of South America, and to the western and southern areas of Europe.
14-16	20	Good openings to most of Europe, the Middle East, most of Africa, northern and central South America, and possibly some long-path openings to Australasia.
16-18	20	Good openings to most of Africa and South America, with some also possible to the western and southern areas of Europe.
18-20	15	Fair-to-good openings to the Pacific area, Australasia, Far East and other Asiatic areas. Good openings to central and southern South Amer-

[1] In some cases a rating of (2) or (1) was selected when no higher rating was expected on the particular path.

		ica, and a possible opening to Antarctica.
20-22	20	Openings to most of Africa, Pacific area, Australasia, Antarctica and all of South America.
22-00	40	Most of Europe should be possible, as well as the Middle East; most of South America, and some openings to the Pacific and Australasia.

Radio Storms

The forecasts discussed in this column are based on *normal* propagation conditions expected with a sunspot level in the low 50's. If actual conditions during the contest turn out to be *above normal,* DX openings on 10, 15 and 20 meters are likely to be somewhat better than shown in the *Charts.* On the other hand, if a radio storm should develop, with accompanying *below normal* or *disturbed* h.f. propagation conditions, fewer openings will take place on these bands. During radio storms, propagation conditions on 40, 80 and 160 meters generally also become erratic, with poorer openings during certain type of storm and improved openings during other types.

If a radio storm should develop during the contest, circuits passing through or near polar regions will probably become weak, fade considerably, or may even black out entirely, depending upon the severity and duration of the storm. During certain storms, while eastwest propagation may become poorer, north-south openings may improve.

If a storm should occur, concentrate on working the higher frequency bands and the paths to the northeast, north and northwest during the daylight hours, and the lower bands and the paths to the east, south and west during the evening and early morning hours. A "Last Minute Forecast" for the Phone section of the contest, made at press time, appears at the beginning of this column. A similar forecast for the c.w. section will appear in next month's column.

For a more complete discussion of radio storms, and what can or cannot be done about them on the amateur bands, see "Don't Be Afraid Of The Big Bad Blackout," by John J. Schultz in the November, 1969 issue of *CQ* (page 31).

WWV Forecasts

Up-dated propagation data and forecasts can be obtained directly from WWV voice transmissions during the contest. Located at Fort Collins, Colorado, WWV transmits continuously on the following frequencies:

2.5, 5, 10, 15, 20 and 25 mHz.

Propagation data is transmitted hourly, in voice, following the 14th minute time announcement. The transmission consists of a letter:

N (November)
U (Uniform)
W (Whiskey)

followed by a number between 1 and 9.

The letter designates propagation conditions expected during the *present* six hour period, as follows:

N—Normal propagation conditions

U—Conditions unstable or erratic, signals subject to increased fading and noise

W—Radio storm in progress, conditions below normal or disturbed

The number designates propagation conditions expected for the *following* six hour forecast period, as follows:

1—Useless; 2—Very Poor; 3—Poor; 4—Poor-to-Fair; 5—Fair; 6—Fair-to-Good; 7—Good; 8—Very Good; 9—Excellent

For example, the announcement "November-7," repeated once, would mean propagation conditions are normal at present, and are expected to be good during the next six hour forecast period.

While WWV forecasts apply primarily to h.f. trans-Atlantic circuits, they are also a good indication of general conditions on a world-wide basis.

Detailed data and forecasts concerning a wide range of solar and geomagnetic activity are also given hourly from WWV following the time announcement for the 18th minute, and hourly from WWVH following the 45th minute announcement. These announcements contain a description of current solar and geomagnetic activity and a forecast for the remainder of the day.

Solar data is assessed in terms of *very low, low, moderate, high* and *very high.* Similar data for geomagnetic activity is given in terms of *quiet, unsettled,* or *active.*

If a storm is in progress or is expected, the transmission will assess its severity in terms of *minor* or *major,* and give the time it began or is expected to begin, and when it ended or is expected to end.

All times in the transmission are given in U.T., which is the same as GMT. This information is revised daily at 0400 GMT, with provision to provide immediate storm alerts if it becomes necessary to do so.

WWVH incidently, is located at Kawai, Hawaii and transmits continuously on 2.5, 5, 10, 15 and 20 mHz. All announcements are in voice.

V.H.F. Ionospheric Openings

While the *CQ* DX contest *does not* include the v.h.f. bands, some ionospheric activity may be possible on these bands during October.

There is a fairly good likelihood for some meteor scatter openings on the v.h.f. bands during the two-day *Orionids* meteor shower, which should peak during the early morning hours of October 21st. This is expected to be a major shower, with an hourly rate of about 25 meteors.

There is a fairly good possibility for some 6 meter DX openings between the southern half of the United States and the central and southern regions of South America, by means of trans-equatorial or TE propagation. These openings generally occur during the evening hours, peaking between 8 and 11 p.m. local time, and the path must cross the magnetic equator at an approximate right angle.

Auroral activity usually increases during October, and some auroral-scatter type v.h.f. openings are expected during the month, especially during periods when h.f. propagation is either below normal or dis-

turbed. Check the "Last Minute Forecast" appearing at the beginning of this column for the days that are expected to be in those categories during October.

1972 Contest Critique

My colleague and good friend Frank Anzalone, *CQ's* Contest Editor, says that last year's forecast for both the phone and c.w. sections of the contest were right on the nose. The forecast called for normal conditions on October 30 and above normal for the 31st, during the phone section, and normal for both days of the c.w. section, November 27 and 28. According to Frank's observations, and reports from the worldwide ionospheric measuring network, conditions were pretty much as forecast.

A note of significance, however, which may explain some of the high scores achieved on both 10 and 15 meters. The *CQ* forecast was based on an expected solar level in the mid-50's for the 1971 contest period. A solar level of 67-68 was actually observed, and this higher than expected level accounts for the improved openings observed on both 10 and 15 meters during the contest.

For those who may be keeping score on the accuracy or inaccuracy of these *CQ* forecasts, the 21 year tally for the 42 sections now amounts to 33 more-or-less on the nose, 6 partially accurate, and only 3 totally wrong.

Post Mortem

CQ DX contests generate a very large amount of radio amateur operating activity throughout the world. For this reason, these contests offer an excellent opportunity to check the accuracy, or inaccuracy of the *CQ* propagation forecasts. Reports received from previous contests have contributed considerably in improving these forecasts over the years. Any comments or observations concerning this year's contest forecast would be appreciated. Comments of this nature may be sent directly to W3ASK, the Editor of this column.

C.W. Contest Forecast

This month's forecast is valid for *both* the Phone and C.w. sections of the 1972 contest. *Be sure to keep the Charts appearing in this month's column for use during next month's c.w. section.* Next month's column will contain Short-Skip Charts for November and December, 1972. Short-Skip propagation forecasts for October appeared in last month's column.

Good luck in the Contest! 73, George, W3ASK

October 15 — December 15, 1972
Time Zone: EST (24-Hour Time)
EASTERN USA TO:

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

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

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

CENTRAL USA TO:

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

[*Continued on page 115*]

CQ World-Wide DX Contest
ALL-TIME U.S.A. RECORDS

Tabulated below are the record-high scores achieved over the years by U.S. contesters in all the various divisions of competition in the *CQ* World Wide DX Contest. All-Time World-High scores are shown on pages 20 and 21. Number groups following calls and bands are: year of operation, total score, contacts, zones, and countries.

PHONE

Single Operator/Single Band

1.8	K1PBW ('69)	299	13	5	8
3.5	K8YWG ('66)	26,492	149	24	50
7.0	W3PHL ('71)	86,814	276	29	88
14	W4AXE ('70) (Opr. WA4PXP)	595,725	1068	39	156
21	W1RIL ('70)	346,495	922	34	97
28	W2SKE ('68)	429,976	1030	34	108

Single Operator/All Band

Station	Band	QSOS	Zones	Countries
	1.8	—	—	—
W6RR	3.5	40	15	23
(1970)	7.0	116	21	33
1,837,620	14	310	37	83
	21	627	27	70
	28	468	30	76
	Total	1561	130	285

Multi-Operator/Single Trans.

Station	Band	QSOS	Zones	Countries
	1.8	5	4	3
W4AXE	3.5	59	16	29
(1969)	7.0	130	20	58
2,929,552	14	631	39	113
—	21	491	33	98
	28	519	32	109
	Total	1835	144	410

Multi-Operator/Multi-Trans.

Station	Band	QSOS	Zones	Countries
	1.8	4	3	3
WA2ZAA	3.5	127	19	46
(1969)	7.0	228	29	78
6,743,880	14	936	39	138
	21	1183	38	126
	28	1012	33	103
	Total	3490	161	494

CW

Single Operator/Single Band

1.8	K1PBW ('71)	2,914	36	11	20
3.5	W3MFW ('71)	61,243	239	23	68
7.0	K6ERT ('71)	180,222	632	31	67
14	W4AXE ('68) (Opr. WA4PXP)	396,414	836	39	123
21	WA8LYF ('70)	286,767	756	35	94
28	K1JGD ('68)	158,510	520	28	82

Single Operator/All Band

Station	Band	QSOS	Zones	Countries
	1.8	—	—	—
K1KTH	3.5	86	20	38
(1970)	7.0	297	26	61
1,632,480	14	253	34	84
	21	345	32	67
	28	225	30	64
	Total	1206	142	314

Multi-Operator/Single Trans.

Station	Band	QSOS	Zones	Countries
	1.8	—	—	—
W3WJD	3.5	148	19	51
(1970)	7.0	424	34	87
2,259,075	14	380	37	98
	21	335	27	76
	28	249	29	67
	Total	1536	146	379

Multi-Operator/Multi-Trans.

Station	Band	QSOS	Zones	Countries
	1.8	14	4	5
W4BVV	3.5	173	25	56
(1970)	7.0	665	33	86
5,552,352	14	810	38	122
	21	909	37	107
	28	485	31	80
	Total	3056	168	456

Club Record: Potomac Valley Radio Club ('69) 44, 441, 644

Contest Calendar

BY FRANK ANZALONE,* W1WY

Calendar of Events

Sept.	23-24	VE/W Contest
Sept.	23-24	SAC Phone Contest
Oct.	6-9	Massachusetts QSO Party
Oct.	7-8	RSGB 21/28 mHz Phone
Oct.	7-8	California QSO Party
Oct.	8-9	LU American Contest
Oct.	7-8	VK/ZL/Oceania DX Phone
Oct.	14-15	VK/ZL/Oceania DX C.W.
Oct.	14-16	CARTG RTTY Contest
Oct.	18-19	YLRL Anniv. C.W. Party
Oct.	21-22	RSGB 7 mHz C.W. Contest
Oct.	21-22	Boy Scouts Jamboree
Oct.	21-22	WADM C.W. Contest
Oct.	**28-29**	**CQ WW DX Phone Contest**
Nov.	1-2	YLRL Anniv. Phone Party
Nov.	3-6	CHC/HTH/FHC QSO Party
Nov.	4-5	RSGB 7 mHz Phone Contest
Nov.	12	Czechoslovakian Contest
Nov.	11-12	ARRL Phone Sweepstakes
Nov.	18-19	ARRL C.W. Sweepstakes
Nov.	**25-26**	**CQ WW DX C.W. Contest**
Dec.	2-3	Telco. Pioneers QSO Party
Dec.	2-4	Lone Star QSO Party
Dec.	9-10	ARRL 160 Contest
Jan.	4-5	Firebird QSO Party
Jan.	**27-28**	**CQ WW DX 160 Contest**

VE/W Contest

Starts: 2300 GMT Saturday, September 23
Ends: 0200 GMT Monday, September 25

Rules in last month's CALENDAR. This year your log goes to: VE/W Contest Committee, Att: MARC Secretary, 535 Lansdown, Westmount, Quebec, Canada. Mailing deadline is Oct. 31st.

S.A.C. Phone Contest

Starts: 1500 GMT Saturday, September 23
Ends: 1800 GMT Sunday, September 24

The c.w. section took place earlier in the month. Complete rules in last month's issue. This year the logs go to: SSA Contest Manager, SM5CEU, Rydsvagen 120 C, 582 48 Linkoping, Sweden.

*14 Sherwood Road, Stamford, Conn. 06905 .

RSGB 21/28 mHz Phone Contest

Starts: 0700 GMT Saturday, October 7
Ends: 1900 GMT Sunday, October 8

It's the world working the British Isles on 21 and 28 mHz phone in this one. Check last month's CALENDAR for details.

Logs must be received no later than Dec. 11th and go to: RSGB HF Contest, c/o R. J. Polley, G3PYC, 81 Beech Road, Horsham, Sussex RH12 4 NW, England.

Massachusetts QSO Party

4 Periods (GMT)

2300 Fri.	Oct. 6	to 050 Sat.	Oct. 7
1900 Sat.	Oct. 7	to 0700 Sun.	Oct. 8
1100 Sun.	Oct. 8	to 1700 Sun.	Oct. 8
2200 Sun.	Oct. 8	to 0400 Mon.	Oct. 9

The eighth annual Mass. QSO Party is sponsored by the M.I.T. Radio Society, W1MX. The same station may be worked once per band and mode. And Mass. may work in-state stations for QSO and multiplier points.

Exchange: QSO no., RS(T) and QTH. County for Mass.; state, province or country for all others.

Scoring: One point per QSO. Outside stations multiply total QSO points by different Mass. counties worked (max. of 14). Mass. stations use Mass. counties, states (not including Mass.) and VE provinces for their multiplier. DX contacts have QSO point value only, not as multiplier.

Stations using v.h.f./u.h.f. exclusively add the multiplier worked on each band for their final multiplier. Logs containing more than 50 QSO's must include a check sheet of contacts made on each band (ARRL Op. Aid 6).

Frequencies: C.W. — 55 kHz up from lower band edge. Phone — 15 kHz up from lower edge of General class phone section. Novice — Lower third of each Novice segment. V.h.f. — All bands and modes. Try phone on even GMT hours.

Appropriate awards will be made. Include a s.a.s.e. for copy of results and awards.

Mailing deadline is Nov. 10th to: M.I.T. Radio Society, W1MX, Box 558, 3 Ames Street, Cambridge, Mass. 02139

California QSO Party

Starts: 0001 GMT Saturday, October 7
Ends: 2400 GMT Sunday, October 8

This is the 7th annual QSO Party sponsored by the North Hills Radio Club. The same station may be worked once per band and mode. Calif. stations

may work each other for QSO points and section multiplier.

Exchange: QSO no., RS(T) and QTH. County for Calif., ARRL section or country for others.

Scoring: Each contact 1 point, except Novice QSO's which are worth 5 points. Calif. use ARRL sections and DX countries worked for their multiplier. Others use Calif. counties (max. of 58).

Frequencies: C.W. — 3560, 7060, 14060, 21060, 28060. Phone — 3880, 3980, 7280, 14280, 21280, 21380, 28580. Novice — 3735, 7175, 21110.

Awards: Certificates to the winners in each of the 74 ARRL sections and each DX country. Additional awards where justified.

Include a summary sheet with your entry. Each band and mode must be on a separate page.

Mailing deadline is Nov. 4th to: John Minke, W6KYA, 6230 Rio Bonito Drive, Carmichael, Calif. 95608

LU American Contest

Starts: 2100 GMT Sunday, October 8
Ends: 0300 GMT Monday, October 9

This is a s.s.b. contest only, open to all amateurs in the American continents and associated islands.

Each log should contain at least 10 QSO's with LU stations.

Exchange: Signal report plus a 3-digit QSO number starting with 001.

Scoring: Total QSO's made on each band multiplied by the American countries worked on that band. It would seem that scoring is for each of the 3 individual bands.

Frequencies: 14200 to 14350, 21250 to 21450, and 28500 to 28700 mHz.

Awards: Certificate and plaque to the Top station, certificate and medal to 2nd and 3rd place. Certificates to all stations working at least 15 LU stations in the contest.

Use separate log and summary sheet for each band.

Mailing deadline is Nov. 10th to Radio Club Argentino, P.O. Box 97, Buenos Aires, Argentina.

VK/ZL/Oceania DX Contest

Phone: Oct. 7-8 **C.W.** Oct. 14-15
Starts: 1000 GMT Saturday
Ends: 1000 GMT Sunday

This is the contest in which the rest of the world works stations in Oceania, but with the emphasis on VK and ZL.

Rules apply to stations other than VK/ZL.

Exchange: Five and six figures, RS/RST plus a progressive QSO no. starting with 001.

Scoring: *Oceania stations:* 2 points for VK/ZL contacts, 1 point for contacts with rest of world. *Outside Oceania:* 2 points for VK/ZL contacts, 1 point for Oceania contacts other than VK/ZL.

Final Score: Total QSO points multiplied by sum total of VK/ZL call areas worked, on all bands. Single band scores are also acceptable.

Logs: Date/time in GMT, station worked, number sent/rec'd, band and QSO points. Underline each new VK/ZL call area worked on each band. Use a separate log sheet for each band.

A summary sheet showing the scoring, your name and address in BLOCK LETTERS and a signed declaration that rules and regulations have been observed is also requested.

Awards: An attractive colored pictorial certificate goes to the top all band scorer in each country and call areas of W/K, JA and UA. Single band awards will also be made determined by conditions and activity.

There is also a s.w.l. section. Only VK/ZL stations are to be logged, include call of stations being worked and serial number sent.

Logs must be in the hands of the committee before Jan. 25, 1973 and go to: NZART Contest Manager, Box 489, Wellington, New Zealand or NZART Contest Manager, 152 Lytton Road, Gisborne, New Zealand.

C.A.R.T.G. RTTY Contest

Starts: 0200 GMT Saturday, October 14
Ends: 0200 GMT Monday, October 16

This year's contest, the 12th sponsored by the Canadian Amateur Radio Teletype Group is known as the "Maple Leaf Sweepstakes."

Contest operation is limited to 36 hours out of the 48 hour contest period. The 12 hour non-operating period may be taken any time in the contest.

Use all bands, 3.5 thru 28 mHz, and the ARRL country list and CPR Zone chart.

Exchange: QSO no., time, zone, country.

Scoring: Two points for QSO's with stations in one's own zone, other contacts according to points listed in CPR zone chart. The same station may be contacted once per band.

Multiplier: Each country worked, including one's own, on each band plus KL7, KH6, VO.

An additional 100 bonus points will be given for each VE or VO station worked on all bands.

Final Score: Total QSO, points × country multiplier × continents worked, plus the bonus points.

Awards: Certificates to top scorers in each country, and each USA and Canadian call districts. There are also 17 plaques and medallions in many different categories, including one for s.w.l.'s.

Log sheets and CPR map/exchange table are available from CARTG, s.a.s.e. or IRC's.

Logs must be received no later than Dec. 1st and go to: C.A.R.T.G., VE3RTT, 85 Fifeshire Road, Willowdale, Ontario, Canada.

YLRL Anniversary Party

C.W.: Oct. 18-19 **Phone:** Nov. 1-2
Starts: 1800 GMT Wednesday
Ends: 1800 GMT Thursday

This is the 33rd annual YLRL contest open to all YLs around the world. OMs not eligible.

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

Exchange: QSO no., RS/RST, ARRL section or country.

Scoring: One point per QSO between stations

within an ARRL section, or between DX stations outside ARRL territory. However contacts between DX and ARRL sections count 2 points. The same station may be worked only once regardless of band.

Multiply total QSO points by sum of ARRL sections and countries worked for final score.

There is a low power multiplier of 1.25 if input power is 150 watts or less on c.w., or 350 p.e.p. on s.s.b.

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

Compute your score, sign your log and air mail it no later than Nov. 18th to: Betty Marsh, KL7FJW, 2411 King Road, Fairbanks, Alaska 99701

RSGB 7 mHz Contest

C.W. — Oct. 21-22 **Phone** — Nov. 4-5
Starts: 1800 GMT Saturday
Ends: 1800 GMT Sunday

Its the world working the British Isles on 7 mHz in this one (G, GC, GD, GI, GM, GW). Only single operator entries are acceptable.

Following rules are for overseas stations.

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

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

In addition a bonus of 50 points may be claimed for the first contact with each British Isle country/number prefix, *i.e.*, G2, GC3, GM4, etc. Max. of 36 possible. GB stations have no bonus value. There is no multiplier, just add QSO points and bonus points for final score.

Awards: Certificates to the continental leaders in each contest.

There is a s.w.l. section. Only British Isles stations may be logged, scoring same as above.

Logs go to: HF Contest Committee, c/o J. Bazley, G3HCT, Brooklands, Ullenhall, Solihull, Warwickshire, England. And must be posted to arrive not later than Dec. 22nd for the C.W. contest and Jan. 1st for the Phone contest.

Boy Scouts Jamboree

Starts: 12 Midnight Saturday, October 21
Ends: 12 Midnight Sunday, October 22

This is the Scouts' 15th Jamboree-on-the-Air and has been given extensive coverage in Scout magazines around the world.

Note that the above are local times, not GMT, and that this is not a contest but a period when Scouts around the world are active.

Participating certificates will be issued to all reporting their activity. Send reports to your National Organizer.

More information may be obtained from the Boy Scouts World Bureau, att: L. F. Jarrett, P.O. Box 78, 1211 Geneva 4, Switzerland.

WADM C.W. Contest

Starts: 1500 GMT Saturday, October 21
Ends: 1500 GMT Sunday, October 22

This is a c.w. only contest, on all bands 3.5 thru 28 mHz. There are three classifications, single operator, multi-operator and s.w.l.

Exchange: RST plus QSO no. starting 001.

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

Awards: will be in the form of certificates. Contest QSO's may also be applied for the many DM awards. WADM, DMCA, DMDXC, DMKK.

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

Editor's Notes

Complete rules and a list of 27 Trophies and Plaques for this year's contest appear on page 63. There are two modifications from last year's rules.

1. Under Par. III 2a, a broader definition for Single Transmitter operation.

2. Under Par. **XII,** more rigid disqualification penalties, possible barring for periods of up to three years, in future *CQ* contests.

Be sure to check George Jacob's PROPAGATION COLUMN for his special contest forecast.

In preparing your score keep in mind that we use the ARRL country list, and the WAE list for European contacts. The WAE list may be found on page 85 of the July issue.

You are expected to score your log and check it for duplicate contacts and correct multipliers. Recopied logs must be in their original form, with duplicate contacts included but crossed out and no credit taken. Also be sure to indicate the number of QSO's made, but less duplicates, and divide your multiplier into zones and countries.

Official log and summary sheets are available from *CQ*. (a large s.a.s.e. or IRC's) Or you can make up your own, 40 contacts to the page. Use a separate sheet for each band, and enter the Zone and Country multiplier only the first time it is worked. We do insist on a summary sheet showing the scoring, name and address in BLOCK LETTERS, and the usual signed declaration. It is recommended that you use the official *CQ* Summary Sheet.

Club secretaries are reminded to send in a list of their participating members and their claimed scores. Members make sure to indicate their club affiliation on their log.

Good luck, see you in the pile-ups.

73 for now, Frank W1WY

THE dwards PROGRAM

BY ED HOPPER,* W2GT

Special Honor Roll
All Counties

#76—Benjamin F. Davis, Jr., K5YWX, 6-23-72.
#77—Corwin Arndt, WA0LRQ, 6-24-72. (Story/Foto August '68 *CQ*)
#78—Stephen J. Johnson, K3LXN, 6-29-72. (Story/Foto December '68 *CQ*)

USA-CA HONOR ROLL

3000	2000	1000
	WA0SKQ ...156	WA0LMK ...272
GW3NWV .. 99	K9KKK 157	WA0SKQ ...273
WB4FBF ...100		WB4SLS ...274
2500	**1500**	**500**
	WA0LMK ...187	VE1AHG ...904
	WA0SKQ ...188	WA0SKQ ...905
WA0SKQ ...134	K9KKK 189	W0SZC 906

THE October, "Story of The Month" is:

John McCaa, W4HA

(All USA Counties #75, 5-4-72)

Born in 1905, John got his first license as 5GP in 1920, at that time Alabama was in the 5th District.

Starting with a spark coil and galena and "cat whisker" and going through all the improvements/advances to s.s.b., and building all his equipment including winding transformers, making condensers, yes, everything but the tubes. When s.s.b. arrived, John decided it was about time he had some "store bought" equipment so he got the Collins S-Line.

Electrical Engineering was studied in college and when talking pictures came along, John went with Electrical Research Products, a subsidiary of Western Electric. After twelve years he returned to Anniston and went with the Alabama Power Company as a Distribution Engineer.

During WWII, the Anniston Manufacturing Company wanted an Engineer to help them with the manufacture of material for the Army. After being with them for 16 years, the company was sold and John left.

In 1961 his own Sound and Electronic Equipment Company was started and now John is semi-retired and still enjoying radio.

John has two sons and two daughters. His wife died in 1960 and John married Alys in 1961. Alys had no knowledge of radio but soon caught on and now enjoys the mobile trips and they both try to get to all the County Hunter Conventions and get-togethers, yes, they did make it to Peoria.

As John is very modest, I could not find out how many counties he has given out in his many trips, and I had to dig a little to discover that he received *two* honors at ICHN KC71, a trophy for being *The County Hunter of The Year* and being elected a director of MARAC for a 3 year term. At the annual July meeting of MARAC a plaque was received as winner for Net Control Operator of the year.

Our records show that John waited until June 15, 1968 to apply for USA-CA-500. Then on February 3, 1969 he acquired USA-CA-1000 & 1500. On February 9, 1970 he received USA-CA-2000 & 2500

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

John McCaa, W4HA operating mobile in Mobile County, Alabama with the Battleship Alabama in the background.

After a lot of paper work, April 25, 1972, John was issued USA-CA-3000 endorsed All 14; All 2× SSB; All Mobiles. May 4, 1972 was the date for issuing All Counties #75, endorsed All Phone.

John desires that I thank *everyone* for all the help he received along the way and special thanks to the Mobileers who really make it all possible.

Awards Issued

As you will see from the Special Honor Roll, 3 more made All Counties. What do they have in common? Hard work, patience and new QTHs.

Ben, K5YWX is now at 36 Second Ave., Atwater, California 95301.

Corwin, WAØLRQ now uses Box 161, Nelson, Nebraska 68961.

Steve, K3LXN (Congratulations and lots of happiness) married and is now at 646 Sequoia Drive, Edgewood, Maryland 21040.

Bob Holt, GW3NWV was issued USA-CA-3000 endorsed All SSB, one of the few 3000 going to a station outside the USA.

Cliff Taylor, WB4FBS (now at 7912-B Cayer Court, Ft. Meade, Maryland 20755) was issued a Mixed 3000 Award.

Dick Morgan, WAØSKQ waited until he had 2500— then received 2500 Mixed, and 500, 1000, 1500 and 2000 endorsed All 14 SSB.

Ray Gomes, K9KKX did a bit more paper work and qualified for All 14 SSB 1500 and 2000.

Le Roy Ullrich, WAØLMK waited quite awhile before sending for USA-CA-1000 and 1500.

Emil Bitterlich, Jr., WB4SLS worked the Mobiles on 14 SSB to acquire USA-CA-1000.

William A. "Bugs" Grundy, VE1AHG was issued USA-CA-500 endorsed All A-1.

Clarence Graham, Jr., WØSZC acquired USA-CA-500-All SSB.

Awards

Worked Ohio's Highest Point Award: This Award is sponsored by the Champaign-Logan Amateur Radio Club. It will be issued for contacts made during field day and one of the v.h.f contests with the Club Station, *W8EBG:* operated at Ohio's Highest Point located in Bellefontaine, Ohio. Only contacts made after June 1, 1972 will count. Send data and $1.00 or 7 IRCs to cover cost of handling and mailing to: John L. Wentz, Box 102, West Liberty, Ohio 43357.

All Alaska Counties Award: The Moosehorn Amateur Radio Club of the Kenai Peninsula is offering this Award. Applicant must work one station in each of the four judicial districts plus one member of the Moosehorn Amateur Radio Club. Each two-way contact must be confirmed by a QSL card. QSL cards plus return postage should be sent to Moosehorn Amateur Radio Club, Box 733, Soldotna, Alaska 99669. All contacts must be dated May 1972, or later. Current members of the Moosehorn Amateur Radio Club are: KL7EAN; EJM; EKN; EKO; EOU; FLO; GIC; GIQ; HHV and VE6NH/KL7.

Whitman Amateur Radio Club Award: This Award will be issued for working ten (10) club members.

Ohio's High Point Award.

Seals issued for working each additional five (5) members, to a total of twenty (20). Award will be endorsed for band and mode if so requested. Send log data and $1.00 for basic Award. Higher class seals are 25¢. A club membership roster is available for s.a.s.e. Make application to: Whitman Amateur Radio Club, Inc., WA1NPO, P.O. Box 48, Whitman, Massachusetts 02382.

Clara Certificate: The one and only Worked YLs across Canada Award and sponsored by the *C*anadian *L*adies *A*mateur *R*adio *A*ssociation. Requirements: CLARA members: Work 12 YLs in 6 Canadian call areas (no more than 5-VE3s). Other YLs and OMs in Canada and continental USA: Work 10 YLs in 5 Canadian call areas (no more than 4-VE3s). Other stations: Work 5 YLs in 3 Canadian call areas (no more than 2-VE3s). Canadian call areas are VE1, VE2, VE3, VE4, VE5, VE6, VE7, VE8, VO1 and VO2. All bands, all modes are ok, but no cross band. QSLs dated September 12, 1972 or later count. QSLs must be in your possession (but do not send them). GCR rules apply, so send certified log data and $1.00 (or IRC equivalent) to Certificate Custodian: Cathy Hrischenko, 30 Lisburn Crescent, Willowdale, Ontario, Canada. For additional en-

[*Continued on page 111*]

Whitman Amateur Radio Club Award.

SURPLUS sidelights

BY GORDON ELIOT WHITE*

I HAVE received a new batch of replies to my poll of surplus dealers, and am listing this month an additional batch of sources where surplus electronics may be found. If any readers have knowledge of good sources I have not mentioned I would appreciate hearing from them.

Since as I write this the floods from Agnes are still pouring across the northeast, I thought it might be worthwhile mentioning the subject of salvaging wet equipment. Even those who are not flood victims may get water in the shack or may find equipment which has been left out in the weather. The military often stores surplus outside, and scrap yards often have interesting gear which they leave exposed to the elements.

It is surprising how much water-damaged equipment can be readily salvaged, particularly if it has not been exposed for too long. Mechanical gear, such as Teletype machines, are often so well-protected by years of oil and dirt that a few weeks of rain do hardly any damage to operating components. They may be externally rusted, with no inside harm at all.

While water doesn't do any good for receivers, transmitters, and other electronics goodies, it often does little harm, either. If treated at once, a dunking may even get out a collection of dirt that was more harmful to the gear than the water.

Even a salt water bath, while distinctly not recommended, can be overcome if the equipment is quickly flushed with fresh water.

The first thing to do with a wet piece of gear is to wash it out with the garden hose, getting all the mud and dirt out. If you dropped your R-390A in the Atlantic Ocean, be certain all the salt is washed out, as it is a conductor of electricity, a corrosive, and an attractor of moisture from the air. Even a thin film of mud can provide an electrical path over an insulator, and if the flood waters were oily, hot water and soap, even brushing with a stiff paint brush, may be helpful in removing it.

There are several emulsifying agents, detergents, and "gunking" solutions that can be used on oil-contaminated gear, before or during the water rinse.

A final flush with hot water is often quite helpful. It gets the unit warm, and aids in evaporation. The set should be placed in direct sunlight in the open air, to dry. If at all possible, put it in an oven set for 120 degrees or slightly higher if there is nothing likely to melt involved. Be sure you have done your best in cleaning before heating as some dirt may be baked on by forced drying. I usually give a water victim at least 12 hours in the oven, after giving it a good draining and shaking to remove as much water as possible beforehand. (Be sure your wife knows what's going on. Once mine came along all unknowing and turned the oven up to 400 degrees to preheat it for a roast, and roasted a receiver. Small children have been known to do the same.)

Water and conductive dirt deposits often collect in hard-to-reach crevices, such as tube sockets, and closed but not sealed parts like pots and i.f. cans are the most likely spots for irretreviable damage. Television sets and any gear with CRTs are to harder salvage because the high voltages involved demand greater care in cleaning. A good deal of care is dictated in first turning on a salvaged item, because of the risk of internal shorts from remaining moisture. Internal heat however, can drive out some dampness by itself, during initial operation.

After drying, particularly with mechanical gear, it is necessary to spray a light oil film on exposed steel surfaces to protect them against rusting. Panels may be cleaned with a household cleaner such as Fantastic, and a toothbrush. The emulsifier that I use is Formula 925, made by Amerace-Esna, Tenafly, New Jersey. I cut it 3:1 with Kerosene and apply it in a large washtub, with a paintbrush. (It is too costly to waste), I drain the excess solution first, then rinse with 190 degree water before drying. It would be possible to use this solution in a sonic cleaner, but be careful about "cleaning" permanently-packed bearings, or items such as pots or i.f. cans, as I mentioned above.

If your car gets flooded, by the way, similar cleaning may be effective. Be sure to drain the crankcase, cylinders, carburetor, transmission, etc., before trying to start it, and refill with clean oil.

Surplus Dealer List Continued

To add to the surplus dealer list, I offer the following names:

California

Los Gatos: Tinker's Electronics, 805-D University Ave., zip 95030.

Los Angeles: A-Ber Electronics, 1204 W. Washington Blvd., zip 90007. C H Sales Co., 2176 E. Colorado Blvd., zip 91107.

Oceanside: Oceanside Aircraft Radio Municipal Airport, zip 95815.

Sacramento: W. F. Slagle Surplus, 1201 Del Paso Blvd., zip 95815.

N. Hollywood: Seltronics, Box 4517, zip 91607, ph. 213-877-2421.

Hayward: Lesko Warehouse Sales, 733 A. St., zip 94541.

Florida

Miami: Marmax Sales, 3815 NW 35th Ave., zip 33142; Ham Shack, 1665 NE 33 Place, zip 33142.

Hialeah: U. N. Electronics, 1632 W. 31st Place, zip 33012, (tubes only).

Titusville: United Surplus Co., 1002 Tropic St., zip 32780, (general surplus).

Jacksonville: Acme Electronics, 928 Main St., zip 32202, ph. 904-356-0485.

*1502 Stonewall Rd., Alexandria, Va. 22302

North Carolina
Burlington: G & W Metals, Box 594, Motley St., zip 27215, ph. 227-9608.
Washington
Seattle: Seattle Equipment Co., 215 S. Austin, zip 98180; Radar Electronics Co., 168 Western Ave., West, zip 98119; Harold Kroutwick, 16280 Bothwell Way NE, zip 98155, (general surplus).
Tacoma: American Surplus Sales, 2916 S. Tacoma Way, zip 98409
Auburn: Valley Electronics, 4517 Auburn Way, zip 98002.
Oregon
Portland: Star-Tronics, Box 17127, Kenton Station, zip 97217, (mail order only).
Connecticut
Middletown: G. U. Reed Co., 154 Main St., zip 06457.
Milford: Surplus Electronics, 246 Naugatuck Ave., zip 06460.
Pennsylvania
Philadelphia: Selectronics, 1206 S. Napa St., zip 19146; Soundtronics Labs, 924 Arch St., zip 19107; Fertik's Electronics, 5249 D St., zip 19120; JAN Industrial, 441 N. 5th St., zip 19123, (tubes and transistors).
Delaware
Wilmington: Penn-Del Salvage, 506 S. Market St., zip 19899.
New York
Manhattan: Advance Electronics, 54 W. 45th St., zip 10036; Communications Equipment Co., 343 Canal St., zip 10013; Electromatic Equipment Co., 334 Canal St., zip 10013.
Rochester: Greenwood Sales, 594 Hague St. zip 14606.
Farmingdale, L.I.: Nationwide Electronics, 41 Heisser Lane, zip 11735, (quantity only).
Syosset, L.I.: Jerico Electronics, 271 Robbins Lane.
Nebraska
Lincoln: Surplus Center, Box 82209, zip 68501.
Minnesota
Minnapolis: Acme Electronics, 224 N. Washington Ave. zip 55401.
Idaho
Boise: Stone Equipment Co., Apple and East Amity Sts. zip 83705.
New Jersey
Jersey City: Allied Electronics, Box 4118, zip 07304 (Part order only).

Northern Radio Conversion

I said in a column last spring that it seemed wasteful to tear up a Northern Radio variable-frequency oscillator to make a frequency-shift oscillator, when there was already a Northern Radio FSK unit around in surplus. I still feel that way, but always in surplus you can have a beautiful piece of gear that isn't quite right for your purpose, and you can't get the one that is.

WØLFH writes me that he has successfully, and rather simply, converted the N.R. model 115 vari-

[*Continued on page 111*]

SLEP'S SPECIALS

RADIO RECEIVERS, TRANSMITTERS, TEST EQUIPMENT

R-390A/URR, The Cadillac of all receivers, tunes 500KHZ thru 30.5 digital tuning, 115V/60HZ 19" rack mount..... **$750.00**

HAMMARLUND SP-600JX, Tunes 540KHZ thru 54MHZ in 6 bands, 19" rack mount..... **$285.00**

AN/URR-13 RECEIVER, Tuneable UHF 225 - 400MHZ used to monitor military and astronaut frequencies, AM/CW 115V/60HZ..... **$85.00**

BC-348, A great receiver for AM/CW and VLF/HF work, unmodified original 28V P/S easy to convert for 12VDC or 115V/60HZ operation. tunes 200-500KHZ and 1.5 to 18MHZ..... **$65.00**

BENDIX RA-10 RADIO COMPASS RECEIVER, reception AM, CW, MCW and voice, freq range 100 to 1750KHZ in 4 bands..... **$9.95**

URC-11 EMERGENCY HANDIE TALKIE, 243MHZ less 1.5 and 135V battery, ideal for aircraft, marine or 220MHZ conversion, see May '69 CQ..... **$14.50**

HP-524C FREQUENCY COUNTER, base freq 10HZ to 10MHZ, 8 digit nixie read-out, 525 series plug-ins extends range to 510MHZ..... **$375.00**

FREQUENCY CONVERTER PLUG-IN'S FOR HP-524, B, C, D, USM-26, FR-38 AND NORTHEASTERN:

HP-525A 10-100MHZ	$ 69.50
HP-525B 100-220MHZ	$ 85.00
HP-525C 100-510MHZ	$195.00
HP-526A Video Amplifier	$ 85.00
HP-526B Time Interval Plug-In	$ 85.00

TS-413/U SIGNAL GENERATOR 75KHZ to 40MHZ in 6 bands, precise calibration from 1MHZ Crystal Oscillator, has % modulation meter CW, or AM 400/1000CPS variable 0-50% and RF level meter 0 to 1.0V. Ideal for amateur, marine, aircraft and hobbyist for if and receiver-transmitter alignment or development work..... **$89.50**

SG-66A/ARM-5 OMNI SIGNAL GENERATOR, military version of Arc H-14, FAA approved for aircraft radio shops. **$550.00**

TS-382/U AUDIO OSCILLATOR, 0-200KHZ with 60 and 400 cycle reed frequency meter checkpoint, a fine lab instrument..... **$79.50**

SG-299D/U SQUARE WAVE GENERATOR, a wide range 1HZ to 1MHZ continuous coverage, use with any oscilloscope to determine frequency response and phase shift characteristics of video and audio amplifiers, military version of HP-221A..... **$39.50**

BALLANTINE 300 AC VTVM, 10HZ to 150KHZ range, 1MV to 100 volts in 5 ranges, logarithmic scale 1-10DB accuracy 2%..... **$29.50**

JERROLD 900A SWEEP FREQUENCY GENERATOR with D-50 detector head..... **$475.00**

BECKMAN BERKLEY MODEL 1452 DIGITAL RECORDER **$65.00**

HP-202A LOW FREQUENCY FUNCTION GENERATOR **$79.50**

FLUKE 404M POWER SUPPLY..... **$29.50**

POLARAD MODEL 1308-1P SIGNAL GENERATOR 7.1 thru 8.5 GC..... **$145.00**

HP-430C R F POWER METER..... **$39.00**

TS-505D/U VTVM 0-25-VAC, 0-1000VDC, 0-100M OHM resistance measurements, AC frequency response 30HZ-500 MHZ, high input impedance, portable ruggedized construction complete with probe..... **$45.00**

TS-723/U DISTORTION ANALYZER 20HZ to 20KHZ frequency range, measures distortation down to .1%, built-in VTVM with full scale reading of .03-300V RMS: -30 to +50. Military version of HP-330B..... **$175.00**

HP335 FM MONITOR, has two panel motors to show carrier deviation and percentage of modulation with lamp to indicate peak modulation, ideal for radio station or shop..... **$225.00**

TV-2/U TUBE TESTER, mutual conductance, checks old and late type receiver transmitter, sub-min tubes with roll charts, fully metered. This is the king of all tube testers..... **$65.00**

SG-12A/URM-48 FM SIGNAL GENERATOR, used by the military for alignment of GRC and commercial FM equipment, covers 20-100MHZ..... **$275.00**

PANORAMIC INDICATOR 1P-259/U, military version of SB-8A type 200, 400-600KHZ if input, 5 inch CRT, complete with PS-8 115V/60HZ power supply, a complete 5 inch panoramic system, the best..... **$90.00**

COLLINS CU-351 ANTENNA COUPLER, same as 180L-3 tunes 2-30MHZ, has vaccum variable, metered, used by military as antenna match box rated to 1KW..... **$29.50**

SINGLE SIDEBAND CONVERTER MILITARY CV-591A/URR, used with R-388, R-390, SP-600, GPR-90 etc., or any receiver with 453-458 KHZ IF; 12 tubes, 19" rackmount, grey finish 110/220VAC 60HZ, this will improve your receiver reception..... **$125.00**

HP185A OSCILLOSCOPE WITH 187 DUAL TRACE AMPLIFIER, DC to 1000MHZ, 10V/CM to 200/CM, internal voltage calibration, low noise, has X-Y recorder output, one of the best..... **$375.00**

GR 1390B RANDOM NOISE GENERATOR, used for noise and vibration testing in electronic and mechanical system **$135.00**

ARN-30D OMNI SYSTEM CONSISTING OF R-138 RECEIVER, B-13 converter, dual mount, in-10 indicator, control head and OMNI antenna 28volt, can be changed to 12 volt. Ideal for aircraft or marine use..... **$65.00**

EIMAC TUBES Fresh yellow boxed factory guaranteed 3-400Z $36.00; 3-500Z $36.00; 3-100Z $85.00; 4-400A $49.00; 4-400C $58.00; 4-1000A $130.00; WRITE FOR OTHER TYPES AND SOCKETS, CHIMNEYS.

electronic distributors

ALL EQUIPMENT EXCELLENT CONDITION, F.O.B. ELLENTOWN, FLORIDA, SATISFACTION GUARANTEED OR MONEY REFUNDED, IMMEDIATE SHIPMENT. WRITE OR PHONE 813-722-1843 BILL SLEP.

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AN/APR 4Y FM & AM RECEIVER

Originally designed for AM reception, this receiver can easily be modified for FM. High precision lab instrument for monitoring and measuring frequency and relative signal strength, 38 to 4000 Mc in 5 tuning ranges. For 110 v, 60 cycle AC. Built-in power supply.

"FB" for Satellite Tracking

Original circuit diagram included.
All tuning units available for above (Price upon request).

- Calib. Accuracy: 1% approx.
- Video output: 1.5v at 70 ohms.
- Audio output: 100 Mw into 600 ohms.
- Sensitivity: 35 to 50 Mv avg.
- Selectivity: 4 Mc wide position and 600 Kc narrow position.

Checked Out Perfect, Like New **$88.50**

HEADSET

Low impedance. W/large chamois ear cushions. 4' cord & plug. Reg $12.50. Our Special Price **$2.95**
Less ear cushions $1.95
High impedance adaptor for above .. .69

SCR-274-N, ARC-5 COMMAND SET HQ!

Freq. Range	Type Complete w/Tubes	Exc. Used	Like New	Brand New
RECEIVERS				
190 - 550 Kc	BC-453	$16.95	$23.50	$27.50
6 - 9.1 Mc	BC-455	$16.95	------	$22.50
1.5 - 3 Mc	R-25	------	$19.50	$21.50
TRANSMITTERS	**Complete with Tubes**			
4 - 5.3 Mc	BC-457	$8.95	------	$11.95
5.3 - 7 Mc	BC-458	$8.95	------	$11.95
7 - 9 Mc	BC-459		$21.50	------

CATHODE RAY TUBES

Standard make. All new in original carton

3FP7 .... $ .98 5AP1 ... $3.75
9GP7 ... $3.95 5MP1 ... $2.75

SHIELDS: 3"... $1.29 5"... $5.25

MN-26Y RECEIVER

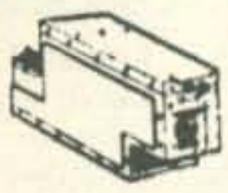
Designed for Marine & Aircraft Installation. Also fine for home use. Continuous tuning from MN-28C Control box. Complete with 24 volt DC Dynamotor. MN-268 Radio Receiver, 150-325 KC; 325-695 KC; 3-4.7 Mc. Complete with tubes and dynamotor, only. Like New **$13.50** New **$15.25**

Remote control commercial type navigational receiver

ACCESSORIES FOR ABOVE AVAILABLE FROM STOCK

ARC-5 VHF RECEIVER, TRANSMITTER MODULATOR 100-156 MC

R-28/ARC5 VHF RECEIVER — Tunes 100 to 156 Mc AM. Easy to convert for 2 meter Operation! Ideal for installation in vehicles.



Excellent Used With Tubes **$19.50**

T-23 TRANSMITTER with tubes and crystals. Brand New in original carton. **$21.50**
MD-7 MODULATOR with tubes, exc. used. **$10.50**

TG-34A CODE KEYER

self-contained, automatic, reproduces code practice signals from paper tape. 5 to 12 WPM built-in speaker. Brand new with tech manual.

AC line cord. **$24.50**
Code practice tapes. Price upon request.

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Aircraft Beacon Receiver 200 to 400 Kc. Operates from 24V DC 1.5A. Continuous tuning, vol. control, on-off switch and phone jack. Very sensitive. Compact. Complete with tubes, NEW **$12.50**

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Rugged, heavy-duty carbon handmike with press-to-talk switch. Equipped with 4-ft cord & phone plug.
New, boxed. . . . . Each **$1.88** 2 for $3.25

SCR-625 ARMY MINE DETECTOR

Locates any metal buried to depth of 2 feet in ground or water. Audible tone indicates presence of metal. Equipment back pack weighs only 15 lbs. Sturdy wood storage chest and 64 page manual included. Adaptable for underwater use. Complete as pictured, less batteries. **$42.50**

LORAN APN-9

Receiver & Indicator Less all tubes and crystals **$22.50**

LORAN APN-4 RECEIVER

RECEIVER AND INDICATOR NEW **$49.50** SPECIAL OFFER

APN-4 is a four-channel long range navigation receiver and indicator (dual units) which will provide, for ships and aircraft, an exact position by the reception of known loran transmitters. Compact two-piece set with separate receiver and indicator. Indicator has large 5-inch Cathode Ray Tube. Very popular on fishing boats and commercial vessels. Operates from external 12 V or 24 V DC power supply. Has 43 tubes including CR tube.
Accessories for the LORAN APN-9 & APN-4 available from stock. Prices upon request.

PE-206 INVERTER

New **$69.50** Like New **$52.50**

For use with APN-9 and APN-4 Loran. Made by Leland. Input: 28 VDC 38 Amp. Output: 500 VAC 800 cyc. at 500 VA. 1 phase. and 80 VAC 800 cyc at 500 VA. 1 phase.

BC-603 FM RECEIVER

converted for 35-50 mHz. 10 preset push-button channels or manual tuning. Complete with 10 tubes, checked out, like new . . **$39.50**

AC Power Supply, New. $14.95 Technical Manual . $2.50
DM-34 24V Power Supply New . $4.45 Set of 10 tubes for BC-603 recv. $5.95 DM-36 24 V Pwr Supply, Exc., Used $2.25

BC-604 FM TRANSMITTER (20 to 27.9 Mc.) $12.50

BC-645 TRANSCEIVER BRAND NEW

EASILY CONVERTED FOR 420 MC OPERATION

This equipment originally cost over $1000. You get all in original factory carton.

Dependable Two Way Communication more than 15 miles.

- Frequency Range: About 435 to 500MC
- Transmitter has 4 tubes: WE-316A, 2-6F6, 7F7
- Receiver has 11 tubes: 2-955, 4-7H7, 2-7E6, 3-7F7
- Size: 10-½" x 13-½" x 4-½"

Makes wonderful mobile or fixed rig for 420 to 500 Mc. Easily converted for phone or CW operation.

"SPECIAL PACKAGE OFFER"

BC-645 Transceiver, Dynamotor and all accessories below, including conversion instructions for Citizens Band. BRAND NEW, while stocks last. **$26.95**

- Mounting for BC-645 transceiver
- PE-101C Dynamotor, 12-24V (easily converted to 6 volts)
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- Complete set of 11 connectors
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Transceiver only . . . $16.95

F.O.B. NY City or Ogden, UT for Savings on Freight Charges.

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With Crystal and Calibration Book. Exc. used; checked out.

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Fine general purpose Navy unit 125 to 20,000 Hz. Operates on 12 or 24 VDC. Complete with tubes, crystal, calibration book.

Checked out, Excellent Used. **$59.50**
As above, less book. **$22.50**

Terms: 25% with order, balance C.O.D., or remittance in full. F.O.B. NYC. Subject to prior sale & price change. Minimum order $5.00.

G & G RADIO ELECTRONICS COMPANY
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New York, N.Y. 10007 / (212) 267-4605

Surplus [*from page 108*]

able master oscillator. Harold wrapped a small wire around the cathode lead of the oscillator tube and ran it to the usual RTTY diode shifter. The wire needs to have high-temperature insulation to allow it to lie against the tube as it runs up to a small bracket built adjacent to the oscillator.

W@LFH says that the resulting output is about as stable as the N.R. FSK unit, and a whole lot smaller and simpler. He says the stability is unchanged, though the dial calibration might be moved over a mite. He uses the 115 without the oven turned on, and finds it stabilizes more rapidly that way, since he does not allow it to run continuously.

USA-CA [*from page 105*]

dorsements of 12, 10, 5 — same rules apply but only s.a.s.e. (Canadian stamps), or s.a.e. and IRC, no fee. Contacts *must* be made off Net frequency during Net time. CLARA Net meets Tuesdays 1900GMT around 14.160. Certificate Launching CLARA Day, September 17, 1972. Look around 14.160. USA look around 14.280.

The Arabian Radio Night Award: King Hussein of Jordan (JY1) issues this certificate for contacts with 10 of the following countries: 9K2, 7Z3, JY, 7X2, SU1, YK1, CN8, OD5, 3V8, MP4B, MP4M, MP4T, MP4Q. One contact with JY must be included. All contacts since January 1, 1971 are valid. The certificate costs 7 IRCs. Send certified list of contacts to: JY1, Box 1055, AMMAN, Jordania.

The Acropolis Award: The National Amateur Radio Union of Greece issues the Acropolis Award to any licensed radio amateur who can submit proof of contacts with Hellenic stations (SV1, SZ∅) as follows: Class 3: EU-stations work 10 stations; DX stations work 5 stations. Class 2: EU 20; DX 10. Class1: EU 30; DX20. No restrictions as to bands or modes. Valid QSOs April 1968 and later. Fee: 5 IRCs. Apply with certified list (no QSLs). Endorsement stickers for Classes 1 or 2 available for 1 IRC In addition to the Class 1 Diploma, the applicant will receive a

gold plated pin and the Acropolis bronze engravement. Send to: The National Amateur Radio Union of Greece, P.O. Box 1442, Athens, Greece.

Notes

ALL reports indicate that all had a wonderful time at Peoria 72, and I will have data and foto/fotos via Marv, WB2SQN and Max, W9SOM in next month's column.

What a shock! All County Hunters, other hams and friends who knew Jerry Longwell, WA7GTK send regrets, heart felt sympathies to "Willie," WA7IRD on the loss of her husband. Story/Foto on Willie, May '71 *CQ*.

For those who do not know about them, to save you money and work, two County Hunter bureaus for handling your CH QSLs have been established. For data, send s.a.s.e. to WA2AEA, 4 Pinewood Circle, Corning, N.Y. 14830 and W6CCM, P.O. Box 146, Lakeside, California 92040.

Hope you all had fine vacations/holidays, write and tell me: How was your month?

73, Ed., W2GT

PLEASE USE YOUR ZIP CODE NUMBER ON ALL CORRESPONDENCE

on the other bands. On 80 the p.a.-tune dip is nowhere in the ballpark with the maximum-power position. Tuning appears to be off resonance when using either an antenna or dummy load. It apparently otherwise works Okay, but there seems to be a design defect in the 80-meter stage. Do you know if a cure has been found for this?

ANSWER: The above situation is characteristic of many other all-band rigs. Can't say what the exact cure is without modifying the neutralizing system to switch one of the fixed capacitors in the neutralizing bridge circuit (as done in some of the Swan jobs). As long as you're tuned for maximum *output*, rather than plate dip, operation should be Okay as long as instability does not crop up and cause spurious emissions.

Also, be sure to load up *fully* to where the output starts to drop after you have reached the maximum peak output (in other words, increase the loading slightly after the maximum output point has been obtained). This should bring the maximum-output peak and plate dip closer together. A different set of tubes and reneutralization sometimes is a good bet.

Reducing Cross Modulation Etc. With Pre-Amplifier

QUESTION: I should like to know if the dynamic range, cross modulation and other overloading effects of the Drake R-4B or the Drake SPR-4 receivers could be improved by adding the Comdel HDR-101AC H.F. Broadband Amplifier to them, when considering the receiver and the r.f. amplifier as a system? Also to what degree could one expect the improvement to become?

ANSWER: The addition of an r.f. preamplifier to a receiver will increase the input-signal gain and thus the level which in turn will tend to deteriorate the signal-handling capabilities of the receiver. To prevent this, the preamp output would have to be padded down to the normal input level for the receiver (for the same sensitivity) and then we're back to from where we started.

On the other hand, reducing the receiver r.f. gain most likely would improve the signal-handling capabilities, while the loss of gain could be made up with the preamp and thus make an improvement without losing overall sensitivity v.s. S/N ratio.

A *tunable* (High-Q) preamp, functioning as a preselector, will often reduce spurious input-signal responses, but since the Comdel job is broadbanded (as per the specifications you supplied), such an advantage cannot be realized with it.

By the way, our experiences with measurement and on-the-air operation with the Drake SPR-4, found it to be one of the best as far as the signal-handling situation goes. We have not checked the R-4B in this respect.

73, Bill, W2AEF

Things Called Countries [*from page 82*]

[19] One of four countries comprising the United Kingdom of Great Britain and Northern Ireland.
[20] French is the official language on Jersey Island.
[21] Bajo Nuevo consists of a sandbar about 30 feet wide.
[22] Malpelo consists of a large rock rising to 845 feet above the sea. Landing is extremely hazardous and serious accidents have occured.
[23] The Country List does not recognize the establishment of separate governments in North and South Korea.
[24] The area of Vatican City is 108.7 acres.
[25] Free territory under the UN with two zones designated A and B. Zone A, which contains the city of Trieste, is administered by Italy. Zone B is administered by Yugoslavia.
[26] Italy is subdivided into large Regions which are made up of Provinces. Sardinia includes three Italian Provinces.
[27] Formerly the Bonin and Volcano Islands.
[28] Formerly called Marcus Island.
[29] Navassa Island is a rocky island with a lighthouse.
[30] Major islands are Truk and Ponape which are two of the six separately administered districts in the UN Trust Territory of the Pacific.
[31] Major islands are Palau, Yap, Ulithi and Peleliu. Palau and Yap are two of the six separately administered districts in the Trust Territory.
[32] The base is administered according to the terms of a US-Cuban treaty which can only be terminated by mutual consent.
[33] Guam has locally elected government and residents are U.S. citizens.
[34] Principal islands are Rota, Saipan and Tinian.
[35] According to the National Geographic Society, Kure Island is part of Hawaii. However, the Midway Islands lie between Kure and the remainder of Hawaii. Midway is independent of Hawaii thus constituting intervening territory under Rule 3.
[36] Puerto Rico is a self-governing Commonwealth under the US flag. Puerto Ricans are US citizens.
[37] Swan Island may shortly revert to Honduran administration.
[38] American Samoans are nationals but not citizens of the US.
[39] Natives of the US Virgin Islands are US citizens.
[40] The Marshall Islands are one of the administrative districts in the UN Trust Territory of the Pacific.
[41] According to international treaty.
[42] Under British protection.
[43] Seven partly independent Sheikdoms under British protection.
[44] One of the 12 Provinces of Finland.
[45] Not shown on National Geographic Society map of Scandanavia.
[46] A Province of Denmark.
[47] Self-governing Danish territory.
[48] Includes the islands of Aruba, Curacao and Bonaire.
[49] Self-governing Dutch territory.
[50] Population figures for various sub-divisions of the USSR vary widely between references.
[51] Part of the European Russian SFSR.
[52] The USSR is composed of 15 associated soviet socialist republics under one central government in Moscow. Each of these republics could potentially be a Class 1 country.
[53] The US does not recognize the Soviet conquest of Lithuania, Latvia and Estonia in 1940 and considers each of these three countries to be independent.
[54] Under British Crown.
[55] Administered by New South Wales.
[56] Administered from Tasmania.
[57] A research station is maintained in the islands.
[58] Steps toward independence have been initiated.
[59] Anguilla, St. Kitts and Nevis made up one of the West Indies Associated States. (W.I.A.S.) Each of the WIAS is self-governing under the British Crown and has the option of dissolving its association with Great Britain at any time. Anguilla recently broke its ties with St. Kitts and Nevis and its exact status is uncertain at the present time.
[60] One of the six West Indies Associated States, under the British Crown.
[61] Administered from the Falkland Islands.
[62] Tanganyika and Zanzibar were combined to form Tanzania (5H3), but Zanzibar has not yet been deleted from the Country List.
[63] On National Geographic Society maps Agalega and St. Brandon appear to be about 400 miles apart.
[64] Part of the British Indian Ocean Territories, administered from the Seychelles.
[65] The Northern Solomon Islands are governed by Australia as UN Trust Territory.
[66] The Southern Solomon Islands are governed as a British Protectorate.
[67] British territory administered from Fiji.
[68] Governed by India.
[69] Britain and France govern the New Hebrides jointly.
[70] St. Helena is the British administrative center for Ascension, Gough, Tristan de Cunha, Inaccessible and Nightingale Islands.
[71] The Cook Islands are a self-governing dependency of New Zealand, but are also claimed by the US.
[72] Claimed by the US.
[73] Southwest Africa is a self-governing dependency of South Africa.
[74] This is an unofficial prefix as the ITU does not recognize prefixes beginning with the figure 1.
[75] Area of this country could best be expressed as square inches or square feet.
[76] See the February, 1972 issue of *CQ*, pages 64-66.
[77] Formerly Rio Muni and Fernando Poo.
[78] The Country List does not recognize the establishment of separate governments in North and South Vietnam.
[79] Governed by the International Amateur Radio Club. This country consists of one room of average size.
[80] See also VQ1. Tanzania resulted from the merger of Tanganyika and Zanzibar.
[81] In the British Commonwealth.
[82] Part of Malaysia.

Want a wall-sized reproduction of these country charts? They'll be available soon in larger type and in color on heavy poster stock for $1.25 per copy, mailed flat. Order several for your DX friends; they make attractive, inexpensive Christmas gifts. Order DX Country Chart from CQ Circulation Department.

Propagation [*Continued from page 99*]

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

Time Zone: PST (24-Hour Time)

WESTERN USA TO:

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

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

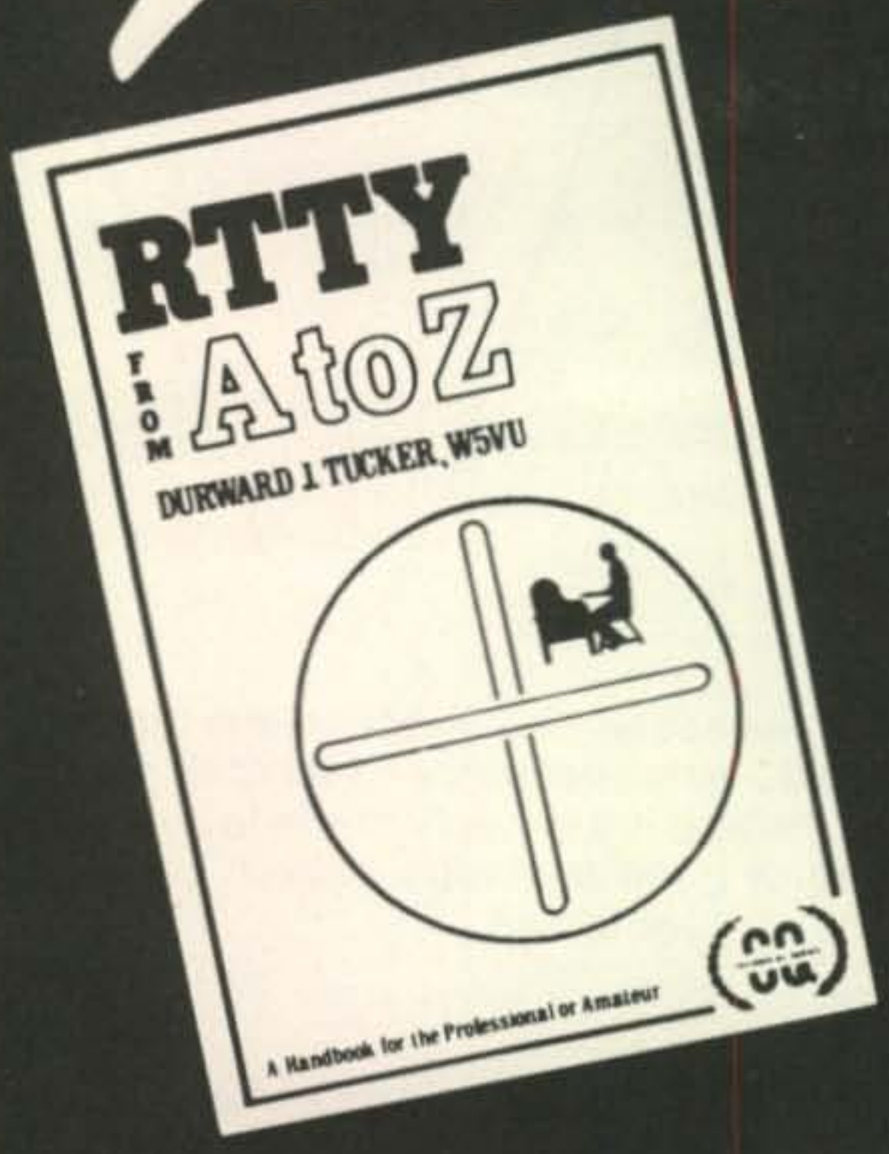
DX [*from page 92*]

F6AFV/FC — Via DI5UAC
F6AHY/FC — To DJ6UP
FH8CY — c/o VE3IG
FM7WU — Via WA5UHR
FO6RV — To G5RV
FP6LK — c/o WA2RLK
FR7AI/T (Tromelin Island) — Via Yoland Hoarau, 4 eme Km. St. Francois, Reunion Is.
HB6XJQ — To K3SSC
HC2DX/8 — c/o DL2GG
HM1EJ — To W3HNK
HS1AFP — Via WB2RLK
HS3AET — Via W0YZB
I2HBW — c/o W4CNZ
JD1ACF — To JA1OAF
JD1ADK — c/o JA1KSO
JT0AE — Via OK1AQW
JX2HK — To LA2HK
JW1EE — c/o W2GHK
K9KNW/CE0 (San Felix) — Via K3RLY
KC6SK — To KH6HIF
KC6SW — c/o W7YBX
OD5CS — c/o W3HNK
OH0AB — To OH2BGD
OJ0SUF — c/o OH0MA
OX5AU — To W3HNK
OY8KR (Faroe Is.) — Via OZ8KP
PJ8WP (St. Maarten) — To W5KGJ
PQ0MI — c/o P.O. Box 19094, Sao Paulo, Brazil
PQ0WH — Via P.O. Box 19073, Sao Paulo, Brazil
S21IR (Bangladesh) — To VE7BWG
SU1MI — c/o W3HNK
SV0WUU — To W3HNK
SV0ZZZ — Via W5KDJ
TG9DX — c/o W3HNK
TG9KE & TG9UZ — To W9UZC, 1305 S. Roosevelt, Harrisburg, IL 62946
TN8BK — c/o JA4BLY
VK9DH — Via WA6TVH
VK9JW (Mellish Reef) — To VK3JW
VK9ZB (Willis Island) — c/o Box 708F, GPO Melbourne 3001, Australia
VK0RC (Macquarrie Island) — Via K3RLY
VP1BH — To VE2AKZ
VP2KU — c/o VE3BMV
VP2MQ — Via KV4AM
VP2VV/FS7 — To F6AEV
VP9LR (Falkland Islands) — c/o WB4FIN
VP8ME — Via WA5FWC
VP9DX — To WA3HGV
VQ9R — c/o Box 193, Mahe, Seychelles
VR1AA — Via K3RLY
VR4BS — To ZL4NH
VS5AA & VS5JA — c/o K3RLY
VS6DO — Via W2GHK
XV5AC — To W1YRC
W9IGW/CE0 (San Felix) — c/o K3RLY
WA9OTH/TF (Iceland) — Via WA9PZU, 5711 W. Brooklyn Pl., Milwaukee, WI 53216.
WD4USA — To Box 501, Miami Springs, FL 33166
WR4USA — c/o Box 501, Miami Springs, FL 33166
XP1AA — To W3HNK
YJ8BO — Via I1IJ
YJ8RV — To G5RV
ZD7AV — c/0 DL7FT
ZF1DT — Via W0MRN
ZK1CD — To ZL2FA
ZK1MA — c/o W6KNH
ZL4/A/A — Via ZL2GX
ZS3KW & ZS5AR — To WB2RLK
3D6AX — c/o W5IEV
3G3AA — Via Box 13630, Santiago, Chile
5A3TB — To Box 121, Tripoli, Libya
5H3LV/1 — c/o VE3BIZ
5U7AU — Via WB2AQC
5W1AU — To W6KNH
5X5NA — c/o G3LQP
5Z4MG — Via WA5UHR
7P8AR — c/o Ulli Dehning, 4 Bay View Ave., Tambers Kloof, Capetown, South Africa
7Q7AA — To K4CDZ
9M6AB — c/o JA2KLT
9X5VA — Via W2PPG
73, John, K4IIF

years in the making

RTTY FROM AtoZ

DURWARD J. TUCKER, W5VU



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Written to round out the amateurs' RTTY bookshelf which up to now has relied solely on another **CQ** classic: "The New RTTY Handbook," the combination of the two is unbeatable. To properly describe the scope of this volume would demand a volume in itself, but the chapter headings below tell the story:

Chapter 1—**RTTY Basics.** Chapter 2—**The Teletypewriter.** Chapter 3—**Teletype and Radio Reception.** Chapter 4—**Converter (Terminal Unit) Basics.** Chapter 5—**Polar Relays and Distortion.** Chapter 6—**Special RTTY Circuits.** Chapter 7—**Test Sets.** Chapter 8—**Machine Adjustments.** Chapter 9—**Tape Printers.** Chapter 10—**Kleinschmidt Machines, Tape Readers, Teletype Models 28 and 32.** Chapter 11—**Codes, Data Processing & Advanced Machines.** Chapter 12—**Distortion Producing Test Sets.** Chapter 13—**Regenerative Repeaters and Frequency Shift Monitors.** Chapter 14—**Terminal Units.** Chapter 15—**The RTTY Station.** Chapter 16—**FCC Rules, Operating Procedures.**

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what we need for a satisfactory circuit. See fig. 1. From a close look at the many words that have been published, the signal and sweep circuits can be very complex or they can be very simple. What do we really need? See fig. 2. In fig. 2 I have not included a power supply because the h.v. requirements will be determined by the CRT you choose. By choosing a 2AP1A or a 902, I was able to simplify the circuitry because of the moderate deflection voltages required.

The waveform of a 60 Hz voltage provides a reasonably linear change in voltage at the zero-crossover points [fig. 3]. Therefore if we use a voltage of approximately 115 v.a.c. (162 peak or 324 peak-to-peak) we can have a reasonably linear sweep; and by adjusting the amplitude for the particular CRT in use we can get a good envelope pattern. So although I realized that a small filament transformer could be used for T in figure 2. I used an old ac/dc audio output transformer. With 6.3 v.a.c. connected to the "voice coil leads I could get about 150 v.a.c. from the "plate leads." In order to have some variation in output voltage I used a 500K pot across the plate leads of the transformer. So much for the sweep circuit.

Now for the signal circuit. Since my Swan operated only on 20, 40 and 80 meters I had no need for all band coverage. I found some miniductor stock and after a little session with *LC* formulae and some dimensional measurements on the coil, I came up with a coil with three taps so that I could use one capacitor to tune the three bands. A 2-turn loop on the cold end of the coil, connected to a coaxial line coupling unit[4] through a short piece of 50 ohm coax provided coupling between the *LC* circuit and

[4]"Testing a Sideband Transmitter," *QST*, Sept. 1965, p. 14.

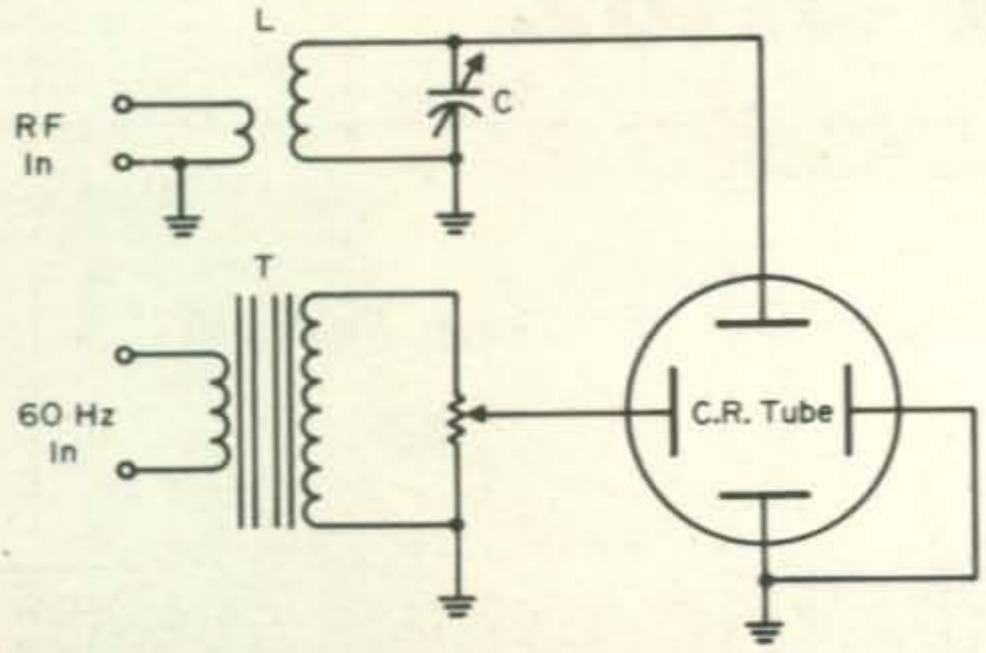

Fig. 2 — Circuit of the minimum complexity s.s.b. monitor scope. Transformer T is an old a.c./d.c. radio audio output transformer.

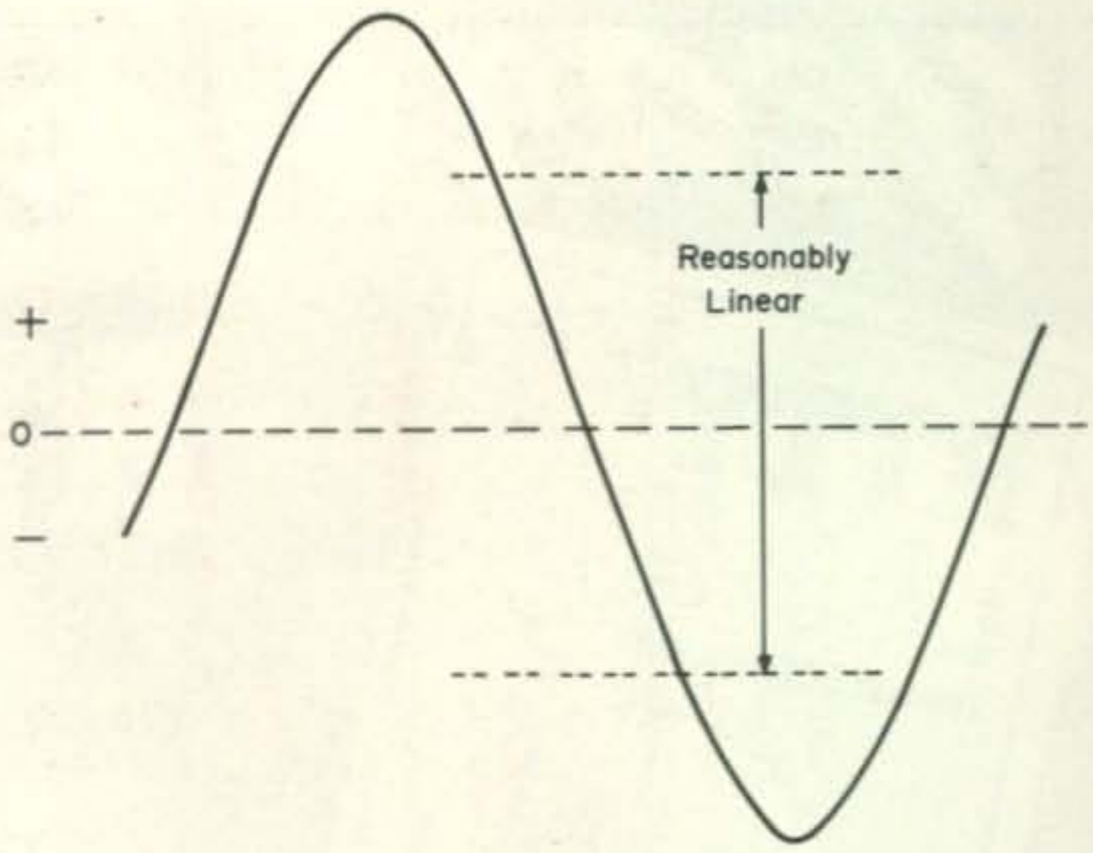

Fig. 3 — By selecting the most nearly linear portion of the 60 Hz waveform, and adjusting the amplitude of the applied sweep voltage to suit the CR tube used, a good envelope pattern can be obtained.

the transmission line feeding the antenna. So much for the "pragmatic approach" to the electronic circuits involved.

I used a few money saving shortcuts on the mechanical side also. Did you ever price an mu-metal shield for a 2" scope? Well, it will certainly make you become involved in some experimenting with adjusting the power transformer location to prevent "magnetic deflection" from the field of the transformer. However your local hardware store or plumbing shop can provide you with a short piece of 2" blackiron or galvanized pipe for less than $1. (I could write a complete humorous article on my "persuasion" of the salesman to sell me the piece of pipe, sans threads. He finally sold it to me even though he *knew* I would be violating the plumbing code if I used it.) A 2AP1A or a 902 just fits inside this pipe; and, mounted on the chassis with a couple of standoffs, it makes a very fine shield for the tube. I mounted the socket on the end of the tube and centered the socket in the pipe with some old rubber feet from the junk box. An old 2" meter case made a fine front panel escutcheon for the CRT. The end of the tube just fits into the meter case.

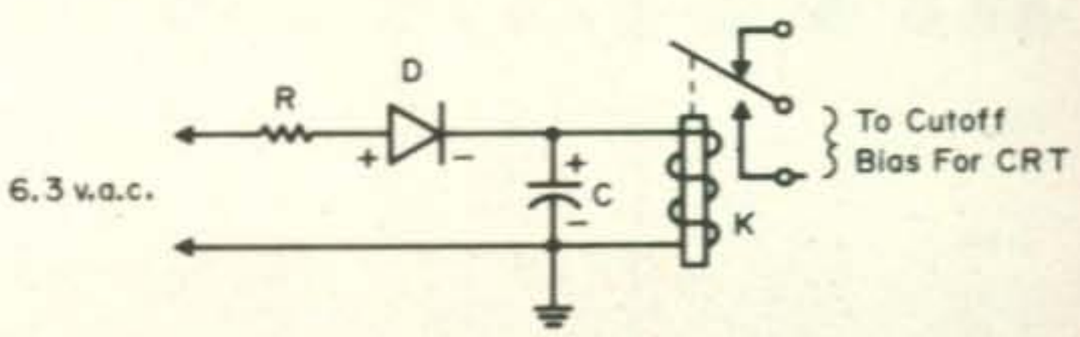

Fig. 4 — To bias the scope trace off during receive to prevent burning the screen, a relay operated by the T-R relay in the rig is used.

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We can't really save much on the power supply because we need about 600 to 800 volts d.c. for the deflection and focusing elements in the CRT, and 6.3 v.a.c. for the heater. There are still some reasonable scope transformers on the surplus market. But again the use of an old audio transformer together with the use of diodes and small oil-filled capacitors in voltage multiplying circuits should be given due consideration. *Don't use an ac/dc line voltage type power supply! It could be lethal!*

I mentioned earlier that I wanted to be able to check on my antenna system. Having built several ARRL MK I and MK II Monimatch units, I decided to build two MK III Monimatch units.[5] I built one for 75 ohm and one for 50 ohm line. I brought two shielded leads for the d.c. voltage from each reflectometer up to 4 RCA phono jacks on the back of the monitor, through a d.p.d.t. switch to the SENSITIVITY control and the FWD-REV switch on the front panel on the monitor. I used a 2", 0-1 ma meter for which I made a new scale calibrated in v.s.w.r. as the indicator. So I now have completed 2/3 of my requirements.

As you can see from the photo, the symmetry of the 2" meter (v.s.w.r.) and the 2" scope, together with the four knobs and utilizing a cabinet size similar to the Swan power supply I have somewhat matched the decor. Somewhat? Yes, I couldn't find the exact shades of paint and I used a Dymo labeler. But it works very well and I would be lost without it.

As with all homebrew projects such as this there is always something that could be added. And I didn't like the idea of the line on the scope when I was "listening." Why burn a line on the screen? So I decided to "change" the bias on the CRT when I was listening. Again to the junk box! All I could find was a 6 v.d.c. s.p.s.t. relay. OK, the Swan 240 has a NO/NC pair of contacts on the transmit relay that are available on the back of the set. So with a diode, a resistor, a capacitor and the relay I came up with a manner of biasing the grid of the CRT to cutoff during listening periods (fig. 4). I mentioned earlier that I now have a Swan 270/1200W. The only changes that will be required will be to increase the tuning capabilities of the *LC* circuit to include 15 and 10 meters, and some means of "keying" the CRT grid bias circuit.

The number of hams who have visited my shack and have seen the monitor in operation have been impressed with it and when I tell them what it consists of, they can't believe it. ■

[5]"Monimatch MK III & IV," *QST*, Sept. 1964, p. 21.

Zero Bias [*from page 5*]

erate in the entire 145 to 148 MHz segment. The new rules also restrict linked repeater operation, place limits on the effective radiated power from a repeater station antenna, and require the licensee to maintain supervision and control of both the technical and operational performance of his repeater station.

The rules also provide for operation of stations by visiting operators, automatic identification of repeater stations by telephony as well as telegraphy, and for continuous monitoring of remotely controlled transmitters to prevent interference to radiocommunication already in progress on a given frequency.

Although the rules do not proscribe amateur radio stations from being automatically interconnected to a telephone exchange system, the Commission said that because of numerous violations of the rules regarding interconnection, it may be necessary to examine the use of "autopatch" facilities and possibly restrict the use of such devices in the Amateur Radio Service. It warned that until new regulations are adopted, interconnection devices must be limited to amateur radiocommunication and may not be used for any type of business communication.

The new rules become effective October 17, 1972.

Action by the Commission August 29, 1972, by Report and Order. Commissioners Burch (Chairman), Robert E. Lee and Wiley, with Commissioner Johnson concurring in the result, and Commissioner Hooks not participating.

West Africa [*from page 34*]

to continue his successful contest activity. I told Lee about the healthy climate in Albania (I need ZA) but I don't think I could convince him.

In Liberia — for the first time on this trip — I saw many African amateurs, like Pete, EL2CY, Sam, EL2P, and others. In many other places in Africa only foreigners — Europeans and Americans — are amateur radio operators and the attitude of those government towards amateur radio is not encouraging at all.

I recommend visiting a village to see how a large majority of the country lives.

If you are not an African I don't recommend that you drive a car on the streets of Monrovia. A local super-patriotic policeman could stop and search you for no known reason.

Next month we will conclude this travelogue of our West African DXpedition with stops at Ivory Coast, Togo, Ghana, Niger, Dahomey and Cameroon. ■

EER [*from page 17*]

heterodyned to 432 mHz and then passed through a tripler to 1296 mHz.

Will It Work?

The EER system was first used in 1952 to convert existing a.m. equipment to the s.s.b. mode and since has been used with high power shortwave s.s.b. systems. The DJ4ZC signal processing technique has been used in Germany on the 432 mHz and 1296 mHz bands with good success and also in one of the ARTOB balloon transponders flown over Europe. A version of this circuit is proposed for a forthcoming OSCAR v.h.f. repeater satellite. Dormant for some years, the EER system seems to be an idea whose time has arrived. The requirements for v.h.f. s.s.b. systems plus the inherent limitations of solid state devices operating in a linear mode require a new approach in this field. Perhaps the EER system is the answer. ■

Math's Notes

and we would like to hear about these from our readers. We will be quite pleased to publish clever ones from time to time and I am sure they will often solve many problems.

With all of the experimentation that is going to begin, there is a very neat, new breadboard idea now available from El Instruments Inc., 61 First Street, Derby, Conn. 06418. This device, somewhat expensive at $17.25 each, is well worth the expenditure however, as components can be used over and over again. You never have to use solder and the breadboard accommodates transistors, diodes, DIP packages, round packages and, in short, any component with #20 leads or smaller. A unit in use is shown in the photo. Leads are very securely held and jumpers can be made with buss wire or #22 hookup wire, stripped and tinned ¼" each end. We have been using one for 4 months continuously with not a single problem. If you calculate your costs for your present method of breadboarding, considering lost components, you will quickly see the economy of this device.

Finally, just before we close this month, R & R Electronics, 311 East South St., Indianapolis, Indiana 46225, have indicated that they have a large quantity of Western Union facsimile transceivers for $19.95 each as well as the special receiving paper necessary for operation, that should be good for amateur work. We are in the process of preparing a step-by-

step conversion for these units, and will present it in a forthcoming column. In the meanwhile, interested amateurs should contact R & R Electronics, and refer to Gordon White's April 1969 Surplus Column.

See you next month.

73, Irv, WA2NDM

SSTV [*from page 48*]

by an f.m. transmitter using ± 5 kHz deviation), power input, and the calls and signatures of the stations and licensees involved. Allow a couple of months for FCC action. You will be required to submit a report at the end of the test period which will become useful documentation when a rule change petition is eventually submitted.

Facsimile is another activity that could benefit from the STA approach. Fax signals are almost identical in on-the-air characteristics to SSTV, but are not now permitted in the h.f. bands.

Vy 73, Cop, WIGNQ

F.M. [*from page 56*]

operations, with resulting publicity, only a few have been heard from. The first sending information was the Green Mountain Repeater Association of Cheverly, Maryland. During the emergency situation of 22-25 June, 1972, the "Green Mountain (boys)" utilized their repeater and autopatch system in assistance to the Prince Georges County Emergency Planning Agency, Civil Defense, and the Red Cross. Letters of appreciation were received both from the American Red Cross and from Civil Defense. The text from the Civil Defense letter is repeated herein.

"Dear Sirs: I wish to take this opportunity to express my sincere appreciation to the Green Mountain Repeater Association during the recent flood disaster encountered in the State of Maryland during June 22-25, 1972.

"The use of your Amateur Radio FM repeater system together with mature, competent and unselfish communicators was a primary factor in maintaining continuous and reliable communications throughout our county. The performance of Amateur FM Repeaters and your members speaks for itself.

"Again, on behalf of the flood victims, my Staff and myself, thank you for your invaluable contribution in the interest of public service.

"Signed R. Hal Silvers, Director"

This is typical of the response given to amateur f.m.'ers helping in actual emergencies. Keep up the good work fellows!

Q & A

Q. You always say to use the best transmission line available because of losses. Well, I can't seem to

CQ BOOK SHOP

Ham's Interpreter

This valuable book is imported from Germany and written by DL1CU. It contains a collection of phrases and expressions designed to assist those amateurs who wish to enlarge their knowledge of various languages for use on amateur radio. It is a must for every DX'er. $1.50

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Convenient and economical are the words for CQ's beautiful maroon and gold binders. Individual issues can be removed quickly and easily without damage to the magazine. Save precious time as reference copies are within immediate reach in this handy binder. $5.00

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A treasury of vital and "hard-to-get" information, this book is loaded with valuable equipment schematics, adjustment procedures, etc. A boon to beginner and pro. A special section on getting started, written by Byron Kretzman, W2JTP, a well-known authority in the field. $3.95

Surplus Schematics

Ken Grayson has loaded this book with schematics for currently popular pieces of conversion gear, making it invaluable to amateurs as a guide to surplus gear. $2.50

Antenna Roundup I

Edited by Art Seidman, a 160 page mass of antenna information directed at answering a multitude of questions surrounding the mysterious antenna. $3.00

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locate the losses of coax. What are they?

A. First of all, the *ARRL VHF Manuals* (all editions) have a small chart giving typical losses as the amateur frequencies. But, for more specific data the following information is given based on data published by Belden, Saxton, and Motorola (for Andrew line).

As can be seen, there is a definite difference between coax. Choose the best coax possible for best results.

Q. How do you hook-up a "Touchtone" pad?

A. See page 273 of the Third Edition of the *ARRL's VHF Manual*

Q. My solid-state transceiver has been operating quite well until lately. Now, it sometimes shuts itself down while transmitting, just like the s.w.r. was high. However, the antenna checks out OK. What gives?

A. Sounds like a dirty antenna changeover relay. Sometimes it makes contact, but at other times it presents a rather nasty impedance bump or open circuit. When you check with an in-line wattmeter you are on the antenna side of the problem. The cure is a thorough cleaning of the contacts.

Finale

Well, another FM COLUMN comes to a close. As most everyone knows, I moved late last spring, and the US Postal Service is not always getting the mail forwarded, even though it is within the same city. Some letters have taken over a month in transit while others lose no time! If I haven't answered your letter, maybe it is lost somewhere, for my mail volume is about ½ normal at this writing. A sad situation, but it definitely exists. Best of luck and see you next month.

73, Glen, K9STH/5

CQ REVIEWS [*from page 62*]

circuits for the display. Increasing the value of these would be required for increased sensitivity if needed. Otherwise about 100 mv r.m.s. were found to be required at 455 kHz for the b.f.o. input with an average of 50 mv up to 15 mHz on the b.f.o. and l.m.o. inputs. The average needed at the h.f.o. input was found to be 300 mv at 3-36 mHz.

Other Applications

Using the h.f.o. input, the SB-650 may be used to count up to 40 mHz with somewhat higher input levels than just given. Our unit went up to 63 mHz. The device thus can be useful for other applications where a digital frequency readout may be desired, such as that of various oscillators or other functions during adjustments, checks or trouble shooting.

The SB-650 Digital Frequency Display is priced at $179.95 (kit). It is a product of the Heath Company, Benton Harbor, Michigan 49022.

— *W2AEF*

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TRAVEL-PAK QSL KIT - Send Call and 10c; receive your Call sample kit in return. Samco, Box 203-A, Wynantskill, NY 12198

QSLS. Second to none. Same day service. Samples 25c. Ray, K7HLR, Box 331, Clearfield, Utah 84015

SELL Swan 350 with AC/DC Supply 410 VFO, 405 Mars adaptor plus mic, $450 plus shipping. WB6GFJ, P.O. Box 11, Los Altos, CA 94022

FOUNDATION for Amateur Radio Annual Hamfest Sunday 22 October 1972, at Gaithersburg, Maryland Fairgrounds.

MAGAZINES FOR SALE: CQ/73/QST/HAM RADIO issues at 10 cents each (plus shipping) from Lockheed Ham Club, 2814 Empire, Burbank, CA 91504. Send list and check. Available issues and any refund due will be sent promptly.

CINCY STAG HAMFEST: The 35th Annual STAG Hamfest will be held on Sunday, September 24, '72 at the ALL NEW Stricker's Grove, on State Rt. 128 one mile west of Ross (Venice) Ohio. Check local area map for new location. Door prizes each hour, raffle, lots of food, flea market, model aircraft flying, and contests. Identify Mr. Hamfest and win prize. $5.00 cost cover everything. For further information, contact: John Bryning, W8DSR, 6307 Fairhurst Avenue, Cincinnati, OH 45213

DISCOUNTS! Standard, Sonar, Clegg, Robyn, Mosley, Cush-Craft, Others. Also Marine gear. Write stating needs. Arena Communications, Dept. C, 1169 N. Military Hwy., Norfolk, VA 23502

RECIPROCATING Detector parts kit. Write Peter Meachum Associates, 19 Loretta Road, Waltham, Mass. 02154

COLLINS R-390A like new $695. Motorola R-390A, good, $595. Will take 32 or 32 Teletype part payment. Alltronics - Howard Co. Box 19, Boston, Mass. 02101 (617-742-0048)

WANTED: Dial counter; 7-RG-22B/U coax; 2 and 6 meter converters for NC-300. SELL or TRADE: Tri-band fiberglass quad kit; SX-24 with matching speaker, Q multiplier and manual; Navy AN/FRR-26 crystal operated receiver with manual. Bob, W-NØGGD, 5107 Red Barn, St. Joseph, MO 64503

QSLs - See our new leatherfinish cards before you buy. Samples 10c. Practical Products, Box 1365-C, Pittsfield, MA 01201

SWAP/SELL Tenner converted to third-overtone sixer, meter, PTT. Crystal, no mic, want twoer, good condition with crystal. SASE KØAQE, Box 217, Winfield, Iowa 52659

EXPERIMENTERS - Make etched dual- in -line printed circuit patterns on your board at home. Quick! Easy! Inexpensive! No taping! Details: STAMP-A-CIRCUIT, Box 113C, Westchester, Ohio 45069

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160 METER HAMS Join the Northeastern States 160 meter Amateur Radio Association. Annual Banquet in October. Contact W2SZV for details

SAROC Eighth National Convention the PRESTIGE convention at the Flamingo Hotel Convention Center, Las Vegas, Nevada 89109, January 4 thru 7, 1973. SAROC special room rate $15.00 plus tax, per night, single or double occupancy, only 500 rooms so get your accommodations request in early. Advance Registration $10.00 per person. Registration and eyeball session on Thursday. Seminars, Meetings, Exhibits, open Friday and Saturday. SAROC-SWAN Electronics Social Hour, Friday. Ladies Program, Saturday. SAROC Sixth National FM Conference, Friday and Saturday. SAROC-HY-GAIN/GALAXY Cocktail Party, with Leo WØGFQ, at the organ, Saturday. SAROC Buffet Hunt Breakfast, with Champagne, Sunday. Advance registration with Sergio Franchi Flamingo Midnight Show, two drinks, $17.00 per person. Advance Registration with Sergio Franchi Flamingo Dinner Show, no drinks, $21.00 per person. SAROC Jet Roundtrip Vacation Package Plan includes airfare, Deluxe Flamingo Hotel Room for three nights, SAROC Advance Registration with Flamingo Hotel Dinner Show: via United Airlines departure cities: Baltimore/Washington, $280.00 Boston, $312.00; Chicago, $220.00; Cleveland, $250.00; Columbus, $246.00; Detroit, $244.00; Hartford, $304.00; Milwaukee, $233.00; New York/Newark, $296.00; Philadelphia, $290.00; Pittsburgh, $262.00; via Frontier Airlines departure cities:St. Louis,$209.00;Kansas City,$188.00; Denver, $135.00; Omaha, $182.00; Lincoln, $176. The price quoted is per person, double occupancy in hotel room. If single occupancy in hotel room is desired add $25.00 additional per person, to each amount quoted. All fares and schedules are subject to CAB rules and regulations, send for additional details. Remember to send accommodations request to Flamingo Hotel. Send Advance Registration and information request to SAROC, P.O. Box 73, Boulder City, Nevada 89005

$3,000.00 in FREE PRIZES! On October 7 & 8, 1972, SWAN ELECTRONICS will host its Annual Open House. Enjoy refreshments, plant tours, technical talks, movies, etc. Free prize drawings for licensed amateur radio operators . . also, ladies and kids. Located next to Oceanside Airport, overnight trailer and camper facilities will be available. Join the "Talk-In" on 7260 kHz and 146.94 MHz. Don't miss this family affair - include this visit to SWAN in your vacation plans. Any questions? Call 714-757-7525. SWAN ELECTRONICS - 305 Airport Road, Oceanside, CA 92054

ELECTRONIC Calculators at a wholesale price. Four functions: add, subtract, multiply, divide and stored constant, 16 digit capacity for $129. One year factory warranty on parts and labor. Established American manufacturer. Send self-addressed envelope for brochure. W6FNQ, 2120 Amherst St, Palo Alto CA 94306

MUST SELL - Heathkit SB-220 2KW linear excellent condx, little use $275, also Hallicrafters SX-117 rcvr and matching HT-44 xmtr with PS-150-120 Power Supply/Speaker and transceive cables ex condx both $325, also Heath SB-630 station console $60, Heath HA-10 keyer $35, Heath HM-102 RF power and SWR meter $20, Heath HDP-21A SSB mike $20, Hy-Gain TH6DXX tri-bander $100, or complete 2KW SSB-CW station and many extras all $775, Stan Schwartz, 4160-4 Hutchinson River Pkway East, Bronx, NY 10475, 212-379-5752

WANTED: Tx tubes 850, 852, 860. Tnx/W1BB.

FOR SALE: Two meter repeaters built to your spec. Four States Comm., Inc. (505-325-4609) 607 East Bloomfield Hwy, Farmington NM 87401

CLOSED CIRCUIT camera, monitor, 50' RG-59 sound cable, connectors. Never used, 1 yr parts guarantee, $399. Bob WNØGGD, 5107 Red Barn, St. Joseph, Missouri 64503

TRADE: Have Gonset G-76 6-band xcvr and G-76 DC power supply, want good novice xmtr WN5-GYJ, 5146 Gawain St., San Antonio, TX 78218

COMPLETE HAM OUTFIT- one owner, excellent-condition, Hamerlund HX-50, Hamerlund HQ-145-X & microphone asking $395, Owner deceased, Phone 516-AN5-3597 or write Mrs. Josephine De Gaetano, 18 Lincoln Ave., Smithtown, L.I. NY

MINT Drake SPR-4 Programmable receiver $295, LA7HH/W8, 733 Timberland, Berrien Springs, MI 49103, 616-471-2168

COLLINS sale. Collins 32S-3 transmitter less than one year old, SN101448 mint for $599. Collins 75S-3 receiver mint for $425. Both above for $970. New Ten-Tec Argonaut. power supply, microphone for only $225. Antique Western Electric 4-D receiver for $120. QSTs 1932-68 for $100. Want Collins KWM-2A. Write only. Paul Kluwe, Edmore, Mich. 48829

TOWERS protected, stops rust 3 years. Zinc galvanize equals hot dip! 16 oz spray can $3.95. Protect rotors, etc. 2 years with wax base rush inhibitor lubricant. 7 oz. $1.89. Postpaid. HTP, Box 901, Cupertino, CA 95014

HALLICRAFTERS (PYE-ARC) Vanguard 60 watt VHF-highband mobile transceiver w/control head, mike, built in secode. Cost $1100. Solid state receiver, partially solid state xmtr. $175. Hammarlund 500B VHF linear amplifier, $150. Richard M. Jacobs, 1301 W. Estes, Chicago 60626 (312-338-1975)

SWAP Panasonic CCTV WVO33P for a DX-150A or best offer. G. Cormier, 1411 S. Maple Ave, Green Bay, WI 54304

Sell: Waters Compreamp model 359, excit condx, $15 WØRJZ Box 466, Creston, Iowa 50801

Turner 254C mike, EV 636 mike, Lafayette TE-18 grid dip meter w/coils, Johnson 250-37 Swr meter/coupler, champion bug SASE for list WA3LRJ, 1160 King George Court, Pittsburgh, PA 15327

Custom pwr supplies constructed. Linear, xcvr, regulated LV. M Caldwell, W8IFN, 1068 Windsor Ave., Morgantown, W' VA 26505

TTY Wanted: M28 KBD, typing unit, LBXD or LPR in poor condx needs repair, reasonable, B Giekel W2OWH 14 W Holly Dr, Sayville NY 11782

Swap old QSTs. Have good June 1925, Nov 1926, fair July 1924, Apr & July 1925. Need any 1919 & earlier. W6AKM, 1289 Glen Eyrie, San Jose CA

Sell: DX-100 w/SB-10 $115 or best offer. DX-60A HR-10, HG-10 $120. All manuals. WBØFLM, 2941 Josselin, Springfield, MO 65804

Want: Collins G2S-1. Sell: Drake 2-C & 2CS spkr, $175 WA2RJV, 301 Blacksmith Rd., Camphill PA

Want: to borrow schematic diagram & operating manual for Hallicrafter rcvr S-37; will photocopy & return same day K Piletic W9ZMR, 705 S. Oltendorf Road, Streamwood IL 60103, 312-837-2088

Eico 369, new fact wired $95, code osc $5, 6m beam $15 RTTY TU $95, P Graulich, WB2NR4, 1157 Concord Dr., Haddonfield, NJ 08033

Adapters UG201/u, N to BNC 75¢ 5 for $2, J. Schrenk, 2707 McDivitt Rd, Madison WI 53713

Sell or Swap: BC348 rcvr w/ac pwr suply, W7INR/6, 360 Sharry Ln, Santa Maria, CA 93454

Sell: Galaxy III triband trancvr, ac/dc suply, spkr, cabinet, factory checked recently $200 J Brewer Box 724 Jacksonville, AR 72076

Sell: Loktal tubes, most types $1 ea, SASE for list W4JGO, 643 Diamond Rd. Salem, VA 24153

Sell: Geiger counters, Navy AN/PDR-10, clean condition $7.95 ea, W4JGO 643 Diamond, Salem VA

Pair 4-125A tubes, old but never used $25, RCA Iconoscope 5527, best offer, both from dead projects, W2KPZ 6 Rabbit Trail, Poughkeepsie, NY

Sell: National rcvr NC303 w/xtal calib, excit condx best offer, M Herbstman, WA2PHB, 245 E 19 St., NY' NY 10003, 212-473-4808

Bargains: SO-239 .18; UG58A/U .20; UG262/U .22; cable, RG8U w/S-239 & PL259A .62; toggle-switch SPST ST42A .22; DPST 22K .22 add post age. Ken Maas, Burlington, WI

Sell: Coax switches, manual operated 6 positions, 52 ohms, 2KW PEP, $7.95 ea, W4JGO, 643 Diamond Rd., Salem VA 24153

New Gladding 25, 2 mtr FM xcvr in original unopened carton $226, Lampkin 105-B freq mtr $155, 925 Coleridge Rd, Baltimore, MD

2 new 4CX1000 tube sockets, Eimac SK810 forced air-cooled cost $69 ea, 2/$45 pp, B Doctorman, K6AEZ 150 Geneive St, Camarillo, CA 93010

Want: PL 172 final tube for HT 33, good used ok stateside address: R C Bagwell, Box 86 Zapopan, Jal. Mexico

Sell: Heath DX-100 xmitter $50, Elmac AF- 67 xmitter w/ac pwr $25, Hallicrafters S-107 rcvr $25 all good condx, Johnson 841 4th, Oshkosh, WI

Canadians: equpt repair & alignment, lic'd technic, kits wired-repaired, B Fransen VE6RF, 227 Cottonwood, Sherwood Park, Alberta, T8A1Y3

Sell: TR4, AC4, MS4, RV4, absolutely perfect, pd $850 month ago-sell $675, becoming chaplin overseas, Yellin WB2VIN, 49 Parkvill, Brooklyn NY

Sell: Ham-M $70, Collins PM-2 $65, rcvrs, S-38E, CM-1, SX-140, 14AVQ $25. K1VTM

Sell: Cliff dweller 80-40 mtr rotable antenna Frank Miller, WAØILV, 210 Spruce, Clarkson, NB 68629

Johnson Valiant w/manual 160-10 mtrs, 275 watts CW, 200 watts AM, excit condx $110. PB Williams 6 Lloyd Dr., Coventry, RI 02816

Wanted: old battery radios & crystal detector radio sets of the early 1920s, need not be in working condx, price, manufac, model in 1st letter, McKenzie, 1200 W. Euclid, Indianola, Iowa 50125

Heath counter-scaler, Motorola T4GGV 3 freq., operational WA5CMC, 2309 Bullington, Wichita Falls, TX 76301

Wanted: SB-10 manual, also junked SB-10 for parts E A Sjolander Jr., Box 262, Ashland, WI 54806

Sell: Swan 500 w/117xc suply & spkr, mint condx, $400, DC suply & Hostler ant w/resonators available, W2ASI, 15 Kensington Oval, New Rochelle, NY 10805, 914-NE2-0771

Wanted: Collins gear for cash, state condx & lowest price prepaid to my QTH. W8GIV, 600 Beechmont DR., Dearborn Hills, MI 48124

Sell: New, never used Hallicrafters HT-44 xmtr, $225, PS-150 ac pwr suply $70, W4OSC, Box 254 Ware Shoals, SC 29692

G.E. 150mc FM transcvr mobile $15, BC-221 freq meter $25. K6KZT 4434 Josie Av, Lakewood CA

Drake TR-22 solid state 2 mtr FM 94/94, 34/94, 34/76 mint condx w/access $165, W9TKR 505 S. Elmwood, Waukegan, IL 60085

Sell: Johnson Mess, 350 SSB mint condx $175, P S Ostromecky, 29 Meadow Lane BBT, Portsmouth, NH 03801, 603-436-0983

Mint condx RME conv model VHF-126 $80, companion RME 6 & 2 xmtr model VHF-602 $50, K8OUQ, 268 Annis Ct, Chillicothe OH 45601

1st Class? CIE Industrial Electronics unmarked in binders w/answers. Half price. WA4TJJ, 5204 Penelope Lane, Knoxville, TN 37918

Wanted: Collins 312B4 station console. State price condx, s/n W2EHB, 32 Bryant, Blackwood NJ

Sell: excl National 200 transcvr w/ac 200 suply $250 W2GMA 1762 Larkspur, Cherry Hill NJ

Sell: Allied A-2515, A-2589, Heath GC-1A, SW-717, GR-64, HD-11, Knight KG-221, Crown 2 speed recorder, EV 630 mike, make offer. J Dennigan, 47 Mawney, Providence RI 02907

Sell: Drake TR-3/AC-3/RV-3 $450, Drake 2-B/Q mult/spkr, $150 all mint condx K8DBW 74 Marcie Lane, Cincinnati, OH 45150

GSB-101 1.2 kW linear w/spare tubes $250, Heathkit SB-620 Scanalyzer $80 WB2OZA 716 Calhoun Av, Bronx, NY 10465, 212-824-2630

Matched pairs of GE 6LQ6 & GE 6KD6 $13/pr pp K4EPI, R Guard 750 Lily Flagg Rd, Huntsville AL

128 Contest club has openings for contest oriented hams in the greater Boston area. No dues, contact W1BPW, Merrimack, NH 03054

Sell: Viking Valiant - take away only $90. Call 914-RO9-2568

500-CX, TR-3, 2-B, Valiant, SB-200, NC-303. All accessories, write for great prices. R. Conley 37 Wyoming Av, Billings, MT 59102

Collins 32V3 clean w/manual $150 WB6ZGL, 2761 N. Marengo Av, Altadena, CA 91001

Sell: 2 GEM, 2 element 3 band fibreglass quads, $75 & $85, can be used as 4 element quad. H S Corbin, 11704 Ibsen, Rockville, Md, 301-881-7571

Sell/Trade Seneca, amplidyne 2 mtr conv, preamp/pwr. WU104 & TU, Want SSB xcvr, K7UVR, 54 Kaynor Dr., Waterbury, CT 06708

Sell: Heath Twoer HW 30 w/1 xtal, xcit condx, w/Ameco preamp, PV 144 $25 W2UI, 427 Oakland Ave., Maple Shade, NJ 08052

Wanted: Pwr xformer, for SP-400-X or RA-84 --B State price asking. WW Bell, 1813 Nortonia Rd, Richmond, VA 23229. W4JLS

Hickok 292X signal generators $20, AN/FRR-3A RTTY, dual diversity, $100, RCA VTVMs $15, C-F dual trace scopes $45. 3-page list SASE apprec. WA9DY, 114 Lakeview, Milwaukee, WI 53217

Wanted: General Class license theory instruction. Window antenna, Kennedy, 791 Greenwich, NYC

Collins KWM2 w/plug in relays $575, without $515, Drake TR3 w/noise blancher $325. mint WA3IFQ, 1138 Boxwood, Jenkintown, PA 19046

Sell: model 84 duo-bander & AC suply $125. Heath DX60B 10 crystals $65, WB4VWN, 128 Hickory St., Rhodhiss NC 28667

"The Milliwatt" devoted to under-five watt ham radio QRPp. $3 per year. Ade Weiss, K8EEG/1, 117 Central F10, Acton, MA 01720

Sell: earphones, Brandes Supr, West. Elec, Trimm, Telephonics $5 pr; Trimm Acme. Little Gem Dictaphone $3 pr, Douglas, 2254 Pepper, Concord Ca

Sell: Radio News 1936-6; 1938-6; 1939-10; 1940-11; '30-10; '31-12; '32-12; '38-8; '34-11; '47-11; '48-1; '49-11 Sell to highest bidder, Douglas 2254 Pepper Dr., Concord, CA 94520

Sell: RAdio Eng handbooks 1941 & 1947 $8 ea ARRL Handbooks 1944-46-53-52-55-57-47 $3, FOB Douglas, 2254 Pepper, Concord, CA 94520

Sell: Sweep Generator, Philco G8002, UHF-TV range cost $289.95 sell $75, new condx, W4JGO, 643 Diamond Rd., Salem, VA 24153

Wanted: HA-650 or HA-750, K3RCF P.O. Box 1747, Hyattsville, MD 20788

Touch tone pads 12 button w/hookup instructions $17.50 Covers $2.50 18 ft extension cords for telephones $1 Autopatch Systems Ltd. Box 291, Western Springs, IL 60558

Worked South America certificate: work all 13 countries. Send $1 & confirmation list HC1TH, 4805 Willowbend Blvd., Houston, TX 77035

14AVQ, 12AVS, Globe Scout, Eico 232 VTVM, BC-348, ART-13, T Gosman, 143 Roxton Rd, Plainview, NY 11803

Sell: Hallicrafters HT37 xmtr, SSB excl condx $150 Heath xmtr DX20 50 watts CW $20, pickup only WA2DEV, Seaford, LI, NY 516-785-1386

TEAC 1500D tape deck automatic reverse, echo & effect, SOS, etc. perfect condx, Ship in orig carton, $220 WN4UCC, 96 Hallmark, Athens GA 30601

Collins KWM-2, 10, 144, best sound on bands, $650 30-day money-back guarantee, D Whitsett, 2009 Cliffmanor Cir., Huntsville, ALA 35801

Swap: Shakespeare CB antennas 453, 430 never used for Heathkit HW-16 or DX-60B or? JN Brunst 249 Myra St., Neptune Beach, FL 32233

Cleaning out shack - send SASE for list. Tom Cunningham, 1097 Flora, Reedley, CA 93654

Sell: old CQ-QST-73 mags, name what you want, 25¢ ea delivered. L.M. Covey, K1JAR, 238 Jenness St., Lynn, MA 01904

Make offer - Conar 400 novice xmtr. James Brodnax, 704 S. McKinney, Mexia, TX 76667

Sell: DX-40 $25 NC-57 $30 S-38B $15, details on request, P Bishop, W4WRY, R 5, Box 5, Golf Club Circle, Statesboro, GA 30458

Heath HW-32A, HP023A, HP-13 $199, Eico 717 keyer $45, pp, F Beyer 15426 Comstock, Grand Haven, MI 49417

Eico model 722 transmitr w/matching 722 VFO, Knight SWR mtr & antenna relay excit condx $65, W5PSJ, 6821 Fairway 11, Houston, TX 77017

Sell: Johnson Matchbox 275 watt (750) pep, exct shape w/manual (no mtr) $45 plus ship; Want: HA1-TO keyer w/key WØMFV 2116 Lahoma, Wichita, Kans. 67207

Heath IP-12 DC suply mint $40, Heath MP10 $20, 12 new Nixies w/sockets $4 ea, 35mm slide trays revere/wollensak 12 for $10, W9TKR 505 S. Elmwood, Waukegan, IL 60085

Sell: RF watimeters ME 11/u freq range 30-500 mc -0 to 60w in 2 ranges. good condx $75 WN4ZOT, 736 McDowell Rd., Richmond, VA 23225

Sell: KWS-1 1547, SC-101, 75A4, 5831 (3.1 6.0 khz) cables, manuals like-new $1500 crated, pp. Henry 2K-3 $575, Eldice SBA-1 SSB adpt $50, Collins 312B-5, cables, manual $295. KWM2-A, 136B-2 blanker 516F-2 manual $1000, J Craig 29 Sherburne Av, Portsmouth NH, 603-436-9062

Transformer 1600V ct, 250 ma, $8, choke 12 Hy, 300 ma, $5 Continuous ratings. SSB &cw more. A S Gillespie, K4TP, 618 Hillcrest, Gastonia NC

Wanted: FT-101 in mint condx, Smitty, WAINDX 12 Dale St, W. Hartford, CT 203-232-4177

Deskfax facsimile machines, complete send & receive only $9 ea, 22 units. Goodman 5826 S. Western Ave., Chicago, IL 60636

Valiant II, 6N2, RX-1 Mohawk, SB10 Adptr, 80' tower w/guys, pkg, $450, WA4JIG, P.O. Box 247 Crossville, TN 38555

Harvey Wells T-90 and p.s., Heath VF-1, Drake TV 1000 filter, make offer, pickup, W3WIY

T-19/ARCS 3-4 Mhz with tubes, excl condx, pp, $20 KH6PP, Box 677, Waianae, Hawaii 96792

RTTY picture tapes error free. Sell or swap. Stamp for list over 300. Also 8-level form. K2AGI, 5 Hansell Rd., Murrary Hill, NJ 07974

Sell: Swan FM2X 2mtr FM scvr w/ac-dc p.s., crystals for 146.34/.94 .94/.94 .34/.76 .16/76 .22/.76 .10/.70 one 146.52 xmit. Hy-Gain 5/8 wave trunk mounted mobile ant. five crystals are Int. CS, $320 or offer, u ship, WA1IWH 203-237-2071

Sell: Galaxy GT-550, remote VFO, AC supl/spkr, calib CW filter, $400. KØRPH, 707 Ihler Rd, Jeff. City, MO. 65101, 314-893-2813

Sell: 73 mags, vol 1-1 thru vol 23-1. What am I offered? WØPHY L A Stapp, 2903 Ash, Hays, KS

Cayman Turtle net: All ZF1 operators invited to monthly meeting 1st Fri ea month, 21.380 from 2230-2330 GMT. Net control ZF1WE

28 Model RO floor console teletype less page printer & motor, D C Harrington, 1620 Gardenia Av, Fridley, Minn 55432

Wanted: Heath 4W32A & dc supply. Reasonably priced & mint condx, T Dornback, 2515 College Rd., Downers Grove, IL 60515, K9MKX

SBE-33 $125, DX-100B $45, SX-111 $100, AF-67 $25, Manuals. WA6DDN, 1475 31st Av, S.F., CA

Collins 24 volt regulated 4 amp pwr suply rack mount $25 plus postage. WA6REA P.O. Box 93, Catheys Valley, CA 95306 (wt. 20 lbs)

SB-401 axtal pack never used, factory aligned, $275 W McFadden Sr., 29 Vernon Av, Wheeling W. VA 26003, 304-242-3655

Sell: Galaxy V w/acps, vox, cal, spkr, gasoline driven ac pwr unit military PE 75 - 2500 watts. Both for $700, will ship, WA4DJF, M.H. Carey, 815 E. College St., Pulaski, TN 38478

Polarad transistor pwr mtr 10-40,000 mc. 0-10 mw in 5 ranges ac or batt. Needs 1 new switch $11 pp. WA3LPK, 2300 Louise Av, Baltimore, MD 21214

Lightning bug, excit condx $21 pp in USA, Larry Briggs, 5108 Boulder Dr., Oxonhill, MD 20021

Sell: Collins 325-2 xmtr w/516F2 pwr suply & 312B4 station console as bonus, $350 or offer, K4LDR, 15010 Cordell, Woodbridge, VA 22191

Wanted: HW-16 in good condx, send quote to J Roberts, Glendale High School ARC, 6216 W. Glendale Ave., Glendale AZ 85301

Sell: Mite teletype machine, looks new & works, $150, W4AIS, 300 Thornwood, Taylors SC 29687

Ham Transformer rewound. Jess Price, W4CLJ, 507 Raehn St., Orlando, FL 32806

Wanted: to borrow for copy: SX-42 manual; 1971 Callbooks, HS-24 mobile spkr, 3-5 pos, coax switch /4 24 hr clock, WB6AWC, T Coddington, 7825 Scotts Valley Rd, Lakeport CA 95453

Sell: Heath VFO HG-10B, fine, $37.50 pp, M Kinney, 2 Howard Blvd, Hyde Park NY 12538

Touchtone pads, 12 button w/hookup instruc. $17.50 other parts available, Autopatch Systems, P'O' Box 291, Western Springs, IL 60558

Nice BC-348 receiver w/external pwr suply $30. K8OUQ, 268 Annis Ct, Chillicothe, Ohio 45601

CRT-3AQP-1 RCA good raster, mtg-hdw, socket, gratiucle, faceplate, first $15 takes. M Vigorito, 1-1546 Simpson St., Madison, WI 53713

Wanted: Essco dual magnet driver construction manual w/parts list & diagram. Will pay, J Bruner, K3KEK, 323 Second St, New Cumberland, PA

Wanted: CW filter for Hallicrafter SR-160 xcvr, L Kellough, WB9AZQ, 1418 Dubois, Vincennes IN

Sell: 7 new GE pagers, ni-cads, chargers, cases and, tone encoder for fraction orig cost. F Olinger WA8KJJ, 640 Grove, Calion, OH 44833

Eico 730 modulator-driver, little used, w/manual, u ship $30 or offer, WA9PQM, 1101 W. Ridge Rd, Hobart, IN 46342

DX-60B A1 condx, $65 12mfd 1000V oil capacitors, $2 ea, WB4AJZ, Box 3074, Bristol TN 37620

30 amp filament chokes for GG linears. 28 turns-10 wire, bifilar wound on 7 1/2x1/2 dia ferrite rod new $5 ea, 2/$9.50 V Murrell, K4HHA, 712C Rich Road, Newport, TN 37821

HW-100 mint condx, never modified, w/manual, $200 firm plus postage. J Wilkowski, WB8DMC, 25184 Leach, Roseville, MI 48066

Regency HR-2, preamp, 12 ch, xmt capability, a.c. pwr sup., .94 xtals $180 delivered, W8VVD, Box 452, Birmingham, MI 48009

Want: SX-88, spkr, manual J H Gordon, W5GXH, 6 Maple St., Bedford, Mass. 01730

HW-12 & HP-32 pwr suply 80 mtr SSB transcvr, xtal calib, practically new $100, J R Watson, 3087 Carnes Ave, Memphis, TN 38111

Gonset 2 mtr sidewinder w/ac suply, first money order $199 FOB K4HHH Bx 1391 Clearwater FL

Hallicrafters S-27 rcvr, 27.8-143Mhz, AM/FM/CW, $90 Ray Dewey, 7 Caroline Dr, Bennington VT

Sell: good HT-40, SX-140, R48A, 755A VFO pkg deal, u ship, $100. WØMHK, 1005 W. Hobart, Knoxville, Iowa 50138

Sell: Heath transistor-diode checker model IT-27 mint $7.50 Howard, WA6WUI, 654 Barnsley Way, Sunnyvale, CA 94087

Canadians: Heath H.W. 17 w/per amp, DC p.s. & FM adopter 4 extra crystals for AM $150, Telefax model 7099A w/diagram good condx $35 FOB, C Dean, 33 Leaside Dr.-609, St. Catharines, Ontario

Chess-If you play chess via ham radio please tell me of your experiences, K3RCF

Sell: HT-32A THT-33A full2KW station, $520; mike & relays w/pair, make offer on ea, will consider trade. WA9RRB, R. 1, Walnut IL 61376

Vacuum variable: like new Jennings 1000PF 7.5kv w/turn counter $50, WB6NWW, 5349 Abbeyfield, Long Beach, CA 90815, 213-597-2631

Wanted: Novice xtals: 80,40,15 All band converter to 80m; Novice xmtr, all band. Homebrew FB. Reasonable, J M Gunn, Ossipee, NH 03864

10 Henry chokes .30 amps 69¢ ea or $5 dozen. 7.6-Mhz crystals $5 per 100 J Schrenk, 2707 McDivitt Road, Madison, WI 53713, 608-271-7950

Sell: Beckman model 6120 freq counter, 2 plugins counts 1Hz-3000Mhz transistorized small W2ERJ

FCC 1st & 2nd Class license answer booklet $4 CRD Assoc, Bx 291 Western Springs IL 60558

Freed H.V. xformer new potted 60 cycle 115v-2000v CT 700ma plus 2 chokes 700ma 1.8H FOB $19.95 C Lewis, 9 Conrad Pl, Dover NJ 07801

8 to 9 MC crystals in FT243 holders, large stock, many on same freq for net operation. SASE for list $1 ea, W1DL, 24 Cherry Rd, Framingham, MA

Sell: good copies CQ 1954-64, QST 1941-68, RCA review 1940-57 25¢ ea, 4 or more pp, Handbooks, Send SASE for list WØBK

Want: Linear amplifier, HB or commercial, cheap. T Neill, K4MOJ, 1321 Merimac Cove, Memphis TN

Sell: 2K25 Klystron in tuning shell w/microwave contn. $12, more UHF, K5RME, POB 74, Ingram, TX 78025 FOB

Send SASE for surplus list, P Greeson, 8955 C Pensacola, FL 32503

Wanted: RME DB22A preselector send price & condx HE Parr, R. 2, Clifton Hill, MO 65244

Sell: 1 Jennings Vac. condenser 450-50 mfd 2KV test 20 amp. type GSLA 2 Motorola semi conductors, 2N174 sell to highest bidder, Douglas 2254 Pepper, Concord, CA 94520, FOB

Sell: HQ-100C & Johnson Adventurer $125, D McCrary, 1109 Ewing Blvd, Murfreesboro, TN 37130

Sell: BC 375 complete unused 14" Conrac TV monitor, coiled telephone cords, new; TDQ 2mtr transmitr, Beckman Scanner, 24 V PS 40 amp reg. K H Paquee, 53 Jerome Av, Trumbull, CT 06611

Want: 6kHz filters for 51J4, Broadcast coils for HRO-60, mobile telephones, 11 channel, Edwards 85 Decker, Port Richmond, NY 10302

BC-348Q, 6.3VAC fil. $50, HQ-145C & spkr, $75, NC-155 ham band $50, T-60 $25, working condx, plus shipping, Lucas, R 1, Box 347, Plant City FL

Sell: Tri-ex crankup tower 50' $250, if interested write WA6SBS, Box 634 Mendocino, CA 95460

Sell: handbooks, callbooks from 23, CQ from 46, QST from 15, Ham Radio & 73. Want old battery radios & wireless items, Rasmussen W6YPM, 164 Lowell, Redwood City, CA 94062

CQ! Assist in worldwide Ham/CB genealogy birthday hunt. Send call, name, QTH, B/D to: K4CLA, R 5, Box 111A, Lexington, SC 29072

Want: Swan 250C, Sell: Drake %B. URM-25, KG-10B tube. George Kapsokavadis, 23 Kolokotroni St., Corfu, Greece

Sell: Hy-Gain 204BA, like new condx, w/100 ft RG8 $95, will deliver to 100 miles, DX60 $50, W8CUT, 1776 Walnut St., Coshocton, OH

Wanted: Galaxy 5 MK2, AC suply, vox must be mint condx, WA8RIS, 13625 Leroy, Cleveland OH

Wanted: Boonton 250A RX meter, state condx & price. Foss, 5960 Crestview, Paradise, CA 95969

Sell: Tektronic 513D perfect condx w/manual, Beckman 7160 1mHz counter w/all functions, best offers, R. Mendelson 27 Somerset Murray Hill, NJ

Sell: Drake R-4 recvr w/manual, perfect condx, nearest $300 plus shipping takes, Ludin WA2ELJ 21 Indian King Dr., Cherry Hill NJ, 609-429-3997

Sell: Metr relays, Weston 705, 0-1 Ma. or 0-10 microamps, new, $5.95 ea, W4JGO, 643 Diamond Rd., Salem, VA 24153

RTTY model 15 printer, stand, p.s., CV89A freq shift converter, mint condx $80, Jacobson, 21010 Anza Ave., Torrance, CA 90503

Armageddon invasion from outer space. Written by W3ZS. Stamp appreciated. Write: Methods, 416C Palo Alto Av, Mountain View, CA 94040

New QTH: K2DEM has moved from Plainview, NY to 35 Suncrest Dr, Dix Hills, LI, NY 11743

6mtr 500 watt Gonset Linear $200, purchaser may get HX30 xmitr for $150, both like new WA4AUF

Wanted: B&W 370 receiving adapter. State condx & price. W5IHK, 2343 Crest Ridge, Dallas TX 75228

Wanted: Swan 270B PH213/784-3770 or 213/986-6064, S Mosher, 4768 Kester Ave, LA, CA 91403

Sell CQ & QST mags 200 issues 1949-59 15¢ ea, $1.50 yr, pp, SASE for list, W4GHV, 1010 Juniper Alamogordo, N M 88310

Sell: Heath DX-100, SB-10, RX-1 SSB station, xmtr w/solid state p.s., modern case to match, good condx, $220, Waggoner WAØQPM, 7611 Cottontail, Wichita, KA 67212

Sell: ham radio book, "Radio Astromony Simplified" $4, WA5KZE, 1108 Radam Cir, Austin TX

Sell: homebrew a.c. supply for SB101, HW100, etc $25; radio editors & engineers handbook 16th edit, like new $7, B Nastoff, 320 W. 56th, Gary, IN

Wanted: CW filter for Signal/One CX7, A Emerald, 8956 Swallow Av, Fountain VAlley CA

Sell: Lafayette HA-800 6 band rcvr, excl condx, WA2PPQ, 3 E. 85 St., NYC, NY 10028

Sell: HT-37 SX-101 SB-303 Warrior 1Kw Swan xcfr RTTY model 19 Mar UHF xcvr, mint condx, W7KSG, 1876 E. 2990 S., Salt Lake City UT

Sell: HW100 & AC supply $300, Swan 500 & 117 xc supply $350 or best offer, excl condx KØJPZ

Wanted: old transmitter in working condx, must be 1939 or earlier, price lst letter please, Alley, W1DMD, 298 Tauton St, Lakeville, MA, 02346

Want: Drake MN2000, C-4, free standing tower; sell or trade Ht SB630, dictaphone TB7 transcriber, 12ga auto shotgun, WN4UYJ

Receiver control C-975/URR for pr R390s $75, want early wireless, telegraph gear, D Spence, 10 S. 771 Clarendon Hills Rd, apt 201, Hinsdale IL

Sell: Hammarlund HQ-170AC VHF, covers 160m-2m, builtin 24 hr clock, mint, used only 48 hrs, $325, Tom Webb, Newland, N.C. 28657

Sell or wap: Electro instraments model 101 X-Y-recorder $150 will ship, WNØHNV, 2014 Radatz Ave., St. Paul, MN 55109

Sell: Swan 55B pwr bandswitching mobile Ant. near new $69 pp in US, K6RFQ, 109 Rainbow Dr, Oxnard, CA 93030

VHF wattmeter 0-120w $55, Lafayette 2M120w movile amp, $75, Measurements Standard transistor tester $50, swap cleanup VHF/UHF list SASE. W4API, Box 4095, Arlington, VA 22204

Wanted: Solid state 80-40m VFO, 6m coil set AD for HRO 60, imfo on or prod. detc. for HRO60. Sale 2m FM handtalkie, B Tucker 6112 Beachway Dr., Falls Church, VA 22041

Mechanical filters: 455kc for solid state, top quality, $12.95 w/instr. E. Jeltrup, Box 361, Mamaroneck, NY 10543

Sell: ART-13, fully converted and oper. w/PS included. excl condx, $75 W R Gary, 4858 Sharon Hill Dr., Worthington, OH 43085

Wanted: old battery operated radios and crystal sets of early 1920s, need not be working. Give name, model no & price, also want molds for casting lead figures, autos, etc. McKenzie, 1200 W Euclid, Indianola, Iowa 50125

Want: NCL-2000 linear amplifier or similar state condx & firm price, W3ESR, F Hoge, 504 S. Pinehurst Ave, Salisbury, MD 21801

UHF Nems-Clarke 1502 50-250mHz AM-FM 1-300 Khz band width excl condx, best offer over $500, A Parker, 314 S. Western Av, Springfield, OH

Sell: Telrex model 435 rotater system w/approx 100' Telrex 12-cond PVC control cable, $250. Telrex 20M646, $300. HRO-500 $750, Collins KW-1 $850. Johnson desk-KW(no desk) $300 pickup only. Linear all parts for 4-100 rig, 2 tubes, punched panels, 3' cab. p.s. $150 pickup. L-N 28V/100A alternator system, new $100. JW Craig, 29 Sherburne Av, Portsmouth, NH 3801

Collins S Line 1 yr old, round emblems 75S3B w/ 500 & 200 cycle filters $495, 32S3 w/516 F2 $550, 312B4 $125, package price $1100. G.W. 15 Tanners Ln, Levittown, N.Y. (516-731-6662)

Sell: Bird 80A, dummy load, good to 2 GHz $10, Vanguard 2M mosfet, 28MHz IF measured NF 3DB, $20 pp, G. Vilardi, 14 Oakwood Ter., Spring Valley, NY 10977

Sell: Good 5-band 200w pep NCX-200, SSB/CW/AM transceiver & NCX-A ps/spkr $275. KØCBB, 1802 E. Broadway, Columbia, MO 65201

Model 31 teletype type sector $5, 115V AC-DC drive motor with gears $15, W6ERV

Wanted: Nonworking Navy ships clocks for parts. Description and price please. WB6KKI, 217 Santa Mariana, La Puente, CA 91746

Wanted: ARC-5 rcvrs, xmtrs, chassis all intact, for parts, $5; Back issues CQ, old radio books, Morse recorder, J.M. Gunn, Ossipee, NH 03864

$3,000.00 IN FREE PRIZES! On October 7 & 8, 1972, SWAN ELECTRONICS will host its second annual Open House. Enjoy refreshments, plant tours, technical talks, movies, etc. Free prize drawings for licensed amateur radio operators . . also, ladies and kids. Located next to Oceanside Airport, overnight trailer and camper facilities will be available. Join the "Talk-In" on 7260 kHz and 146.94 mHz. Don't miss this family affair - include this visit to SWAN in your vacation plans. Any questions call: 714-757-7525. SWAN ELECTRONICS, 305 Airport Rd., Oceanside, CA 92054

Sell: HT-32B transmitter; SX101A receiver excl condx $400, WA9IMM, 117 S Patton Ave, Arlington Hghts, IL 60005

Popular Electronics Mar 1959-June 1972, 4 missing, lot $15 plus shipping. WB6KFI, 30646 Rigger Rd., Agoura, CA 91301

RTTY picture tapes error free. Sell or swap. Stamp for list over 300. Also have 8-level form. K2AGI, 5 Hansell Rd., Murray Hill NJ 07974

Sell: Parts for ant tuner July 1970 QST cardwell transmitting variable $30, L A Stapp, 2903 Ash, Hays, KS 67601

Sell: Onan 5kw 120v AC generator w/4 cyl engine wt 1500 lbs $600. PE-108 pwr unit 600w 110vAC $75, W4BPQ VR White, 1414 Ft. Bragg Rd., Fayetteville, NC 28305

Sell: Johnson 540 handheld w/.94 xtals $150, L. Fischer KØRVN R 4 Box 217, Waseca, Minn 56093

Want: books @ $7 ea, ICC 1968-71, Harper Rhombics, Jordan Antennas, Keen DF, want 2-mtr cavity & 50 type N 6-dB pad. W3AFM, 5800 Hillburne, Chevy Chase, MD 20015

Want: Chess books and mags for Chess Club. Postage paid by A.M. Fox, Box 895, Greeley, CO

Want: Old Taylor transmitting tubes & Eimac 75T-750T-1500T-2000T needed for amateur tube museum W9LGH, 610 Monroe Av, River Forest, IL

Need: Heathkit SB300 manual, write Rob Harrington, 3181 S. York, Englewood, Colo. 80110

Want: Lyradion, diamond T or other radios made in either South Bend or Mishawaka, Ind. James Fred, Rt. 1, Cutler, IN 46920

Sell or trade: 829B, 4x100, 2K25, 35T, 2K28, 4-400A, 3KPI, 3BPI, all new. T Adams, 9707 Hansford, Austin, TX 78753

3 el. 15m beam, 2m big wheel, Knight r100A w/ S meter, make offer on any. WN6GCE, 5140 Diablo Dr., Sacramento, CA 95842

Teac 1500D tape deck, echo, sound-on-sound, auto reverse & shutoff, perfect cost $450, I ship for $210. WN4UCC, 96 Hallmark, Athens, GA 30601

Sell: HW32A mint $99, EF Johnson phone patch $15, 5" scope RCA WO78A $50, Lafayette HE15 CB xcvr $10, Hallicrafters S40A rcvr $10, BC733 VHF rcvr $10, SSTV adapter per Ju '70 QST $20. P. Turillon 38 Skytop Dr, Ramsey NJ 07446

Good old country music, 2 records and list $1. Guaranteed. Artists-W5TAN & W5TSD. Oatmora Shows, Drawer 9039, Little Rock, Ark. 72209

Transformers Rewound: Jess Price, W4CLJ, 507 Raehn St., Orlando, FL 32806

Wanted: Vibroplex. N. Klieman, 6033 N. Artesian Chicago, IL 60659

Sell: Tektronix scope 513D, perfect condx, 7 digit Beckman 7 digit-1 mHz counter, make offers, R. Mendelson, 27 Somerset, Murray Hill NJ 07974

Sell: 1296 mHz preamplifier 2 stage, one described in ARRL handbook $40 pp, transistors & Johanson capacitors worth more, G. Vilardi 14 Oakwood Ter, Spring Valley NY 10977

100 Central electronics transmitter, mint condition $350, WA2BBU, Jack Rudbart, 21 Ravana St., Clifton, NJ 07012

Collins 75S1 excl condx w/15 extra xtals for SWL CB, Ham satellite $275 C Moore, 3329 March Ln, Garland, TX 75042 (214-348-6217)

Sell: R390A rcvr, excl $525 or swap for SB220 & $200. K9CAX, 312 Gillett, Waukegan IL 60085

Sell: Collins 32V3 $150 75A4 3.1 0.5 $325 both vy clean w/manuals. WB6ZGL 213-794-3431

New(never unpacked) Heath HP23 AC supply $50 New (wired, unused) Heath SB600 spkr $20, R.K. Vonier 866 N. Westmount Dr. W Hollywood CA

Sell: Gladding 25 w/AC pwr, manual, xtals, full, wired for auto patch, like new $200, P. Vitrano, 40 N.W. 189 Terr., Miami, FL 33169

Want: Linear. Cleaning out shack, send address for list. SASE not necessary! K5ZUV/4, Box 7502, Miami, FL 33155

Want: used A V type General License courses. Kennedy, 791 Greenwich St., NYC, NY 10014

Sell: Heath SB101, SB600, HP23 ps, package deal, So. Calif area only, excl condx, A Emerald, 8956 Swallow Ave., Fountain Valley, CA 92708

Canadians: Equipment repair and alignment, lic'd technician, kits wired, serviced. B Fransen, VE6RF 227 Cottonwood, Sherwood Park, Alberta, T8A1Y3

Sell/trade: Atwater Kent mod 40 receiver, tri-ex H-471 tower, Heath SB101 w/ps; want: CW filter for CX-7, Emerald, 8956 Swallow, Fountain Valley CA

Sell: complete amateur station SASE for detailed list & price. T W Strohmeyer, 2504 Clarendon Av, N.W. Canton, OH 44708

Need a pair of 10 KV TV HI-VO-KAPS, Centralab TV3-501 or similar. Will swap with current Greek stamps, George Kapsokavadis, 23 Kolokotroni St., Corfu, Greece

Sell: pair of new triplett 0-4 RF amp meters biltin thermocouples $3 ea pp. 1000Kc marker xtals, new $1.60. Send stamp for complete list, Samkofsky, 4803 Brednda Dr., Orlando, FL 32806

Collins 75-A4 rcvr $275, Hammerlund HQ170AC rcvr $225, good condx w/orig books WA4AUF

Want: Motorola uni-channel pwr supply chassis model P-9031 A. Jarrett, Box 2103 Arlington VA

Sell or trade/make offer: Hunter bandit 2000B, excellent condx, need Drake DC4 mobile pwr supply, also W4 wattmeter KØTUY, Raymond, IA 50667

Seneca VHF2 rxc $119.95 W6RQZ, 1330 Curtis St., Berkeley CA 94702, 415-526-7348

Card dialer w/cards $88. T.T. Call director, 18 button, $98. Each & $4 postage. G. Garton, 1301 W. Estes, Chicago 60626

Wanted: HW-16 good condx, WN6ROP, S Gould, 103 Foxtail Dr., Santa Monica CA 90402

Atwater Kent model 55C no case, needs two UX-245 or CX345 tubes, make offer, Want: HP23 p.s. WB4HLZ, 3479 Mark Twain, Memphis, TN 38127 901-358-0038)

Still in carton, need to sell, PAL 600 & AC 600 AM 1200 SSB out, E Harter, R.1 Box 129, Show Low, AZ 85901

Panalysor model SB-3 type T-200 $45, Want early wireless, telegraph gear, D Spence, 10 S. 771 Clarendon Hills Rd, apt 201, Hinsdale, IL 60521

Sell: Hallicrafter 42A & VFO 2m $100, Ameco xmtr 6X2 $65, Ameco convert/AC p.s. $28.30 IF $20, you ship L Brower 9040 Cherry Av, Morton Grove, IL 60053

Model 15 parts by the pound, pickup only W9FTE 8800 W. Clovernook Ct, Milwaukee, WI 53224

600 OHM CT: xfmr, only 1/2" cube, great for phone patches, $1.25 pp, L Nurmi, 707 Harth Dr West Palm Beach, FL 33406

SOME VERY TRIVIAL STATISTICS about not-so-trivial money ...

Statistic.... In 1971, 127 new businesses advertised in one or more of the amateur radio magazines for the first time.

Statistic.... Of those 127 that tested the ham marketplace, only 64 continue to advertise products or services for hams.

Statistic .... Of those 64 that survived, 51 advertised in CQ with consistency.

Statistic .... Of those same 64 that survived, 46 advertised in CQ first as their primary test.

Statistic .... Of those same 64 that survived, 58 used CQ as their heaviest advertising medium.

What does all this prove? Only that CQ readers are darned good customers, for which we are indeed grateful.

So, if you have a product or service to sell your fellow hams, it might pay to try CQ first with your advertising campaign. Somehow those that don't have a strange way of becoming unfortunate statistics.

Sell or trade: HP B pwr s., perfect condx $35 or trade for HP 23 K4RDJ, Box 361 Hernando, FL

Wanted: HA-650 or HA-750, K3RCF, Box 1747, Hyattsville, MD 20788

Sell: large quanity QST/CQ mags past 7 yrs, Morris Rosen, W2KNP, 240 First Av, NYC, NY10009

GE FI base stations: 60W, 2m 9-freq tran & rec., disc & lim meter on front panel $275. 6m 2 freq tran & rec $250, R Coburn, RFD-2, Tinkham Ln, Londonderry, NH 03053

SSTV Robot camera model 80-no33101 w/tripod model 70 Robot monitor no33133-25 mm-1:1.4 cosmicar lens, dumont model 304H fast hamscan, magnetic program board w/letters, all new w/orig cartons & guaranteed, no trades, cash only $895. W4ZB, 2871 N.E. 8th Ct, Pompano Beach FL

Mint SB301 CW filter & SB600 spkr, first $190 FOB WB2BNJ, 23 Red Barn Ci, Pittsford NY.

Sell: Tempo 2m port. xcvr, w/xtals. also 12w amp exlt condx $275 WA6IFU3051 Kelton, L.A. 90034

Wanted: Ham-M rotor only, Collins 516F-2 pwr sp M Ludiewicz, 143 Richmond Rd, Ludlow MA

Jan tubes: 6AQ5-.45; OA2-;34; OB2-.38; 6AK5-.68 6AG5-.70; 6C4-;38; 6J6-;42; 6V6GT-;65; 6AV5GA -.78 add postage, K Maas, Burlington, WI 53105

Teletype model 15 on stand w/converter, no shiping, hooked up, try before buy, $125, 212-591-5843 evening only.

HyGain rotor brake RBX-1 on 5' tower section w/ map indicator, 75' wire, $50, 212-591-5843 evenings only.

DXers Worldwide Attention: Join the International Amateur Radio Society, 12,000 members in 250 countries, Box 385, Bonita CA 92002

Model 19 RTTY excit $75, W5I tower & cubex quad $200, call after 6 p.m. WA6JIN 213-861-5383, Downey, CA

Hy-Gain TH6-DXX, never used, best offer over $50 you pickup, K2RUR, 22 Pinehurst Dr., Purchase, NY 10577, 914-761-8914

OMs Join YLs. Membership open to OMs in Int. YL AR Assn of Int AR Society, Inc. Write Secty, K7UXN or Box 385, Bonita, CA 92002

Ex-novices: please send your old novice crystals to: Jefferson Junior High ARC, 1115 S. Cresent Dr, Champaign, IL 61820. We will distribute the crystals on a temporary loan basis to new novices in our area. Thank you for your support.

Sell: Drake 2B rcvr w/manual, good elc & mech condx but cabinet scratched, make offer, L Beebe Box 387, Beverly OH 45715

HT-37 SSB xmitr, clean, certified check for $175 & I ship insured or COD insured; new SB102 HD-10 keyer $25; want model 15 page holder panel & crank, K9WQY Box 216, Mansfield IL 61854

Sell: AC adaptors, 6VDC 150MA, standard plug brand new $3.50 pp, K2MFY, 2 Nutley Ct, Plainview NY 11803

Atwater Kent radio model 525, Atwater Kent type E spkr, National Geographic Magazines; want: Hulett Packartd 410B or C VTVM, triggered scope& Sams AR manuals, P Williams, 106 S Jefferson St, Lewisburg, W VA

Sell: Lafayette PF-30 low band police monitor, mint $60; Midland Medallion FM stereo tuner cartridge, new $20 B Thomas, WB5EDV, 2420 Dutton Av, Waco, TX 76706

Want: 220mc conv & pwr supy, prefer Nuvistor type, 432-436 mc xmtr & pwr sply, 2C39 type preferred but might consider another J Lebow Jr, 351 Mower Rd, Pinckney, MI 48169

APL computer programmers. Contact Dick, W2-FGL, to QSO or start net. 19 Mango Lane, Liverpool NY 13088

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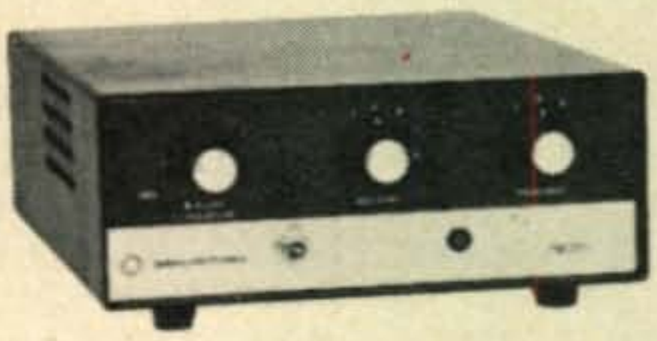
AC400 Power Supply is heavy duty solid state to operate GT-550A at full power, on SSB or CW, and with switch selection of 115/230 VAC, 50/60 Hz input voltages. Order No. 801 Ham Net $99.95

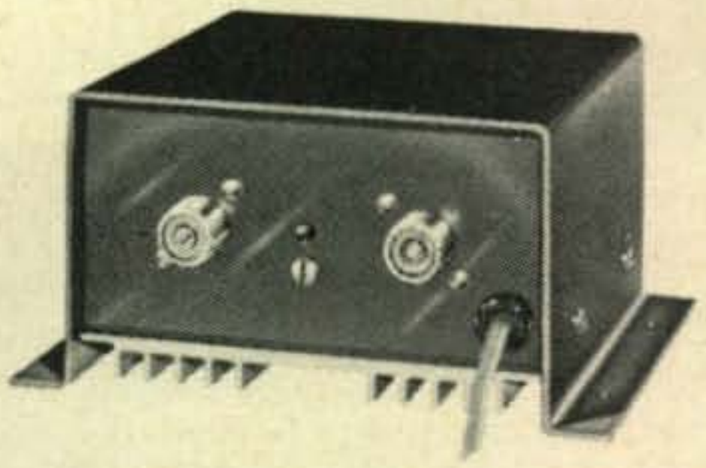


The FM-210 2 Meter Transceiver

Capability... That's what you purchase from Hy-Gain/Galaxy. Top performance from the first mass produced 2 meter transceiver. Fixed or mobile, the FM-210 will provide maximum pleasure with minimum investment. There's a full 10 watts. And all American made, too! No parts problems and backed by Hy-Gain's famous Customer Service!

The PA-210 2 Meter 35 Watt Mobile Amplifier

This all new ruggedized solid state two meter mobile amplifier provides 35 watts output to greatly increase your communication range. The PA-210 is a must for areas where no repeater is available. The PA-210 is designed as a companion for the FM-210. (When used as a system, the AC-210 power booster is not required.) A unique circuit protects the output transistor from voltage spikes and surges. All change-over relay functions are internal and controlled by FM-210 circuitry through a connecting cable.



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In open competition against thousands of commercial and home-brew antennas, WA1JFG won the New England championship with a Gotham beam, by a margin of 5,982 points! WB2JAM won the sectional award for the Sweepstake contest in 1969 and 1970 with a Gotham 4-element 15 meter beam! Hundreds of unsolicited testimonials from grateful hams are our proof that Gotham antennas give you the best design, and the best materials. Forget our low prices - rely on the results of open, competitive contests. Ask yourself: Why do Gotham antennas win?

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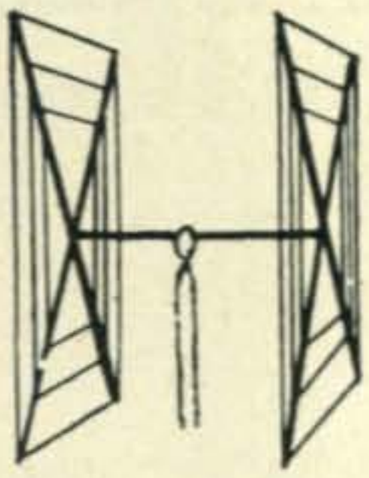
Worked 42 countries in two weeks with my Gotham Quad and only 75 watts...



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
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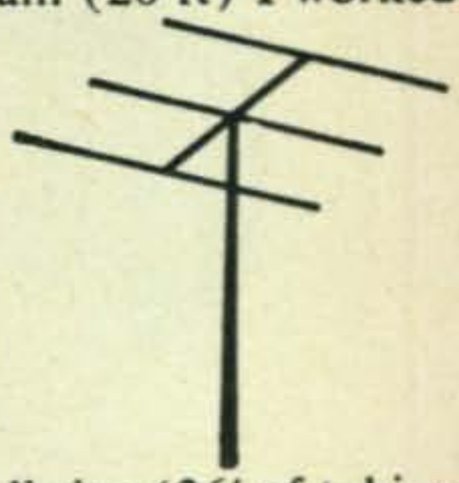
(all use single coax feedline)

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*
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5 EL 15	30*		

***20' Boom**

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
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V160 vertical for 160, 80, 75, 40, 20, 15, 10, 6 meters	$18.95

GOTHAM
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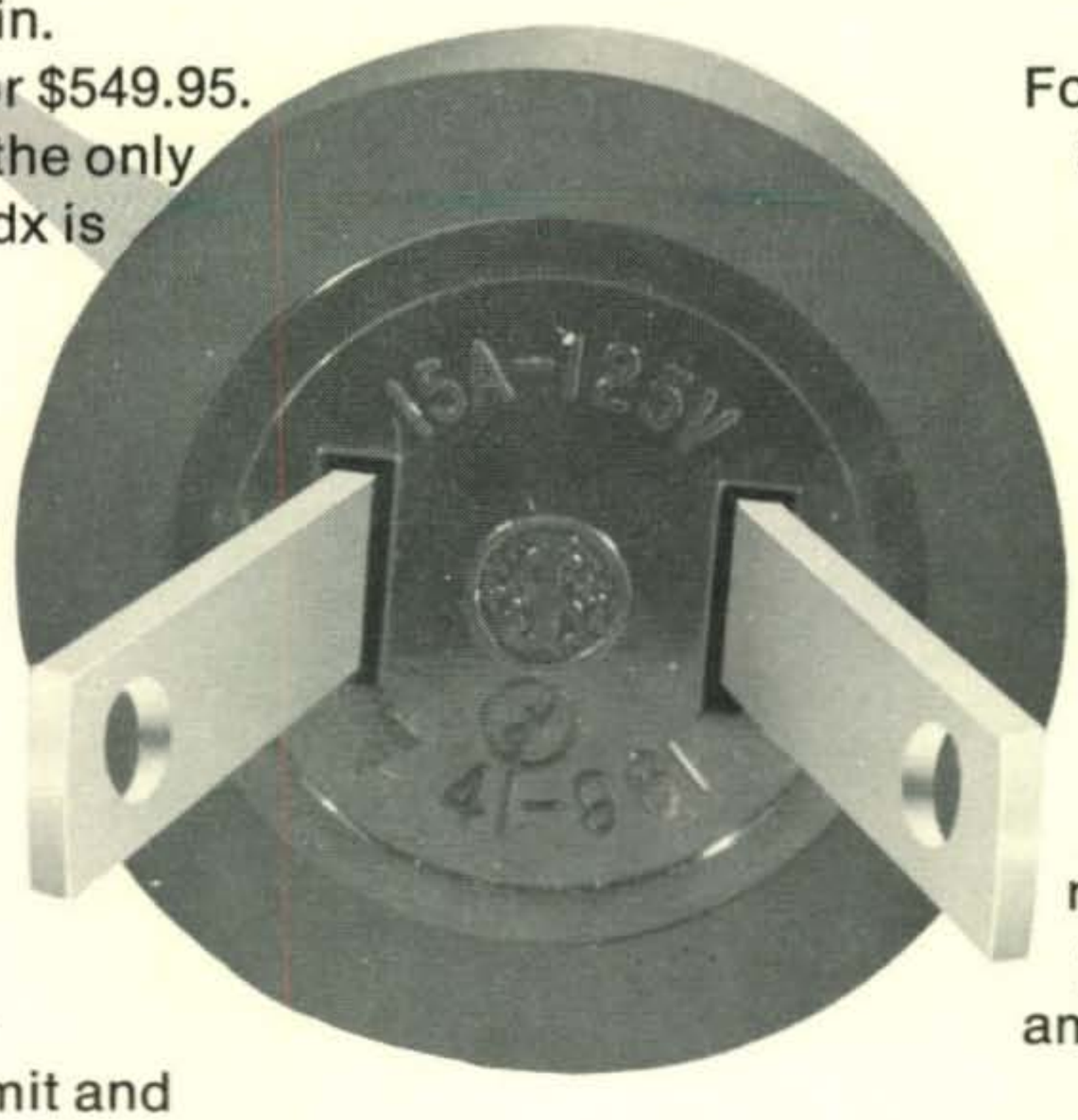

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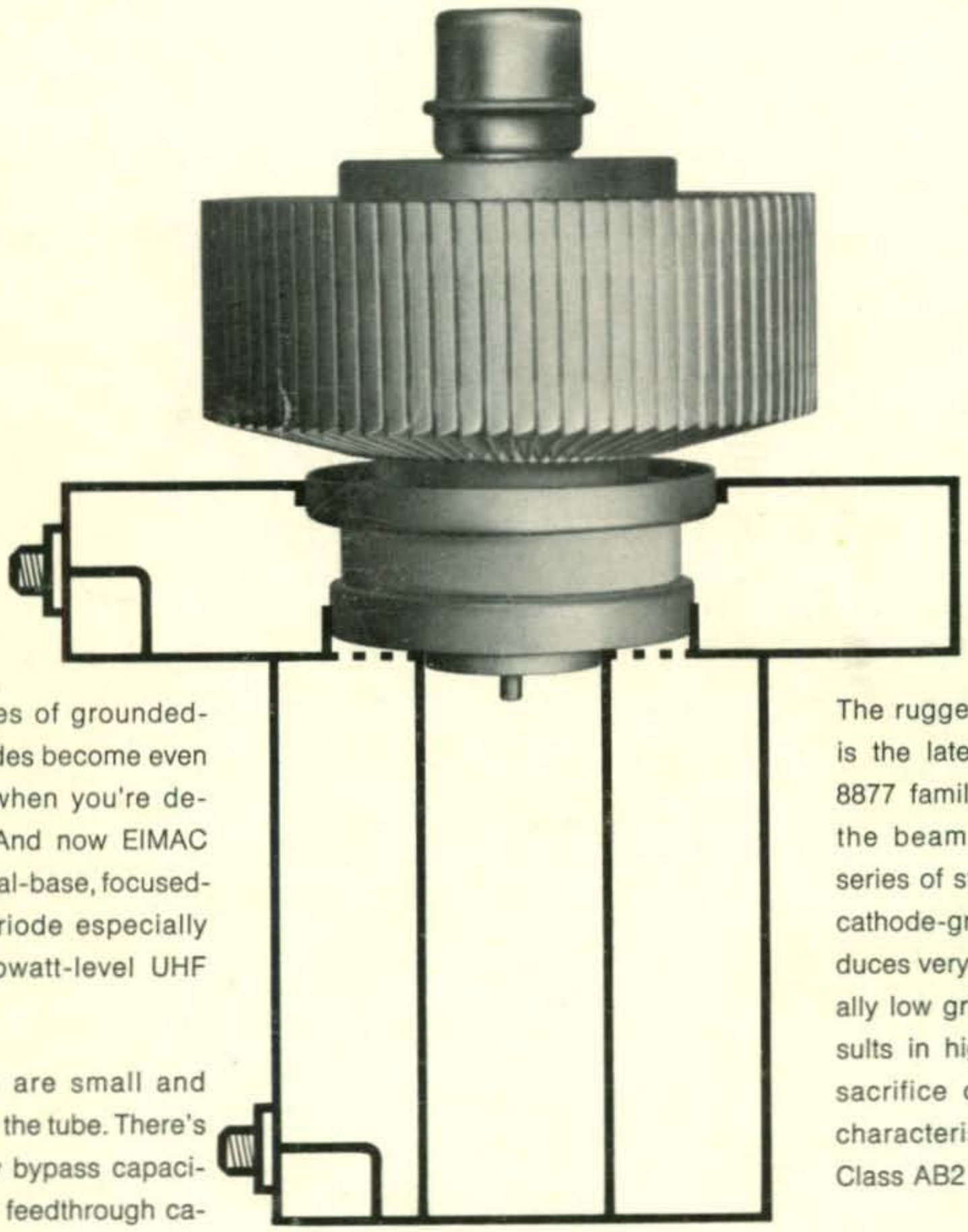

All the advantages of grounded-grid, high-mu triodes become even more important when you're designing at UHF. And now EIMAC introduces a coaxial-base, focused-beam, high-mu triode especially designed for kilowatt-level UHF applications.

At UHF, cavities are small and closely coupled to the tube. There's no room for bulky bypass capacitors, rf chokes, or feedthrough capacitors. With the 8938 in cathode driven (grounded-grid) service, there's no need for the grid circuit bypass capacitor; and no need for screen capacitors, bias or screen power supplies and associated decoupling circuitry. The internal tube structure is simple and the surrounding circuitry is much less complicated.

The rugged, ceramic/metal 8938 is the latest addition to EIMAC's 8877 family of tubes. Because of the beam focusing action of a series of strip electron guns in the cathode-grid region, the 8938 produces very high mu with exceptionally low grid interception. This results in high power gain with no sacrifice of low intermodulation characteristics in cathode-driven Class AB2 amplifier service.

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