CQ

April 1972
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Astronaut Armstrong Positions ALSEP Experiments on Moon
Story on page 19



The Radio Amateur's Journal

08240

Meet the Heathkit "Economy Kilowatt" pair...



Team the Heathkit HW-101 Transceiver and SB-200 Linear for top watt-per-dollar value

Heathkit HW-101 Transceiver... $249.95*

- Better than 0.35 uV sensitivity for 10 dB/S + N/N
- Image & IF rejection better than 50 dB
- Rock-solid tuning 80 through 10 meters

The HW-101 is a further refinement of the widely acclaimed HW-100 Transceiver . . . with improved receiver circuitry and dial drive and added front-panel SSB/CW filter selection. Sensitivity better than 0.35 uV for 10 dB S + N/N has been obtained by refinements in the receiver circuit. Image and IF rejection are better than 50 dB. 36 - 1 knob to dial ratio in a new ball bearing drive mechanism delivers 34 smooth revolutions per 500 kHz band segment. This feature, coupled with new preselector circuitry and thermal stabilized FET VFO with 5 kHz readout, gives you rock-solid drift-free tuning from 80 through 10 meters. Built-in 100 kHz crystal calibrated and zero reset button provide accurate, stable calibration. Front-panel crystal filter selection lets you convert the HW-101 to CW reception at the flick of a switch. The optional SBA-301-2 crystal filter installs in minutes, giving you the same remarkable two-way capability provided by its big brother, the Heathkit SB-102. CW filter offers razor sharp 400 Hz selectivity to carve a QSO out of the QRM. Built-in SSB crystal filter delivers 2.1 kHz selectivity at 6 dB down for superior SSB copy.

Kit HW-101, 21 lbs. **249.95***
Kit HP-23A, AC power supply, 19 lbs. **51.95***
Kit HP-13A, DC power supply, 7 lbs. **69.95***
A-301-2, 400 Hz crystal filter, 1 lb. **21.95***

Heathkit SB-200 1 kW Amplifier... $220.00*

- 1200 watts PEP input SSB; 1000 watt CW
- 80 through 10 meter band coverage
- Built-in SWR meter; ALC

Brawny partner of the "Economy Kilowatt" pair, the SB-200 is a completely self-contained, compact desktop rig with built-in solid-state power supply that sets you up with 1200 watts SSB, 1 kW CW with 80 through 10 meter hand coverage. And since it requires only 100 watts PEP drive, it's the ideal mate for the Heathkit HW-101 and almost all other popular transmitters and transceivers. A pair of 572B/T-160-L are used for amplification, fan cooled and shielded for maximum TVI protection. Other noteworthy features include a pretuned cathode input circuit for efficiency, low distortion; ALC output for automatic exciter control; circuit breaker protection; built-in SWR meter and antenna relay that automatically switches to the exciter when the linear is off; 120/240 VAC operation.

Sturdy, lightweight construction is another plus feature. The SB-200 is designed around a heavy-gauge, one-piece aluminum chassis, partitioned for extra strength and proper isolation of components and circuitry. Well planned circuit design, coupled with clear, concise assembly instructions means you can have your SB-200 on the air 15 to 20 hours after you start the kit. Normal bench tools, a VOM for alignment, and the coupon at right are all you need to get started.

Kit SB-200, 50 lbs. **220.00***

and two new Heathkit tune-up tools

Extend your designing and aligning capability with these great new Heathkit tools

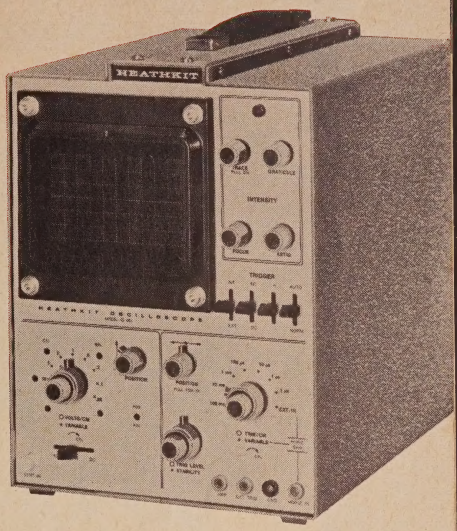


New Heathkit 100 MHz Frequency Counter... $269.95*

- Measures frequency from 1Hz to over 100 MHz
- Wide range input without adjustment
- No special instruments needed for calibration

This is the counter you've been waiting for. A kit-form instrument with a list of features to rival counters costing much more. The exclusive Heath-designed input circuit 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. About 10 hrs. assembly time puts the IB-1101 together. The 26 digital IC packages & readout tubes plug into sockets. All other components, including shielded MOSFET, 10 silicon transistors, 9 diodes & 2 zener diodes mount neatly on one double-sided fiberglass board. If you've been putting off buying that better counter for price considerations ...consider the unprecedented low price of the new Heathkit IB-1101. Then order one today.

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



New Heathkit 5" Triggered Sweep Scope... $229.95

- DC-10 MHz response — Triggered Sweep
- 50 ns sweep rate with magnification
- AC-DC coupling

Maximum flexibility in a general purpose scope at a price to fit any budget...the new Heathki IO-103 is a radio amateur's dream come true Big 6x10 cm screen with lighted graticule fo easy, accurate measurements. DC-10 MHz ± dB response with less than 50 ns rise time o vertical channel. Horizontal expansion gives x magnification ±5% for a 50 ns/cm sweep rate Triggered sweep, too, with selection of eithe normal or automatic modes. Other features ar switch controlled AC-DC coupling; provisio for external triggering signals and horizonta deflection signal; front-mounted connectors fo vertical inputs and 1V peak-to-peak signal fo checking calibration; 120/240 VAC operation Put this budget-minder to work in your har shack...now.

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

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APRIL, 1972 VOL. 28, NO. 4

The Radio Amateur's Journal

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STAFF

EDITORIAL

RICHARD A. ROSS, K2MGA
Editor
ALAN M. DORHOFFER, K2EEK
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WILFRED M. SCHERER, W2AEF
Technical Director
JOAN WEILBACHER
Editorial Assistant

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Contest Chairman
FRED CAPOSSELA, W2IWC
Contest Consultant
GEORGE JACOBS, W3ASK
Propagation Editor
A. EDWARD HOPPER, W2GT
USA-CA Director
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WPX/DX Awards
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GLEN E. ZOOK, K9STH/5
FM Editor

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JOE PIRAINO
Staff Artists

Offices: 14 Vanderventer Avenue, Port Washington, L.I., N.Y. 11050. Telephone: 516-883-6200.

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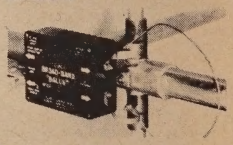
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Mod. 6M516-	6 mtr. 5 el. array, 13 DB gain, 400 W pow. rat., 1.5" x 16' boom	63.95

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ZERO BIAS

For some time now CQ has been investigating new methods of introducing amateur radio to newcomers, especially to youngsters below high school age. Recently, we became personally aware of a whole new potential.

While scanning the ads in the Sunday New York Times Magazine section, we couldn't help noticing that several summer camps for children list amateur radio as part of their optional activities. Interviewing directors of several camps revealed that about fifty percent of the camps sampled already maintain amateur radio programs.

This means that there's a potential for hundreds, possibly even thousands of additional children's camps for expansion of the amateur program concept. For that reason, a forthcoming issue of Camping Magazine will carry an article designed to sell this idea to those camp directors who haven't already added our hobby to their programs. The article will appear in either the May or June issue, and while it might be a bit too late to have much affect on this year's activities, it should certainly bear some fruit for the future.

Several camp directors we've checked with who haven't already added ham radio indicate that their primary problem is getting well-qualified ham counselors. Most camps are looking for well-rounded individuals, preferably college juniors, seniors or college graduates with a General class license or higher. The object is to take the youngsters from scratch and train them over an eight week period to at least the level of an achieved Novice license.

Frankly, we can't think of a more enjoyable way for a college boy to spend his summer vacation. The financial rewards run from modest to excellent, but the opportunities for working with young would-be hams should provide great personal satisfaction, as well.

We suggest that any reader interested in working at a summer camp in this capacity drop us a line immediately. We'll pass your names on to interested camp directors, and who knows, maybe you'll find enjoyable a facet of hamming that you never even considered before.

In applying, be sure to include age, college status, class of license, preferable working location, and as much other data you think will be of interest to the camp director in considering your application. And don't wait too long, since summer is approaching rapidly.

New ARRL President

As this issue is about to go to press, we've just learned of the appointment of Harry Dannals, W2TUK as the new president of ARRL, replacing Bob Denniston, W0DX who has retired.

In the opinions of CQ, this is one of the most progressive and sound moves the League has made in many years. We've known Harry personally for many years and have always found him to be a sincere, dedicated, and responsive person. Harry has been one of the few directors who has had the courage to fight ultra-conservatism and archaic thinking within the League's framework. He will undoubtedly add prestige and stature to US negotiations with other countries as related to amateur frequencies and activities.

Harry Dannals is a leading force in the difficult struggle by progressive hams to readjust band-mode allocations. He is knowledgeable in all phases of amateur activity, and well known in IARU circles. He's liberal without being radical, yet cautious where caution is required. In a nutshell, he's the epitome of well-rounded representation for the great majority of American amateurs.

Our hats off to the League for a wise choice, and our best wishes and congratulations to W2TUK for the difficult job he has to face in the years to come.

The most powerful signals under the sun!

Here come the HAMCATS!

Redesigned for greater performance.

Now you can cover 10, 15, 20, 40 and 75 meters with one Amateur Mobile antenna. Order the HAMCAT mast; plus the "quick changer" coil and tip rod assemblies for the bands you want.

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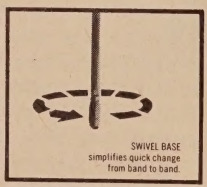
Before you buy a mobile HAM antenna...compare these features...

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- Coil and tip rods are a one-piece assembly. Coil diameters are constant, only lengths change

Then see the man with "the Best Antennas Under the Sun" the Hy-Gain distributor.

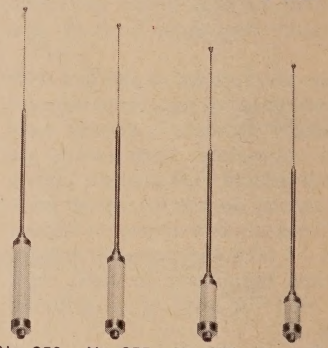
Order No. 257	All new design 5' long heavy duty mast of high strength heavy wall tubing	**$16.95**
Order No. 252	75 meter mobile coil	**$19.95**
Order No. 256	40 meter mobile coil	**$17.95**
Order No. 255	20 meter mobile coil	**$15.95**
Order No. 254	15 meter mobile coil	**$12.95**
Order No. 253	10 meter mobile coil	**$10.95**
Order No. 499	Flush body mount	**$ 6.50**













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OUR READERS SAY

Too Much F.M.?

Editor, *CQ*:

This somewhat rambling letter is in response to your guest editorial in the November, 1971 issue of *CQ* to which I have subscribed for many years.

First, let me introduce myself. I am in the unfortunate (or fortunate) position of holding a Ph.D. in science and engineering and because I am fluent in several languages, I have worked abroad for many years. I have attended various international conferences on frequency allocations.

Well, as in all other conferences, decisions are not made at the conference table. Subjects are discussed and decisions are made in the hotel lounges or bars and as none of the US official delegates usually speak any language other than English, surprises, generally unpleasant, come at the official meetings. See for instances 40 m. and broadcasting.

Contrary to the optimistic statements by W4BW cited by you on your editorial, let me describe the 1977 session as I *think* it will reopen after the US delegation has (hopefully) made a proposal for 10, 18 and 24 mHz. The delegate of Rhumbuwaba (the country does not yet exist but maybe will by 1977) will get up and say more or less the following:

"Mr. President, Gentlemen, co-delegates, we have here a proposal by the US delegation, representing a country known as the most advanced leader in communications technology (make here a polite diplomatic bow to the US delegation). Also we know that Americans go by statistics, numbers, percentages, etc. As an example, the American public is informed that their President made a 7362 word statement, and not that he talked 10 minutes. Following then this technique of that great nation (another polite diplomatic bow to the US delegation) I have here for your inspection copies of the three leading amateur magazines published in the US. A study reveals that from 1969 to-date, at an ever increasing rate, a total of 12,969,322 words were written on technical articles and that of that total 96.32069% (the figures are more but the % are pretty close) are dedicated to a technique known as 2 meter f.m. A total of 12,-693 so called repeaters are operating 24 hours per day and the numbers increase every month. The articles all emphasize this "modus operandi." Again turning now to the advertisements we find that a total of 6,932 M^2 is of 2 m. equipment, mostly made in Japan. The honorable US delegation (repeat the polite diplomatic bow) will forgive me for citing in the metric system, but this system is used in our poor under developed country. It seems then that we should do away with the 80, 40, 20, 15 and 10 m. amateur bands, and have amateurs operate solely on 2 meter f.m. as it seems the majority in the most advanced nation are already doing.

"We need these bands for broadcasting to the interior of our countries and Russia and the Peoples Republic of China have already agreed to supply us with the necessary stations. Finally, I mention that 68 nations have agreed to this approach and we will therefore shortly start broadcasting on 20, 15, and 10 meters. Thank you for your attention."

This could happen!

What to do? You propose that amateurs get together and do something. Well, in my thinking the first thing is to forget the ARRL proposed restrictions on phone. By the way, I won my bet in that when the FCC finally proposed to widen the bands for phone ARRL would oppose it, as indeed they did.

A simple calculation. (I am Advanced) The Generals have on 20 meters 75 kHz which divided by 3 kHz s.s.b. bandwidth gives 25 amateurs operating QRM free. Telegraphy comes at about 1600. Does anyone believe this to be a fair ratio? In all the most advanced military equipment now being built I cannot remember ever having seen a Morse-key!

I speak several languages, as I told you. Believe me that at the lower end of 20 and the phone patch 15 meter band, the South Americans laugh at our *voluntary* restricted phone bands. As a matter of fact, they will come out and say that they are ARRL subscribers, hoping that ARRL will restrict the bands still more.

The solution? Occupy *all* of the internationally agreed upon phone bands for phone. You see what happens with all our international friendly questions (United Nations for instance).

Good so far. How to get this going? A *bitter* observation on our good old US. Don't write the FCC. I propose that *all* amateurs write George Meany. If he would get 100,000 letters all asking for extended phone bands he would phone President Nixon and order (yes, I use the verb *order*) him to get the FCC in his office for a 15 minute one way talk. I can guarantee you that we would have our objective in one day.

Bitter, unbelievable? Maybe so. Anyhow, now I have this off my chest. Please accept my best wishes for the coming season.

Name withheld upon request.

Ranger on DSB

Editor, *CQ*:

In my article, "Sideband With The Ranger," in December *CQ* there were two errors in the schematic diagram fig. 2.

The resistor between C_{105} and grid 1 of the 1614 should be 500 ohms, *not* 500K. This resistor is a v.h.f. parasitic suppressor for the 1614.

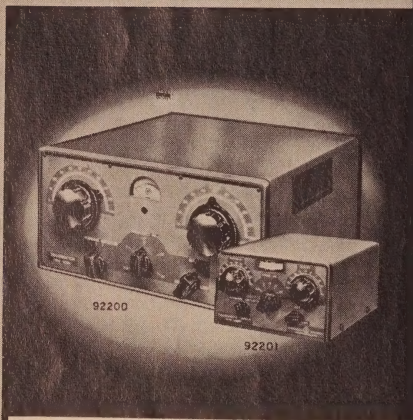
L_{101} should be 0.55h or 550 mh as stated in the parts list and not 0.55 mh as indicated on the schematic.

Fred Brown, W6HPH/G5AWI
Cambridge, England

Designed for



Application



TRANSMATCH or TRANSMATCH JUNIOR

Allows a transmitter to work into the 50 ohm unbalanced load for which it was designed. Converts a multi-band antenna to 50 ohms at all amateur frequencies between 3.5 and 29.7 MC. Match 10 to 300 ohm unbalanced loads.

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92201 TRANSMATCH JUNIOR handles 150 w.

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Announcements

Towson, Maryland

The Greater Baltimore Hamboree will be held on Sunday, April 9th at 10 A.M. at Calvert Hall College, Goucher Blvd. and LaSalle Road, Towson, Maryland 21204. This is one mile south of exit 28 Beltway-Interstate 695. There will be food services, prizes and a flea market. There is a $1.50 charge for admission but no charge for tables or percentage in the flea market.

Wilmington, Delaware

The Delaware ARC will hold an Horse-Trader and Auction night at the County Engineering Bldg., Kirkwood Hwy. Wilmington, Delaware on Wednesday, April 12 at 8 P.M. Bring your gear and sell or swap. For further information contact: Charles McGonigal, WA3AVD, 18 Harvard Road, Wilmington, Del. 19808.

Sullivan, Illinois

The Moultrie Amateur Radio Klub will have its 11th annual Hamfest at Wyman Park, Sullivan, Illinois on April 30th. There will be an indoor-outdoor market. Ticket donation $1.00 in advance, $1.50 at the gate. Open at 8:30 A.M. W9BIL-146.94 mHz. For further details write: M.A.R.K. Inc., P.O. Box 327, Mattoon, Illinois 61938.

Baton Rouge, Louisiana

The Baton Rouge ARC is holding their 8th annual Hamfest Saturday, May 6th. For full details on location, activities, speakers, write to the Hamfest Chairman, John A. Dobbs, WA5OLU, Baton Rouge ARC, P.O. Box 53194, Baton Rouge, Louisiana.

Evansville, Indiana

The Evansville, Indiana Hamfest will be at the 4H Grounds (Highway 41 North 3 miles) Sunday, May 7th. Airconditioned auction, overnight camping, ladies' bingo, reserved flea market booths. Advance Registration. For flyer, contact Morton Silverman, W9GJ, 1121 Bonnie View Drive, Evansville, Ind. 47715.

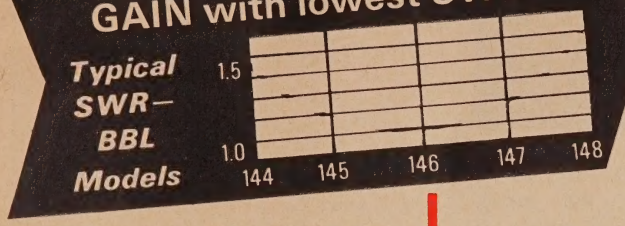
Special Prefix

To celebrate the Centennial Anniversary of the City of San Leandro, the San Leandro Amateur Radio Club has tentatively scheduled operations as KQ6SLC. Operation will be conducted on 80 through 10 Meters during the week of March 17 to March 26, 1972. QSL information: SASE to the San Leandro Amateur Radio Club, c/o City Hall, San Leandro, Ca. 94577, or they will QSL via the appropriate bureau. They also plan to issue souvenirs to the first, fiftieth and one hundredth stations worked to commemorate these historical years of San Leandro history.

[*Continued on page 82*]

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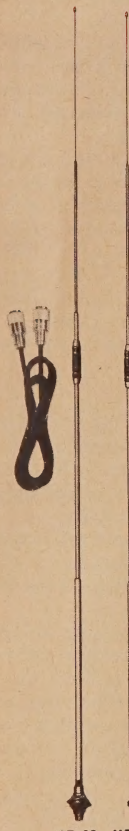
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Heavy duty, precision fit, four section telescopic antenna tunable separately for combined six and two meter operation. Extends to 44". Collapses to 22".

Model HF-2: Antenna supplied with ⅜"-24 base to fit any standard antenna mount. **$9.50**

Model HF-62: Supplied with automotive eight ball base for fender or cowl mounting. Includes 60" RG-58-U and connectors. **$11.95**



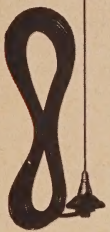
HF-62 HF-2

Tops in Rooftops

140-500 MHz— UHF/VHF Antenna

Low profile, roof top with factory attached cable—installs from outside without disturbing car header. 17-7 PH stainless radiating element—field trimmed for frequencies between 140 and 500 MHz. Complete with 15' RG-58-U coaxial cable.

Model UHT-1
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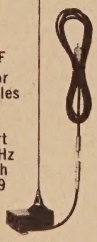


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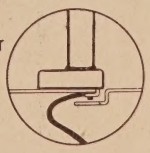
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Q AND A

Allied A-2516 Receiver V.F.O. with DX-60B Transmitter

Question: In your October issue of *CQ* a question in your Column dealt with the use of a Heath SB-640 LMO with a DX-60B. I pose a similar question. I have an Allied A-2516 receiver which has an output jack for its 8.4465 to 9.0465 mHz v.f.o. Could I use the receiver v.f.o. with my DX-60B by using a circuit similar to the one you described in your Column?

Answer: It should be possible to use the v.f.o. of the A-2516 receiver with the circuit as shown in the October Q & A Column for employment of the SB-640 LMO with the DX-60B; provided the proper mixing crystals are used. For 3.5-4.1 mHz to the DX-60B v.f.o. input, use a 4.9465 mHz crystal; for 7.0-7.6 mHz, use a 15.4465 mHz crystal. To prevent spurious emissions around 15 mHz, use a 15 mHz trap at the mixing amplifier.

Reducing Power with FTdx 560

Question: I have a problem coupling my FTdx 560 to the Collins 30S-1 Linear Amplifier since the latter can handle no more than 200 watts input. Would one of the following schemes work for reducing 560 watts of the exciter:?

1—As soon as the linear is turned on, it will energize a relay which will disable one of the p.a. tubes in the FTdx-560 by cutting off the filament of one tube.

2—By the same action provide an insertion of a —20 v.d.c. (or less) at the suppressor grid of the remaining final tube (6CD6) in the exciter.

Answer: Neither of the above methods for reducing the exciter output are recommended. The FTdx-560 puts *out* about 260 watts on c.w. and tuneup, and 300 watts p.e.p. on s.s.b. For 200 watts *output* from the transceiver, use the relay scheme to reduce the screen potential on the FTdx-560 p.a. tubes to one-half or two-thirds of normal. The bias also should be slightly readjusted to maintain good linearity.

Articles on HT-32 and SX-101A

Question: Has *CQ* ever published any articles on

*Technical Director, *CQ*.



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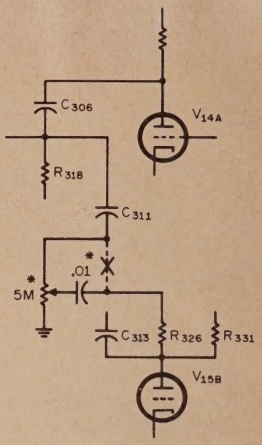


Fig. 1—Portion of HW-101 a.f. amplifier and sidetone amplifier circuitry showing modification for incorporating a sidetone level control. The original circuit is broken at *X* with new components, marked with an asterisk, installed as shown. See text for procedure.

modifying and/or updating the HT-32A transmitter and the SX-101A receiver?

Answer: The following articles on the two pieces of gear above have appeared in *CQ*:

"Mounting the HT-32" *CQ*, June 1960, p. 68.

"Hi-Lo Frequency Shift Keyer for HT-32" *CQ*, December 1964, p. 34.

"Modifying the HT-32," *CQ*, December 1965, p. 65.

"Improving the SX-101A for DX Performance" *CQ*, April 1970, p. 62.

C.W. Sidetone Gain Control for the HW-101

We are indebted to D. C. Pugh, WA6HYB of Chula Vista, California for the following data on modifying the Heath HW-101 with a gain control for the sidetone signal.

The instructions are preceded by these comments: "Here is a simple and inexpensive modification for the HW-101 that will greatly improve your comfort while operating this fine piece of gear on c.w. Since the c.w. sidetone is much too loud to use while using earphones, the following modification will reduce the volume from normal to inaudible while making no changes in the normal a.f. volume while operating on s.s.b."

Three parts are required:

1—5 meg pot

1—.001 capacitor

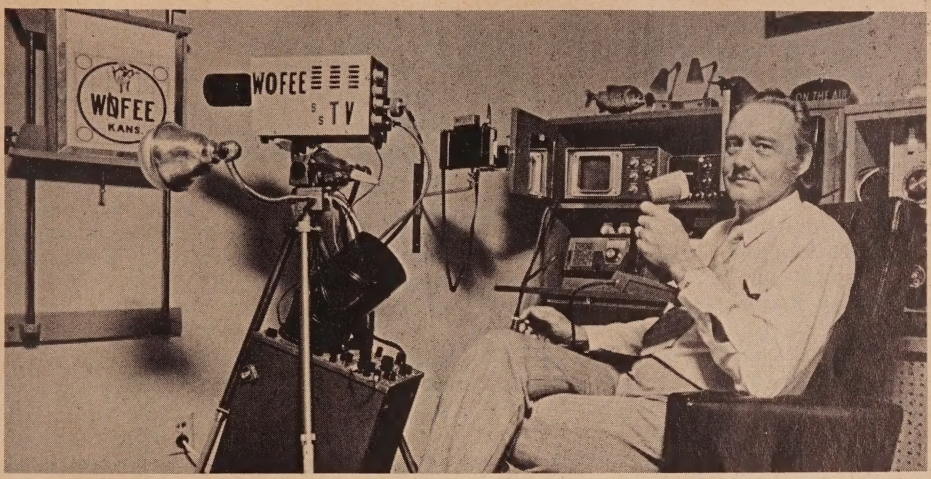
1—single terminal insulated standoff

Procedure:

1—Layout and drill a 3/8" hole for the 5 meg

[*Continued on page 88*]

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"Doc" Taylor, W0FEE answers

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A Converter for 225 mHz F. M.

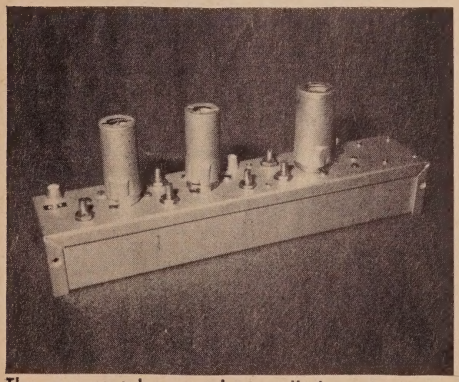
BY BYRON H. KRETZMAN,* W2JTP

THE problems associated with selecting a receiving system for 220-225 mHz f.m. were discussed in a recent issue of *CQ*.[1] One relatively simple solution is the construction of a converter designed to feed a low band fixed frequency f.m. receiver, like the Motorola PA-8633A Sensicon. We had such a receiver, a spare, tuned to 52.525 mHz, the national calling and working frequency for 6-meter f.m. Since this receiver used vacuum tubes we decided to build the converter also with vacuum tubes. The question then arose, "Which tube would work well at 225 mHz, yet would not cost too much?"

Several "hot" u.h.f.-type vacuum tubes were considered, but not for too long. A good Nuvistor was considered but ruled out because it cost about $13. A tiny ceramic tube looked good on paper, but this was likewise ruled out because of cost. So, starting from the venerable 6AK5 with its transconductance of 5100, we went to the 6EV5, used in late vacuum tube receivers of Motorola. This had a transconductance of 8800. Then, at the suggestion of W2FI we looked at the 6ER5. Its diagram makes it look like a tetrode, but that thing that appears to be a screen grid (pin 6) is really an internal shield, which gets grounded. The transconductance of this unusual triode is 10,500, more than twice that of the 6AK5. And, the nice part is that it only costs about $2.00. This was it!

* 431 Woodbury Road, Huntington, N.Y. 11743

[1] B. H. Kretzman, "The Motorola 80D on 220 Mc F.M.," *CQ*, Nov. 1971, p. 51.



The vacuum tube crystal controlled receiving converter for operation on a single fixed frequency in the 220-225 mHz band. Designed to feed into any low band fixed-frequency receiver operating in or just below the 6-meter band, this converter is useful for either general operation or for a repeater control link.

The Design

Figure 1 is a block diagram of the converter. Only three tubes are used, a 6ER5 r.f. amplifier, a 6ER5 mixer, and a 12AT7 crystal oscillator and multiplier. Note that the second section of the 12AT7 multiplies four times. The crystal frequency f_x can be calculated as follows, where f_c is the operating frequency in mHz and f_{if} is the frequency in mHz to which the low band receiver is tuned.

$$f_x = \frac{f_c - f_{if}}{4}$$

For example, with our 52.525 mHz receiver, and for an operating frequency of 224.94 mHz:

$$f_x = \frac{224.940 - 52.525}{4} = 43.10125 \text{ mHz}$$

The crystal should be a commercial standard 3rd mode type in an HC-6 holder.[2]

Figure 2 is the schematic diagram of the converter. Notice the firm grounding of both connections to the cathode of each 6ER5. Don't try cathode bias! The little built-in —1.2 volt bias supply is very simple and its use guarantees stability without the necessity

[2] International Crystal Mfg. Co., Oklahoma City, Okla. 73102. Type CS 05.

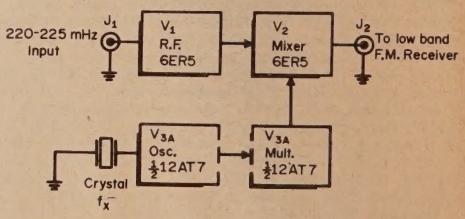
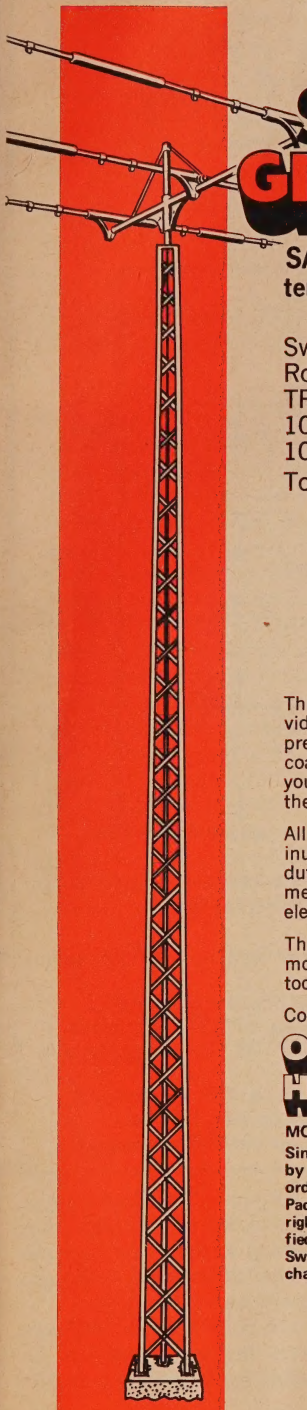


Fig. 1—Block diagram of the 220-225 mHz crystal controlled receiving converter.



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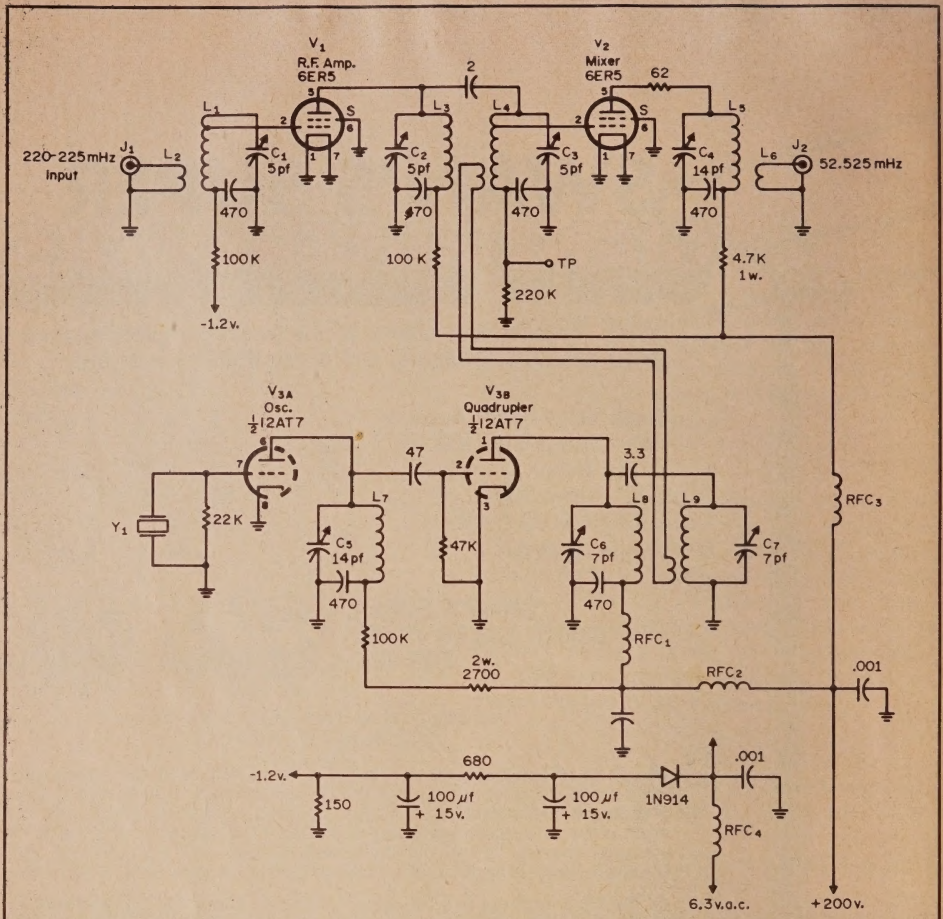


Fig. 2—Schematic diagram of the 220-225-mHz converter. The one-turn link coupling coils on L_4 and L_9 are kept in place by a piece of Teflon sleeving inserted into each coil.

C_1, C_2, C_3—5 pf max. air variable.
C_4, C_5—14 pf max. air variable.
C_6, C_7—7 pf max. air variable.
L_1—3t. #20, 1/4" i.d., 5/16" long, tapped at 2¼ t.
L_2—1t. #22 hook-up wire, inserted in L_1.
L_3—2t. #20, 1/4" i.d., 5/16" long.
L_4—2½t. #20, 1/4" i.d., 5/16" long, tapped at 2t.
L_5—10½t. #22, 7/8" long, on 3/8" dia. poly rod.
L_6—2t. #26 hook-up wire, bottom end of L_5.
L_7—8t. #22, 7/8" long, on 3/8" dia. poly rod.
L_8, L_9—3t. #20, 1/4" i.d., 1/4" long, spaced 1/8".
RFC_1, RFC_2, RFC_3—60 μh, RFC, encapsulated.
RFC_4—12t. #26 hook-up wire, 1/8" i.d.
Y_1—Crystal, 3rd mode, commercial standard.

of neutralization. Almost any silicon diode can be used as the rectifier, by the way. Grids of the r.f. stage and the mixer are tapped down on the respective grid coils. Short r.f. paths are made possible by the use of 70 pf button-type by-pass capacitors at the cold end of each coil. The double-tuned circuit between the r.f. stage and the mixer contribute to an improved image response. The double-tuned circuit in the output circuit of the quadrupler, plus the link coupling to the mixer, contributes to the reduction of spurious responses, say from other harmonics of the crystal.

The converter can be powered by the same supply that powers the associated f.m. receiver. Requirements are 6.3 volts a.c. at 0.66

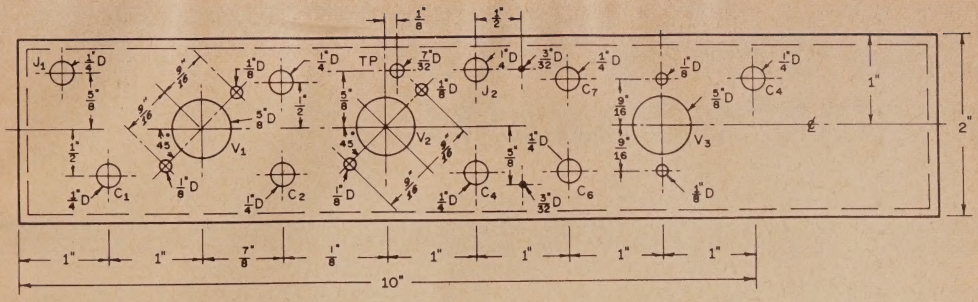


Fig. 3—Chassis layout, top view.

amperes and about 200 volts d.c. at 10 ma. A regulated supply is not required.

Construction

A Bud Minibox, a #3013A, 10" long, 2" wide, and 1⅝" deep, was used. All tuned circuits have air-variable capacitors, the very small Johnson 160-series. All coils are air wound except for the oscillator and the i.f. output coils which were wound on solid polystyrene rod. The layout of the chassis, from the top, is shown in fig. 3. A small shield baffle, detailed in fig. 4, separates the mixer from the oscillator/multiplier section. Antenna input J_1 and i.f. output J_2 jacks are of the phono type, Switchcraft #3501FP. All external connections for power are filtered inside the converter at the end of the chassis where the power leads come through a grommet. Even the crystal and its socket are inside the chassis. And, of course, tube shields are used. The objective here is two-fold: to keep the oscillator and its harmonics out of nearby receivers; and, to keep r.f. radiated by nearby transmitters from getting into the converter and causing spurious responses. This objective is very important when the converter is used at a repeater site where other equipment is in operation.

Alignment

A vacuum tube voltmeter can be a great help in the initial line-up of the crystal oscillator and multiplier stages. The first step is to adjust C_5 for roughly maximum output as indicated by the v.t.v.m. hooked to pin 2 on V_3, the multiplier grid. Next, transfer the test prod of the v.t.v.m. to the test point, *TP*, but avoid setting it right on the edge of maximum output as the oscillator may not start again once the converter is turned off.

With the low band receiver connected to J_2, feed in a signal generator at J_1 and look for a response as indicated on the receiver. Set it for zero discriminator reading and lower the generator output. Now peak up C_4, C_3, C_2, and C_1, constantly lowering the signal

[*Continued on page 82*]

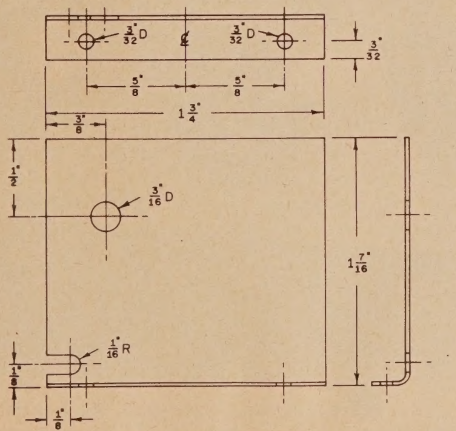
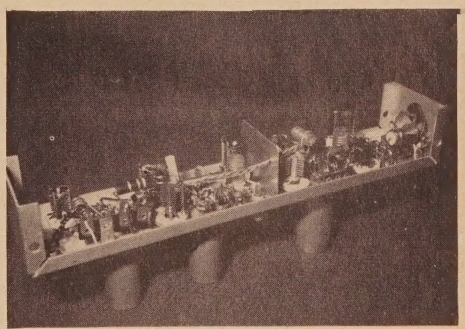


Fig. 4—Internal shield.



Under-chassis view of the 220-225 mHz converter. Note the generous use of button-type by-pass capacitors to provide short r.f. paths to ground. The oscillator and multiplier components are to the right of the shield baffle.

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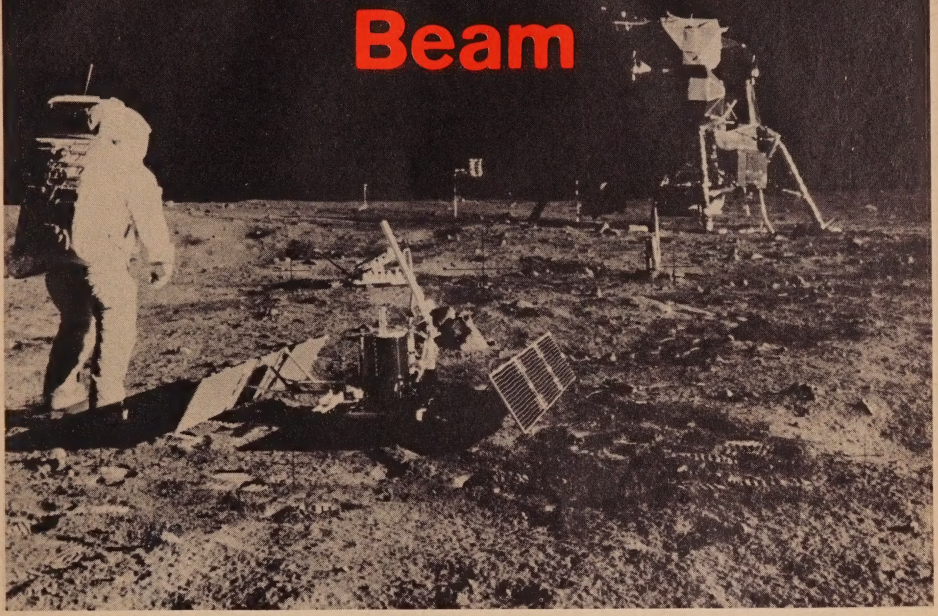
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Riding On A Moon Beam



Spaceship Commander Neil Armstrong lining up scientific experiments with Lunar Module in the background.

BY HOWARD W. KELLY,* K4DSN

On or about April 16 another of the Apollo moon probes should lift off for a journey to the moon. Aboard will be a variety of scientific experiment packages, some similar to those carried on previous moon flights. This is the story of those experiments, called ALSEP.

PERCHED on a dusty moon hump at this moment are three 2300 mHz beacon transmitters sending back to earth scientific data 24 hours a day. Those three stations and the two more to come offer an intriguing challenge to the US space program as well as providing the experimenting radio amateur a superb technical opportunity.

Project Apollo by no means limited itself to manned exploration of the moon. Many of the answers to prime scientific questions can not be gotten from lunar walks about the landing site or bumpy rides in a moon-roving buggy. What was recognized from the beginning, *i.e.*, the necessity of long term data collecting, took the form of the Apollo Lunar Experiment Package (ALSEP). By the first day of 1972 the three beacons already in place had transmitted more than 21,219 command broadcasts from the lunar surface. The Apollo 12 transmitter was still going strong more than two years after being turned on.

ALSEP

The ALSEP system was designed to return to earth scientific information gained from a series of sensors placed about the landing

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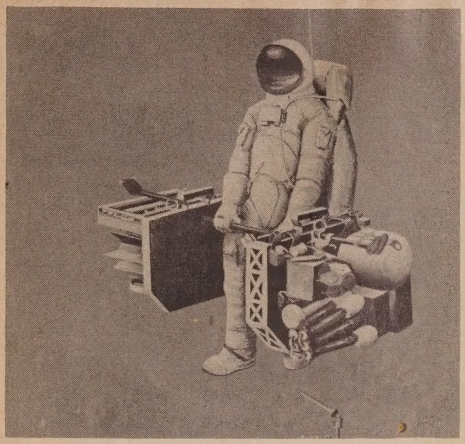


Fig. 1—Artist conception of astronaut using the barbell carrying device to take the ALSEP equipment to the area of deployment.

zone for at least a year after the astronauts' departure.

The data to be acquired will provide the scientific community with unprecedented knowledge of the moon's environment—especially in the areas of geology, geophysics, particles and fields.

In addition to the ALSEP beacons of Apollo 12, 14 and 15, two more packages are planned for the moon when Apollo 16 lands in April, 1972 and the later flight of Apollo 17.

Lunar Operation

Putting the ALSEP into operation is simple for the busy astronauts. The entire package is attached to a barbell device as shown in fig. 1 which is light enough (moon weight) to be hand carried into place. The astronaut puts the various experiment packages into a predetermined pattern as seen in fig. 2, aims the helical antenna and switches the rig on. For the next year or two ALSEP continuously transmits its coded bits of lunar intelligence.

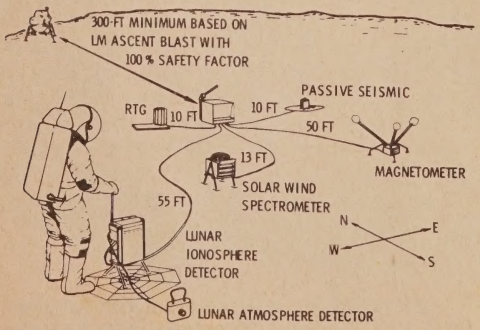


Fig. 2—Typical deployment of ALSEP units.

While in operation on the Moon each one of the ALSEP's will be self-sufficient and use a Radioisotope Thermoelectric Generator (RTG) for electrical power. The package will collect, format and transmit its data back to earth.

Communications

Communications will be maintained through the Manned Space Flight Network (MSFN). ALSEP commands will originate with the Mission Control Center in Houston, Texas, and will be forwarded to remote sites spanning the globe. At those same sites telemetry data received from ALSEP will be forwarded to Mission Control.

Communications to and from ALSEP are handled through a unit known as the Central Station as shown in fig. 3. This is the home of the data subsystem through which everything comes and goes. See fig. 13 for a functional diagram of the ALSEP.

Telemetry from and to the moon-bound package uses two distinct S-band links (transmit and receive) in the vicinity of 2275 mHz. Each Apollo flight's ALSEP unit will utilize a different set of channels as shown in Table 1.

Going Down

The Moon-to-Earth link (downlink) provides transmission of scientific and engineering data through one of two transmitters (transmitter B is used only as a backup). The formatted data are encoded and fed through phase modulators and routed to the prime transmitter which has an output of 1.0 watt. This S-band signal is then radiated through a helical antenna on top of the Central Station. This antenna has a boresight gain of 15.9 db with a beam width of 30 degrees. Both transmit and receive functions are handled through the same helical antenna at the same time. It is aligned by an astronaut using a sun compass.

In addition to scientific data from the experiments there are engineering (housekeeping) data inputs from the experiments and supporting subsystems. Although most ALSEP data are digital in form, there are some analog data collected. The analog data are converted into a prescribed telemetry format.

Mission	Turn-On Date	Freq. (mHz)
Apollo 11[1]	July 21, 1969	2276.5
Apollo 12	Nov. 19, 1969	2278.5
Apollo 13	aborted mission	
Apollo 14	Feb. 5, 1971	2279.5
Apollo 15	July 31, 1971	2278.0
Apollo 16[2]	April 16, 1972	2276.0
Apollo 17[2]	Dec., 1972	2275.5

[1]After transmitting for about one month Apollo 11's ALSEP equipment started refusing ground commands and remains in standby status

[2]Approximate dates at press time

Table 1—ALSEP S-band transmitting frequencies.

A diplexer and switcher provide interference protection between the transmitter and receiver components at the ALSEP antenna. A view of the innards of the data subsystem can be seen in fig. 4.

Coming Up

Commands from ground stations also come by way of the short helical antenna and are directed to the S-band receiver which demodulates the input carrier and provides a modulated subcarrier output to the command decoder. This Earth-to-Moon link (uplink) offers the ground controllers the ability to select experiment modes, change data rates, and provides turn-on, turn-off capability.

Measurements

All measurements, including the science data from each experiment, are transmitted as a pulse-code-modulated signal. The measurement channels are sampled in accordance with a fixed program sequence and the number of measurements and the associated data rates differ from instrument to instrument. For example, the 90 engineering measurements associated with the Central Station's data and command processor are sampled once each minute, whereas to obtain a complete three-dimensional spectrum from the Suprathermal Ion Detector requires 2½ hours.

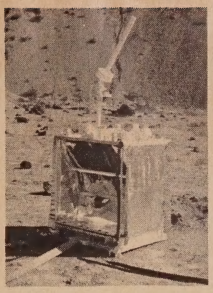


Fig. 3—ALSEP Central Station where 2300 mHz transmitters and receiver are housed. A 15.9db gain helical antenna can be seen on top of the station.

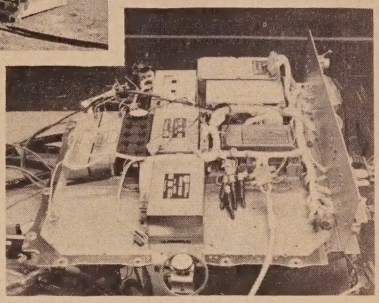


Fig. 4—Above, exposed view of ALSEP transceiver and data subsystem units.

Electric Power

The Electric Power Subsystem provides all the voltages necessary for the ALSEP while it's sitting on the moon's crust. The major components include the generator assembly shown in fig. 5, the fuel capsule, and the power conditioning unit (PCU) which is located within the Central Station.

The fuel capsule assembly uses nuclear en-

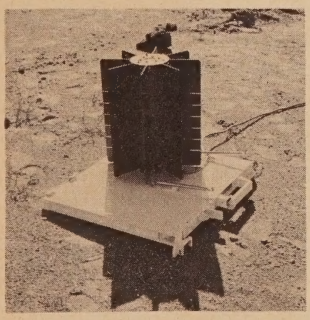


Fig. 5—Radioisotope Thermoelectric Generator (RTG).



Fig. 6—Passive Seismic Experiment.

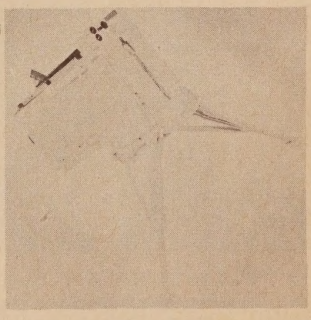


Fig. 7—"Mortar box" stores grenades to create seismic disturbances.



Fig. 8—The "thumper." This device has 21 explosive cartridges that are fired to various depths. Thumper is part of the Active Seismic Experiment.

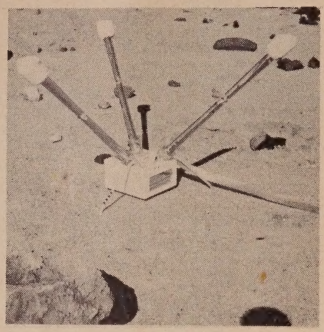


Fig. 9—Lunar Surface Magnetometer Experiment.

ergy generated by Plutonium-238 producing 1500 watts of thermal energy. When the fuel capsule is combined with the generator to form the so-called Radioisotope Thermoelectric Generator (RTG) at least 63 watts are converted by the thermocouples from thermal energy to electric energy. This nuclear power supply puts out a nominal 16 v.d.c. to the PCU.

Thermocouples, which are normally used individually to sense temperature by converting heat into electricity, are grouped in such numbers that a useful amount of electrical power is generated. It takes about an hour and a half after the fuel capsule is inserted into the generator before full power (thermal equilibrium) is reached.



Fig. 10—The Solar Wind Experiment will measure medium energy ranges of particles emanating from the Sun.

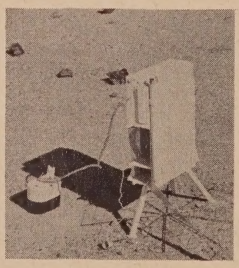


Fig. 11—The Lunar Ionosphere Detector. The small unit to the left is the Lunar Atmosphere Detector.

The PCU accepts the primary 16 v.d.c. from the RTG and performs conversion and regulation duties and produces six output voltages.

All of the ALSEP equipment is designed to withstand lunar environment temperatures of −300°F to +250°F.

Eight Experiments

Each Apollo flight is scheduled to carry four of eight ALSEP experiments.

The following are brief descriptions of each of the eight subsystems and what's expected of each of them:

Passive Seismic: Every Apollo lunar landing will carry the Passive Seismic Experiment shown in fig. 6 which is designed to determine the natural moonquake activity. These quakes or seismic energies are expected to be caused by shifting conditions within the moon's crust (tectonic) and by meteoroid impacts.

By monitoring the displacement of inertial masses from zero positions relative to sensitive transducers, the passive device is able to transmit accurate findings. Four sensors are used to monitor short and long period, low and high frequency activity. In addition, these sensors permit measurements of distance and direction of any seismic activity.

Active Seismic: The Active Seismic Experiment brings along its own seismic events namely, four explosive grenades and a "thumper" assembly containing 21 explosive cartridges.

The grenades will be launched from a mortar box like the one in fig. 7. They will be flung to various distances up to 5000 feet from the seismic detectors. The grenades will be set off by ground control near the end of the planned one-year operation.

The "thumper" shown in fig. 8 is expected to set up seismic waves for investigation of material characteristics within a 75 foot depth.

Lunar Surface Magnetometer: The magnitude and direction of the surface magnetic field of the moon will be the object of this sophisticated magnetometer shown in fig. 9. Apollo's 12 and 15 will have one aboard. An effort to detect changes in field direction up to a frequency of about one c.p.s. also fits into its role.

As the solar wind sweeps the interplanetary magnetic field against the Moon, some of this field should diffuse into the interior in a manner roughly analogous to heat flow.

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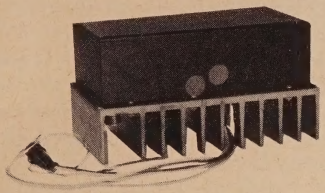
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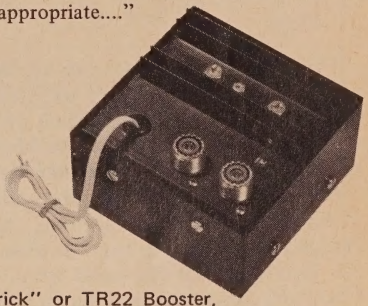
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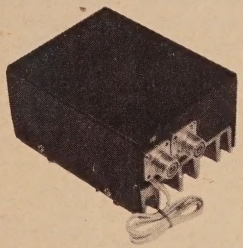


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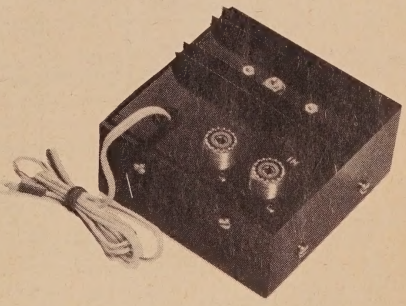
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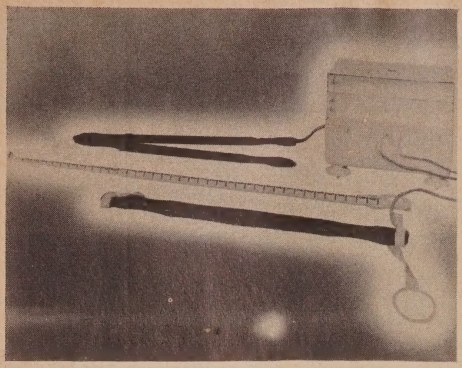


Fig. 12—An astronaut will bore a hole in the Moon with a special drill and insert this Heat Flow Experiment which will measure the internal temperatures of the Moon.

From all of this some clues to the Moon's origin and thermal history are hoped to be obtained as well as information on the generation of plasma waves as the Moon passes through the magnetic tail of the Earth.

Solar Wind Experiment: The solar wind is a flow of electrons, protons, and other charged particles from the Sun. The nature of the interaction of the solar wind with the Moon is an intriguing problem in basic plasma physics. The device used is shown deployed in fig. 10. The interaction is different from that with the Earth's magnetic field, and cannot be predicted theoretically with any certainty.

The occasional violent outburst of protons from the Sun (related to the solar flares) can be studied from the Moon in ways not possible from the Earth. The measurements of the solar wind will permit knowledge to be gained about the length, breadth, and structure of the magnetic turbulent wake of the Earth.

Lunar Ionosphere Detector: The Lunar Ionosphere Detector shown in fig. 11 will measure the flux, number density, velocity and energy per unit charge of positive ions in the vicinity of the Moon's surface.

Heat Flow: Is the Moon's core a remnant of a molten body formed during the same period as the Earth? If the core does exist, and it is still hot, it may be sustained by insulating layers of mantle or supplemented by heat from radioactive decay. The ALSEP Heat Flow Experiment shown in fig. 12 will determine the net flow of heat outward from the Moon's interior, and it may reveal the existence of a hot core.

Charged-Particle Experiment: The lunar surface may be bombarded by electrons and protons of the solar wind. This wind is caused by the expansion of the outer gaseous

[*Continued on page 84*]

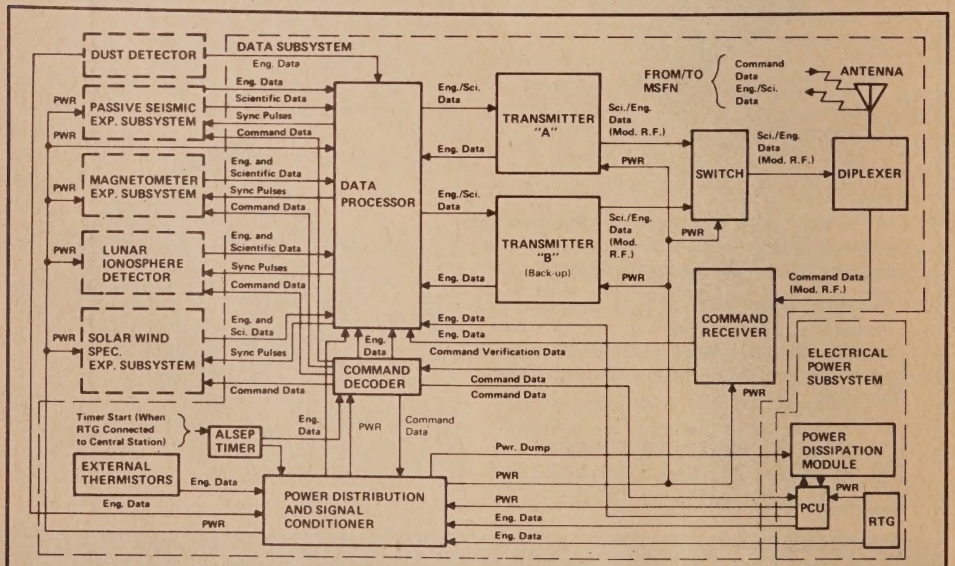
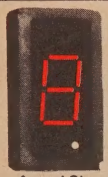


Fig. 13—ALSEP System Functional Diagram.

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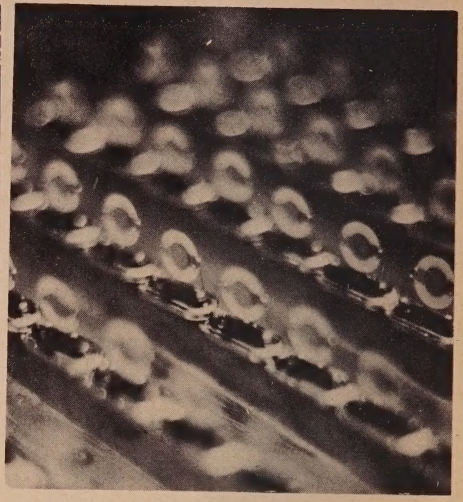
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Inexpensive Antenna Tuner Coils

BY W. R. CARRUTHERS,* VE3CEA

THERE comes a time in the life of a radio amateur when he decides to obtain an antenna tuner, for s.w.r. improvement at the station end and to reduce harmonics. On looking up commercially built tuners he finds them very expensive and then decides to construct one himself. He next finds that commercial copper coil stock is very expensive and doubly so since he requires only a small length from each of several coil stocks.

This article deals with the construction of very inexpensive plug-in antenna tuner coils, using #14 tinned copper bus wire for the coils themselves.

The Coils

The steps involved in constructing the coils are as follows:

1. To determine how many feet of bus wire are required, multiply the number of turns by the diameter in inches, multiply by 22/7; then divide by 12. The result is the number of feet required, but add 1½ feet of wire for use on the form and for connections.

EXAMPLE: For the 20 meter coil shown in the photograph, 7 turns ×2¾" dia. × 22/7 divided by 12 equals a little over 5 feet. Add 1½ feet as stated above. For the primary coil (inside) 2" diameter, 3 turns, requires about 1½ feet, plus the 1½ feet.

2. Straighten each length of bus wire by hand first. Then anchor one end in your bench vise, grasp the other end tightly in your pliers, pull straight, ease up the tension so that about 6 inches of sag appears. Now jerk hard on the pliers and the wire will be perfectly straight. Lay carefully aside.

3. Obtain a hard mailing tube. The type I use are 1¾ inches in diameter and 11 inches long with a 1/8 inch wall.

4. Refer to fig. 1. Obtain from your hardware store about 25 feet of 2 inch gummed paper sealing tape. Wrap on turns of this tape on the mailing tube, wetting the tape as you put on the turns. Build up the diameter of the mailing tube until it is about 3/16 inches iess than the required diameter of the coil itself. When dry the whole unit will be quite solid.

5. Drill two holes near the outside at each end, about 1/8 inch in diameter.

6. Wind on one layer of ordinary household cotton string.

7. Wind on one layer of gummed tape over the cotton cord. Do not glue on. Hold tape in place with a piece of Scotch tape along the slight overlap on the tape.

8. On this gummed tape draw a straight line in pencil and mark off the spacing you wish to have between the turns of wire.

9. Wind on one layer of waxed paper. Put

*256 Alexandra Ave., Waterloo, Ont., Canada.

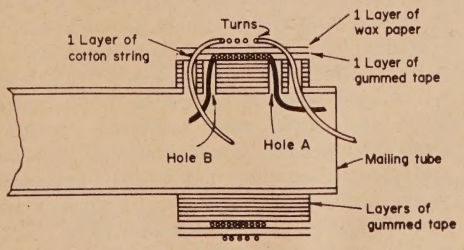
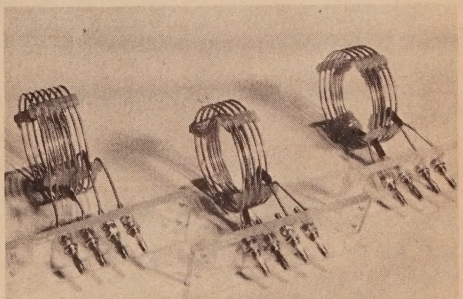


Fig. 1—Cut-away section of temporary coil form for winding inexpensive antenna tuner coils.



20, 15 and 10 meter antenna tuner coils with plug-in bases constructed as described in the text.

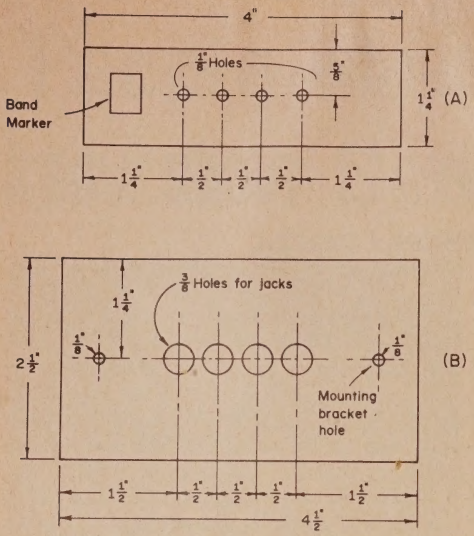


Fig. 2—Bases for antenna tuner coils. (A) Plug-in base. One needed for each band. (B) Fixed base. One needed. Material is 1/4" Plexiglass sheet or equivalent.

Scotch tape over the overlap to hold the paper in place.

10. Lock one end of the straightened bus wire in your vise. Thread the other end through hole A leaving about 3 inches of wire to lock the wire in place.

11. Holding the wire taut, wind on the turns turning the tube hand over hand. When all the turns are wound, thread the end of the wire through hole B. Check for uniform spacing of the turns. If you have wound a bit off the pencil marks, move the turns over or space them with wire of a smaller diameter than the bus wire.

12. Using epoxy glue run four strips across the turns, (see photograph). Let glue dry for 24 hours.

13. Pull end of wire carefully out of holes A and B.

14. Pull cotton cord out, slide coil off form, remove gummed tape and waxed paper, and there is your coil.

Make coils of same diameter one after another.

Mountings

Make one fixed base which will be used for the antenna tuner. Make one plug-in base for each set of coils. Excellent strength is provided in 1/4 inch clear plastic sheet.

Place a solder lug on each jack alternating their positions, *i.e.*, lugs 1 and 3 to the left of the center line, lugs 2 and 4 to the right. Pry the solder lugs up to about a 30° angle with the base.

There is one trick you should know. It is difficult to drill all the holes exactly in line in the plastic, so first make the fixed base complete with plugs. Then place jacks and lugs in the coil base with the nuts only finger tight. Plug this base into the fixed base. The jacks will set into the proper position. Tighten the nuts. Now the coil base will always fit the fixed base exactly. Show the band designation on the marker and always fit the coil base into the fixed base with the marker towards you.

The primary coils, of course, fit inside the secondary (larger) coils. Center them and glue in place with epoxy. Be sure to slip some spaghetti tubing over the primary coil leads where they pass through the secondary coil turns, (see photograph).

Tuner coils made this way are quite solid mechanically and will last for many years. Electrically they are very good and using the #14 copper bus wire will handle 1 kw without any trouble.

The plug in bases shown in the photograph were cut from a larger sheet which contained some holes from another project. No holes are necessary other than those shown in fig. 2. ■

New Amateur Products



Electronic Circuits and Design Co.

An easy to use kit for producing high quality circuit boards is available from Electronic Circuits and Design Co. The method used is photo transfer. Included in each PCBK-6 kit is: etching solution, spray on photo resist with dye, developing solution, exposure lamp, safety light, board material, abrasive pad, glass chemical trays, glass pressure plates and an exposure lamp fixture. Price $24.95. For further information write: Electronic Circuits and Design Co., 33 East Chestnut St., Alliance, Ohio 44601 or circle D on the Reader Service coupon.

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.

Designing Phased Vertical Arrays

BY CHARLES R. COX,* W5SQW

If your antenna farm already includes a vertical antenna for the h.f. bands, you can add to the usefulness of the antenna system by adding another identical antenna and a simple phasing system. The article below describes the design of such an array.

THE antenna system described here is not the ultimate. However, it does offer several extremely useful features, not the least of which is low cost for the amateur already using a single vertical antenna.

The phased vertical antenna consists of two similar verticals connected to the shack with equal lengths of identical coaxial cable. In the shack a phase-shifting network is used to permit the operator to alter the relative phasing of the two verticals in a controlled way to change the system's radiation pattern. By doing so the operator may minimize or eliminate QRM and provide some gain in a desired direction. The system can be built in the smallest back yard, and will work best on the lower frequency bands. While performance will not be as good as with a beam or quad, it will be better than a doublet, Inverted Vee, or a single vertical antenna.

*11002 Montverde, Houston, Texas 77036

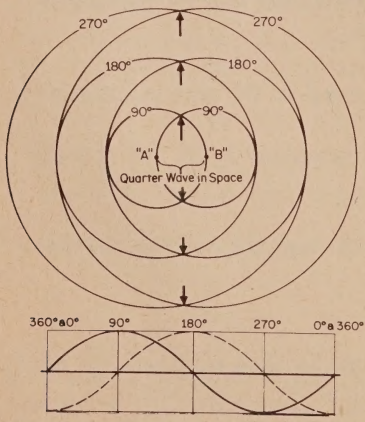


Fig. 1—With two vertical antennas a quarter wavelength apart, and fed in phase, a bi-directional radiation pattern results, with radiation primarily in the broadside directions as shown by the arrows.

The phase shift network consists of a series of delay lines made of coax which can be switched in series with either one or the other vertical antenna feedline to achieve the desired phase relationshiop betwen the antennas.

To design the system, obtain some graph paper, a drafting compass, a great circle bearing map of the world, and a table showing great circle bearings in the US. Decide what spacing the elements will have. If trap verticals are used for an all band system, the minimum spacing should be 1/8 wave in space for the lowest band used. When the two elements are operated in parallel (in phase) best results are obtained with wider spacing. Unless a multiple of a quarter wave spacing is used, calculations will be far more difficult, and minor lobes will also result, so if room is available a quarter wave in space at 7 mHz is a good spacing to choose. Length of a quarter wave in space = $246/f$ (mHz) = 246/ 7.029 mHz = 35.0 ft.

Select the type of coaxial cable you will use

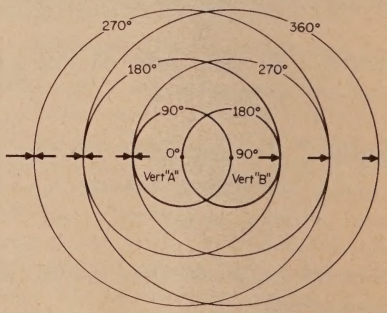


Fig. 2—Maintaining the same 1/4 wavelength spacing, but feeding the antennas 90° out of phase results in an "end-fire" pattern with deep nulls to the rear and sides, and gain in the forward direction.

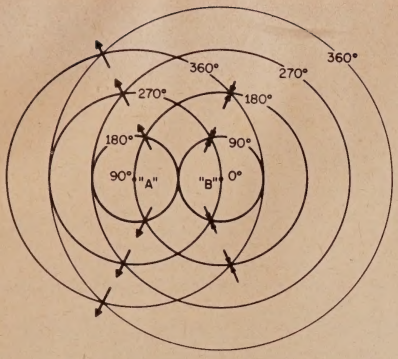


Fig. 3—As the operating frequency is increased the spacing between the antennas becomes greater in terms of wavelength. Shown here is half-wavelength spacing, (90° phasing), which produces a "heart-shaped" pattern.

and look up its velocity factor in a handbook. Most types have a velocity factor of 0.66 including RG-/8U and RG-58/U. To calculate the directive pattern of the antenna, draw the pattern for parallel (broadside) operation (see fig. 1) by drawing circles each representing a quarter wave in space and note which ones add and which ones cancel. It can be seen that the antenna is effectively bidirectional when using no delay line.

To calculate the first delay line (see fig. 2) it can be seen that if the wave front leaving vertical B is delayed 90 degrees (one electrical quarter wave) that the system will have an end-fire directional pattern (monodirective) and a side to side ratio similar to a beam's front to back ratio. The coaxial line length necessary for a 90 degree delay is $246/f$ (mHz) times velocity factor, or for 7.029 mHz with RG-8/U coaxial cable, $35 \times 0.66 = 23$ ft. 1¼ inches. When the delay line is used in the feed line from vertical A the directivity will be opposite that shown in fig. 2.

With these two end-fire patterns and the broadside pattern in mind, the designer is ready to orientate the antenna system using the maps and charts. An east coast ham might put the end-fire direction on Europe to eliminate European broadcast interference on 40 meter phone while eliminating stateside interference when working Europe. The gulf coast ham may put the end-fire direction on Japan allowing the broadside pattern to go toward Europe with no stateside interference in the back lobe due to his location. Careful selection of the orientation will pay off in overall performance.

An easy way to tell direction from a certain location is to use a transistor broadcast radio in the evening, tuned to a station in a known distant city. It is best to use two stations in the same city, one at the high end of the band and one at the low end of the band and to make observations on several different evenings. Make sure the antenna in the portable radio is not crooked and use the null for final determination as it will be much sharper than the peak.

Having determined the orientation of the antenna the designer is now ready to calculate the lengths of other delay lines necessary to fill in some gaps on the map or to reduce minor lobes on the higher bands. A typical pattern is shown in fig. 3. The required delay line length at 14.058 mHz would be $246/14.058 \times 0.66 = 11$ ft. 6⅝ inches. Figure 4 shows that for elements spaced 35.0 feet at 21.087 mHz the length of delay line necessary for end-fire directivity with the minimum number of minor lobes is $246/21.087 \times 0.66 =$ 7 ft. 8⅜ in. The minor lobes result because the element spacing is more than a quarter wave for the 15 meter band. Every delay line is usable on every band and gives some pattern however complex. The designer should complete pattern graphs for the other bands and directions needed for the particular location and situation, and check all calculations before construction.

The ham who has a vertical up and wishes to add to it should duplicate the existing installation as nearly as possible. The length and type of feed line brought to the shack from each vertical element should be exactly

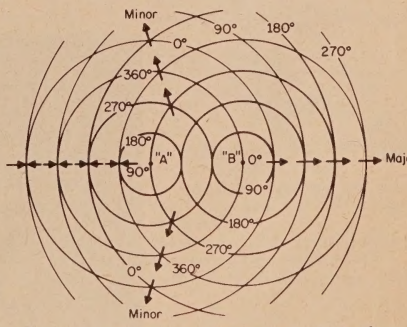


Fig. 4—At 3/4 wavelength spacing, (90° phasing), the pattern begins to take on a "fish" shape with the major lobe in the end fire direction and minor lobes towards the sides. Note that none of the patterns indicated take into account numerous smaller lobes which also generally result.

the same to the inch. A length difference of 1 foot can completely disrupt the 35 foot spaced system on the 10 meter band. If long feed lines are necessary, manufacturing tolerences can also upset the pattern on 10 meters. All the patterns drawn so far depend on exactly equal currents flowing in each vertical and the patterns would be much different if unequal currents were flowing in the elements. When a delay line is used in one feed line the s.w.r. of that vertical and line may vary greatly unless the ground system is perfect.

If it is found to be impossible to make the ground system good enough to prevent wide s.w.r. changes to one vertical while changing the length of line to that vertical, the condition may be helped by adding some length of line permanently to the vertical's feed line. When the correct (detuning) length is found, exactly the same length must be added to the second vertical's feed line also. This condition usually occurs only on 40 or 80 meters and the magic length of line needed may be around 27 feet. Each antenna must be tuned and have its ground system corrected individually and the s.w.r. of any one vertical must not swing widely with different line lengths

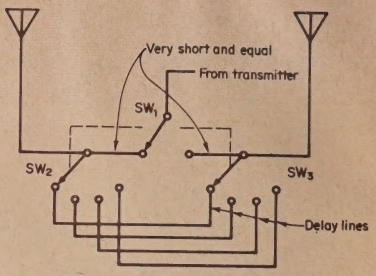


Fig. 5—Simple circuit of delay line switching system.

before the system is ready for operation. If one vertical has a narrow bandwidth with a low s.w.r. but a high s.w.r. elsewhere in the band (as may happen on 80 meters with some verticals) do *not* tune the second vertical to resonate elsewhere in the band in-order-to make the overall system's s.w.r. low over the entire band as this will cause unequal currents to flow in the elements. It is best to tune both antennas to resonate at the same frequency and use an antenna coupler to enable the transmitter to load elsewhere in the band.

Figure 5 shows a system of switching the delay lines at the operator position. Coaxial switches give less trouble but are not absolutely necessary. ■

THE ONLY CONVENTION IN THE NEW ENGLAND AREA for 1972



will be the Air Force MARS fourth annual regional convention at the Statler Hilton Hotel, Boston, Mass., on May 19, 20, and 21.

Because there are no strictly amateur radio conventions this year, the AF MARS Convention will hold three amateur seminars, in addition to our regular scheduled MARS sessions. CQ's FM editor, Glenn Zook, will head up an FM seminar, and the other two subjects to be covered will be amateur antennas and amplifiers.

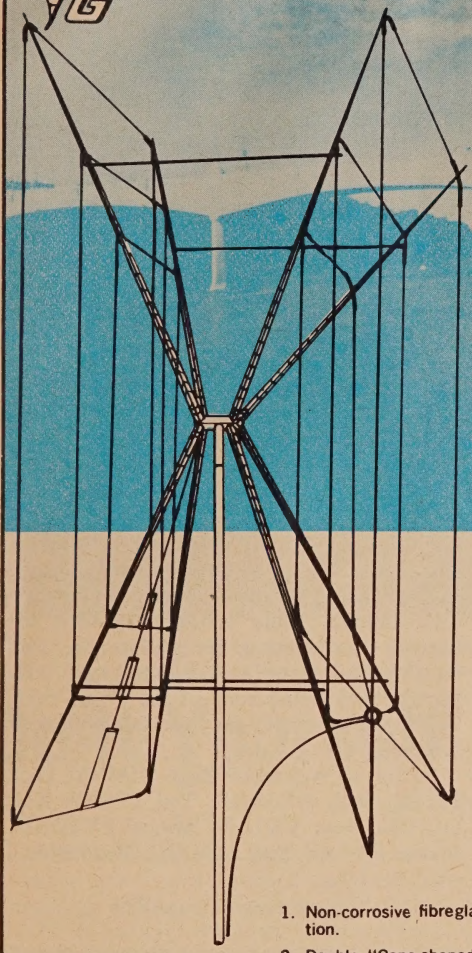
All hams are cordially invited to attend. There will be exhibits by many leading manufacturers and distributors of amateur equipment, and prizes to boot. So come on out.

For further information contact John J. Donavon, AFB1PBJ, Convention Chairman, 19 Pratts Junction Road, Lancaster RFD, MA 01523. Phone 617/422-7938.

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* PATENTED

A Welcoming Center for Foreign Amateurs visiting New York City

BY GEORGE PATAKI,* WB2AQC, ex YO2BO

RADIO amateurs all over the world are the most sociable group of people ever brought together by a common interest. Their desire to communicate, to exchange ideas, to learn from each other, makes them invest money and time in buying or building all sorts of communication equipment.

They also enjoy personal meetings, at radio clubs, conventions, picnics, visiting others' radio shacks, *etc.* One of the biggest thrills for an amateur radio operator is to meet personally another amateur with whom he had a QSO.

American amateurs traveling abroad try frequently to meet with local amateurs and—if possible—to operate their stations. In the same way, foreign amateurs coming to the U.S. are very anxious to meet with their American counterparts. To satisfy this need, at least for those coming to New York City, I am running a "Welcoming Center for Foreign Amateurs Visiting N.Y.C."

We advise every foreign amateur who intends to come to the U.S., to include New York City in his itinerary and to get in touch with us. They should write us in advance, letting us know the date of their arrival, how long will they stay in N.Y.C. and if there is any special thing they would like to see or do. We shall invite them to our house, together with a few local amateurs, we'll take them sightseeing and shopping, to some radio clubs and to the radio stores.

If they are coming from a country that has a Reciprocal Operating Agreement with the U.S. and if they wish to operate here with their own callsign/W, they should ask the Federal Communications Commission for a permit. It may take 4-5 months to get such a permit, so they should apply well in advance.

If they can't get an operating permit, they still can talk in the microphone of any American amateur radio station, provided the licensee is operating the station. So, they could set-up tentative schedules with their friends back home and—if the Third Party Traffic rules permit—they can talk with their families.

So far we welcomed Rene ON4VY, Dick PJ2CQ, Susy HB9AOE, Ted VP9EP, Karl DL1QK, Ross VK1AN, Marcel PY1DAH, Marius FY7YE, Seiji JA2LQF, Otto PZ1AC,

*34-24 76th St., Jackson Heights, N.Y. 11372.

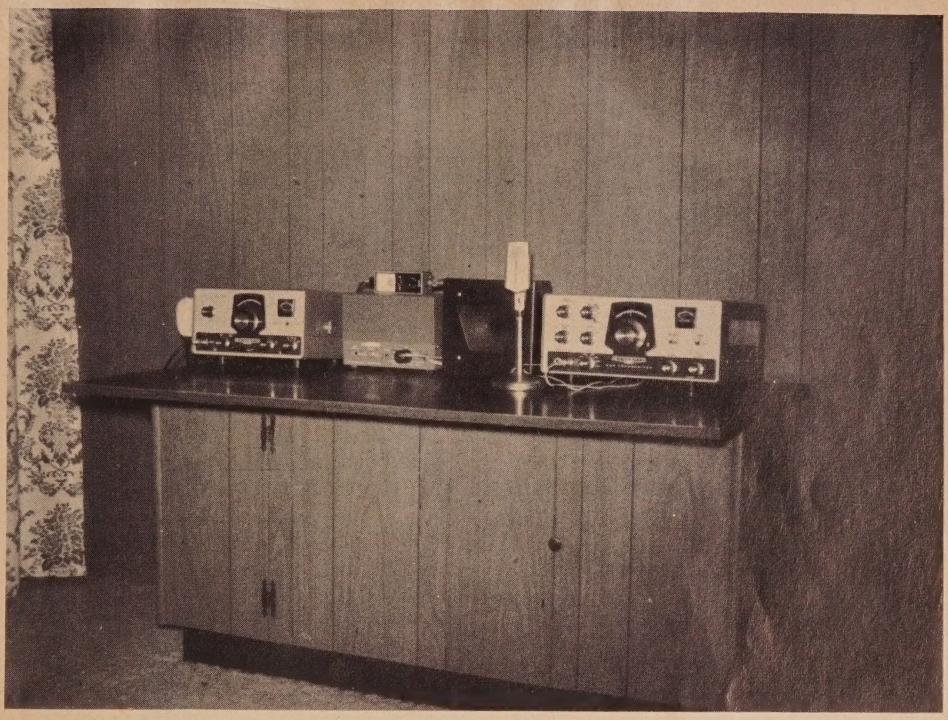
[*Continued on page 82*]



Eva WA2BAV the hostess and Seiji JA2LQF the guest at the Welcoming Center for Foreign Amateurs Visiting New York City.



Phil W2EEH, Henry W2JSI, George WB2AQC, Otto PZ1AC and Eva WA2BAV going thru George's scrap book.



The operating desk has a large working area, approximately 10 square feet. It also provides for 8 cubic feet of storage plus sufficient knee and leg room while still retaining appearance of a piece of furniture.

Do-It-Yourself Operating Desk

BY LA VERNE SMITH*

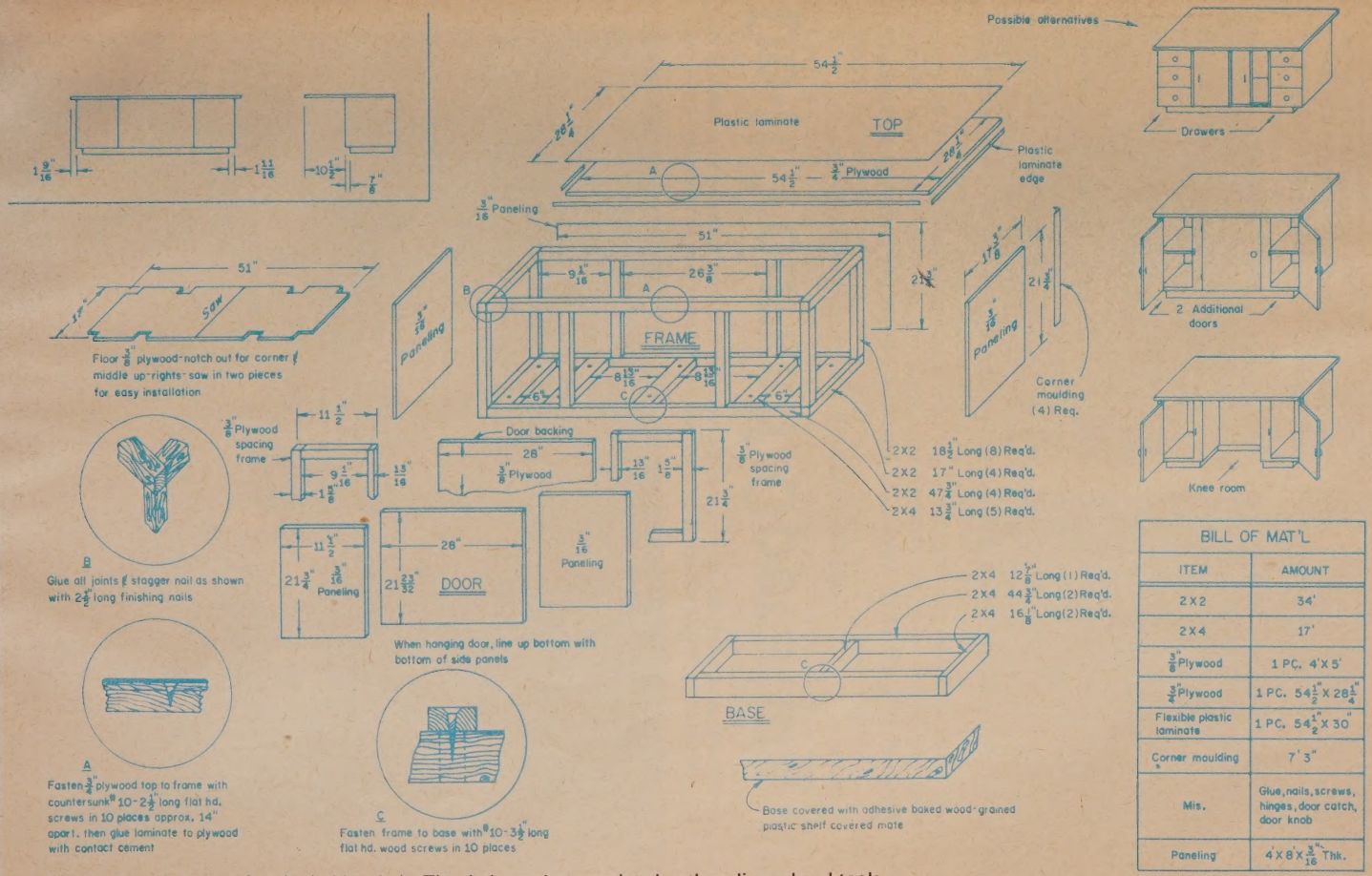
The desk described and shown in the following article was designed and built after checking prices of comparable manufactured units. It has approximately 10 square feet of top area and 8 cubic feet of unbroken storage area. Since I have only hand tools, that was how I got the job done. The desk shown cost me a little over $28.00 to build using a saw, hammer, screwdriver, brace and bit, scissors and rolling pin.

Start with the frame. Before doing any nailing, coat each joint with a liberal amount of Elmer's glue. Build the two end frames first; then nail these two frames to the four long horizontal 2 x 2 uprights and the 2 x 4's in the bottom of the frame. The 3/8" plywood spacers are nailed on next (these spacers are necessary to keep everything lined up with the solid 3/8" thick plywood door which is covered with paneling).

*3104 N. Catherwood Ave., Indianapolis, IN 46226

Next build the base as shown. With the frame and base completed, these two units are fastened together with woodscrews as shown. Cut out the 3/8 plywood floor and install by nailing it to the bottom of the frame. The paneling cover is now installed around the frame and over the door with contact cement. When cutting the paneling (grooved surface paneling) it is possible to saw carefully down one side of a groove and the place where two pieces of paneling meet will be hard to detect. After cementing the piece of paneling over the door, add the hinges and knob to the door, line up the door bottom with the bottom of the side panels and fasten the other

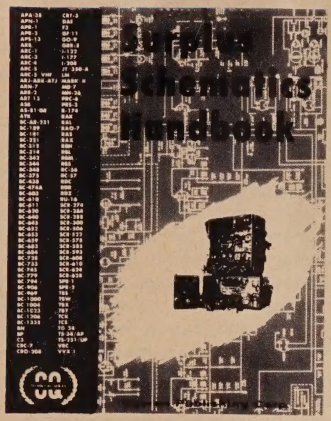
[1]The hobby desk as designed will come out about 26" high or approximately 3" below the average sized desk. The height dimensions can be altered to raise the height to desk height without having to buy additional paneling. Upon further consideration, the basic desk can be modified to a workbench, have drawers or doors at either end.



BILL OF MAT'L	
ITEM	AMOUNT
2X2	34'
2X4	17'
¾" Plywood	1 PC. 4'X5'
¾" Plywood	1 PC. 54½" X 28¼"
Flexible plastic laminate	1 PC. 54½" X 30"
Corner moulding	7' 3"
Mis.	Glue, nails, screws, hinges, door catch, door knob
Paneling	4'X8'X 3/16" Thk.

Fig. 1 - Detailed plans for the hobby desk. The desk can be completed with ordinary hand tools. Above the Bill of Materials are drawings of three possible variations on the original idea. The basic construction technique lends itself to many variations, one of which should suit almost any station's

SURPLUS SCHEMATICS HANDBOOK



$2.50

Partial list of contents:

ARC1	ART13	BC640	SCR284
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This is a book literally loaded with schematics for all the currently popular pieces of surplus gear. Most amateurs are well aware of the problems encountered in purchasing seemingly inexpensive surplus units, only to find that no schematic diagram is available.

CQ MAGAZINE
14 VANDERVENTER AVENUE
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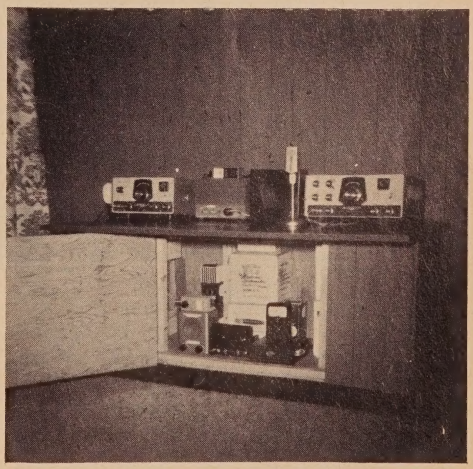
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side of the hinges to the paneled frame. Next add a door catch. The corner moulding is now added to all four corners with contact cement.

Self-adhering plastic shelf covering is cut to size and placed around the base.

The last step is adding the top. Cut out the 3/4" thick plywood top and fasten it to the frame as shown (countersink the screw holes in the plywood and if necessary fill over the screw heads with wood putty after screwing them in place). The most exciting part of the project is next – installing the laminate. If this is your first attempt, cut the laminate approximately 1/16" wider then the plywood top. If there is some misalignment during the installation this should insure the plywood top is completely covered by the laminate. After coating the plywood and laminate with contact cement and allowing them to dry the prescribed amount of time, cover the plywood with a large sheet of paper. Lay the laminate on top of the paper. Align the laminate with the plywood all around the top. Have someone withdraw the paper a little at a time while you roll the laminate onto the plywood with a rolling pin (make sure you do not roll over the sandwiched paper during the process). Next install the edging (previously cut from the original piece of laminate with scissors). If the laminate top was cut larger then required and overhangs the edges, remove the excess by holding a file at a 45 degree angle and filing toward the floor with one way file strokes.



This view with the door open shows the storage compartment. Variations on the original plan as depicted in the drawing will alter the storage space.

F. M.

BY GLEN E. ZOOK,* K9STH/5

WELL, fellers, you had better lean back and prop up your feet and get comfortable, for I just got back from SAROC. SAROC, as most everyone knows, is one of the largest amateur meetings in the country. Lately it has hosted the National FM Convention, as happened this year. The three major f.m. magazines, *CQ*, *73*, and *rpt* were represented on the FM Forum. Wayne Green of *73* was the first speaker, myself the second, and Mike Van Den Branden of *rpt* was the third speaker. Many subjects were covered, but items like the various 200 mHz licensing structures and frequency plans; problems with newcomers to f.m.; and how the f.m.'er and the magazines can cooperate were foremost in the minds of many.

Along the lines of cooperation, the three magazines represented (*CQ*, *73*, and *rpt*) agreed to coordinate efforts when items of national importance are discussed. Things like frequency coordination, band plans, etc. are prime examples. Even though the various editors do not always agree on every facet of a plan, it does no one any good for all three of us to go off our separate ways. There is room for criticism from all sides for any given plan. However, if each magazine presents the various sides of a question then each amateur can make an intelligent decision regarding the best solution. Therefore, whenever writing to Mike, Wayne, or myself regarding things like band plans, please send a copy to all three editors. Since each one of us uses reader response as a major factor in formulating our opinions, similar information going to all three editors cannot help but keep us going in the direction most beneficial to the majority of f.m.'ers. If you have a gripe, pat-on-the-back, question, or suggestion about other matters feel free to write just one of us. But, in matters of national importance let everyone know how you feel. In fact, you may want to include a third piece of carbon paper and send the ARRL a copy. By the way, even though this is April, the above paragraph is no joke!

Continuing with SAROC: f.m. was quite evident both in the exhibition hall and in the halls and grounds of the hotel. A great number of the major amateur f.m. manufacturers and importers were there as were those engaged with accessory and test equipment items. Of course the d.c. band boys had a display or two, but f.m. was definitely on top. Buzz Ross of Ross & White (tone encoders, f.m. rig, etc.) cheated a bit by bringing

*818 Brentwood Lane, Richardson, Texas 75080.



Site of the K1IGF 19/94 repeater in the New London, Conn. area. The building is owned by the Town of Groton, Conn., Civil Defense Group

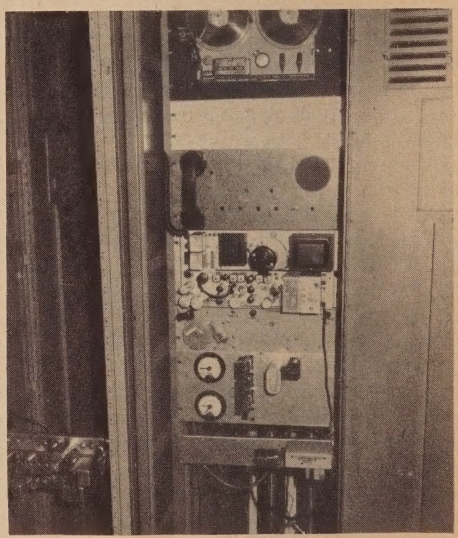


Photo of the interior of the K1IGF machine. Equipment is GE Progress line with the necessary control and logging equipment in the same cabinet.

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NEW 2 METER FM TRANSCEIVER MODEL SRC–146



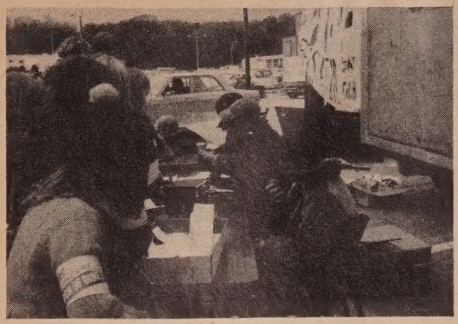
Frequency .....143-149 MHz (2MHz spread)
Number of channels.....5 Supplied with 146.94 simplex, 146.34/.94 (same plug in crystals as SR-C826M)
R.F. Output.....1 watt minimum
Sensitivity.....better than 0.4 uv/20 DB Q.S.
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Meter .....monitors battery voltage on Tx, S Meter on Rx
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Weight .....24 oz., less batteries

Options: external mic, or mic-speaker, stubby flexible antenna, desk top charger, leather case.

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The New London area f.m.'ers helped enhance our public image by assisting the 22 mile March of Dimes Walkathon in Groton, Conn. Seven mobile units participated. This photo is of the control point with WA1MWD at the mike.

along the cute little brunette pictured in the Ross & White ads. Really, there was something for everyone either in the exhibition hall or at the casinos. Antennae, RTTY, s.s.b., SSTV, MARS, f.m., you name it. Dick Cowan of *CQ* even tried to run the casino out-of-business with his own poker table (gambling for *CQ* subscriptions, of course).

The security guards seemed a bit nervous with all those HT's on everyone's belt. I don't know if it was a professional interest or a bit of envy. Since radios are not supposed to be used in the immediate vicinity of the gambling tables it could be professional interest. However, with all those HT200's and HT220's I cannot help but think a few officers would like to have some better equipment themselves. Seriously, one f.m.'er did run into some trouble at a certain hotel when he pulled out his HT in the main gambling area. However, this columnist had no problems in that hotel or any other hotel while carrying an HT-220. Speaking of HT220's, SAROC gave away one as the main prize at the FM Forum. Gee, fellows, you out did the Texas VHF FM Society and their HT200 raffle! What next, a Micor or MASTR?

SAROC 1972 was this columnist's first visit to Las Vegas and I was suitably impressed. The shows were great, the people friendly (for the most part, anyway), and even the slots were friendly ($22.00 to the good for my wife and myself). Even better was SAROC itself. The meeting of old friends and the making of new ones adds much to a meeting. SAROC was no disappointment in this department. If you failed to make SAROC for 1972, plan to make it for 1973. If you were there, see you again next year.

FCC

The only thing I missed at SAROC concerning f.m. was Prose Walker's (Chief FCC Amateur and Citizens Division) talk. The FM Forum ran over into Prose's talk and I was unable to hear him speak. Fortunately Prose was in Richardson (see address at beginning of column) the Monday following SAROC to speak to the Richardson Wireless Klub. After flying half way across the country and missing him I had only to drive a few blocks! Anyway, Prose had many things to say of interest to all amateurs and to f.m.'ers in particular.

Another 220 Plan

On page 40 of the December, 1971, issue of *CQ* there appears a plan for the 220 mHz amateur band. This was presented because of the apparent need to get something going to save 220. Well, at the same time a group of amateurs on the West Coast were formulating another plan for 220 mHz. This plan took into consideration the RACES frequency assignments, and has been published in *rpt*. There is nothing sacred about the plan published in this column nor is anything sacred in the California plan. Each is an attempt to get amateurs thinking about 220 mHz. Thus, in keeping with the plan to keep everyone informed about items of national interest that 220 mHz plan is repeated herein (fig. 1). Channel spacing does not have to be the 25 kHz suggested by myself in the December column, nor does it

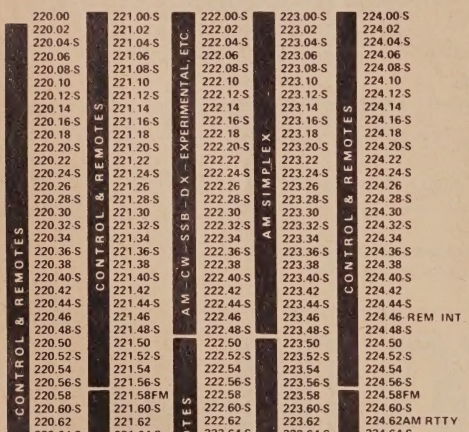


Fig. 1—The West Coast proposed 220-225 mHz Channel plan.

have to be the 20 kHz suggested in the plan in this month's column. However, keeping with RACES does often help. The 3 mHz input/output spacing is much too wide to work simplex and duplex using the repeater output channel. However, this may or may not be important to the majority of operators. For my feelings and reasons for a 1 mHz input/output spacing go back and read the December column. Then, let Mike, Wayne, and myself know how you feel about a plan for 220. If you would like to see something else or would like to modify the plans presented either in December or this month let us know. If there is activity other than f.m. in a certain portion of the band in your area make this known. It does not one bit of good to keep frequencies secret, especially when the lack of operation could make for the loss of part or the whole of a band. Of course FCC action on the Class E "CB" petition presented by the EIA could throw water on any plan. However, we must get cracking on something for 220. How about it?

Well, enough opinion for a month or so.

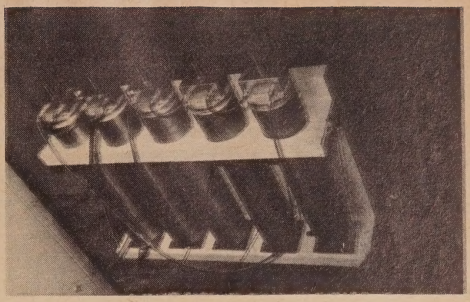
Technical Talk

It's time for another simple circuit or two for the f.m. minded amateur. The first is a simple timing circuit lifted from the bulletin of the North Central Texas Six Meter Repeater Association. See fig. 2. Like some previous circuits the originator was K5FOG (Foggy Joe). Basically it consists of a JFET and a switching transistor. The timer is activated by the application of the 4.7 volts and reset by grounding the point labeled "reset." A switched 3.5 volts becomes available at the output point after the desired time has elapsed. The timer as described is for about 3 minutes duration. The time span can be changed by modifying the values of C_1, R_1, R_3 and R_4. The total combined resistance of R_3 and R_4 should total about 2K ohms. However, for moderate variations in time the capacitor C_1 should be all that has to be changed. This circuit is good for a few seconds to over 10 minutes.

Channel Marker Generator

The second project for this month is courtesy Ted Bensinger, W5PCX, a local f.m.'er very active in the Dallas 22/82 group. Basically the circuit, fig. 3, is a marker generator with 30kHz markers which coincide with the standard 2 meter f.m. channels. Although Ted built this circuit some time ago, it was recently repeated in the Fall/Winter 1972 issue of the *Texas VHF-FM Society News*. I'll quote Ted in describing how the unit works.

"The combination schematic and wiring diagram shows how simple this useful piece of test equipment is. The crystal is used in a standard TTL multivibrator, the crystal being placed in the loop (normally series mode of operation) to determine the oscillation frequency. The crystal



The home brew two meter cavities used in the K1IGF repeater for diplexing.

used is a 32 pf parallel mode unit, so the circuit configuration was modified to enable the crystal to work into an effective load of 32 pf. The series 220 pf capacitor raised the crystal frequency sufficiently to allow the trimmer to adjust the frequency very accurately.

The oscillator output is buffered from the divider circuitry and the calibrate output by gate section IC_1 . IC_1 isolates the calibrate output so that a short at the calibrate output will not affect the marker generation. The oscillator output is also fed to two decade divider (divide by ten) integrated circuits. The output of the first decade divider IC_2 is a symmetrical 300 kHz square wave. The output of the second decade divider IC_3 is a 30 kHz square wave with a 20% duty factor. Output isolation capacitors were used to insure that a long term short circuit would not damage the IC's (even though they can withstand relatively short-term short circuiting). Power supply requirements are 5.0 v.d.c. ±0.25 v.d.c. at a nominal 110 ma.

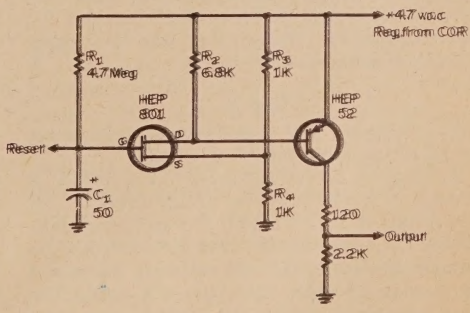


Fig. 2—A solid state timer circuit. When the timing is completed, 3.5 v.d.c. is available at the output. A voltage of 4.7 d.c. is applied through the receiver COR to activate (N.O. contracts). The timer is reset by grounding the "Reset" point (through n.c. contacts on the COR). Capacitor values greater than one are in pf and those less than one are in mf unless otherwise indicated.

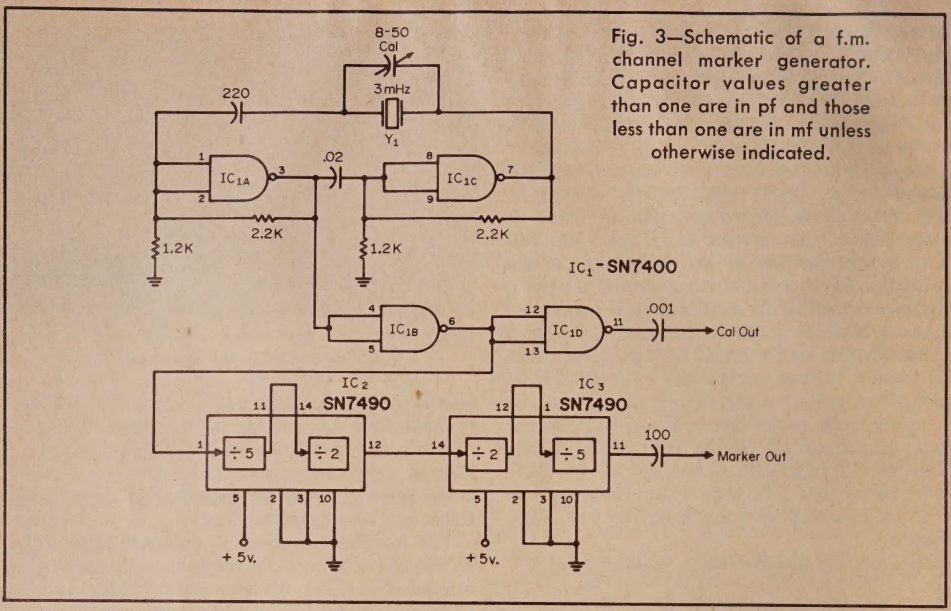


Fig. 3—Schematic of a f.m. channel marker generator. Capacitor values greater than one are in pf and those less than one are in mf unless otherwise indicated.

Ted's description of the workings of the generator should be enough to let everyone know how it works. Just zero the 2 mHz crystal with WWV at 15 mHz and you now have short term accuracy in the neighborhood of 50 Hz at two meters. By the way, substituting a 2 mHz crystal will give markers at all six meter f.m. frequencies except 52.525 mHz. The pin configurations are for the 14 pin dip.

Photographs

It is quite obvious by now that there are actually photographs with this column! Ray, K1-IGF, sent along some photos of the 19/94 machine in the New London, Conn. area. One thing to look at is the home brew cavities for diplex operations. Thanks, Ray, and how about a photo of *your* repeater.

Q & A

Q. Is there any way to easily increase the power output of the Motorola Motrac units?

A. The low band (six meter) U41HHT-B through D models can be rebuilt from the 30 watt output to the U51HHT 50 watt output units merely by replacing the transformer with the suitable 50 watt model and replacing the bridge rectifier diodes with 1000 p.i.v. 1A types. The later versions including the HHT-E and LHT require metal work on the chassis and much more work. Going to a 100 watt output model requires a scratch rebuilding of the final and driver assemblies and the conversion of the power supply. The highband (2 meter) 25 watt units are best left alone, but the higher powered (U53, U63, U73) units have only a jumper on the power supply rectifier board which changes. The older HHT units may be either 60 or 80 watts output by changing the jumper and the newer LHT/MHT series may be 60, 90, or 110 watts output by changing the jumper and the The same thing holds true for various versions of the 450 mHz Motrac units. Take a good look at the service manual for the minor changes between some units.

Q. Is high power a necessity on f.m.? Many amateurs on the lower frequencies are running high power, but most fellows I work on f.m. are running just a few watts.

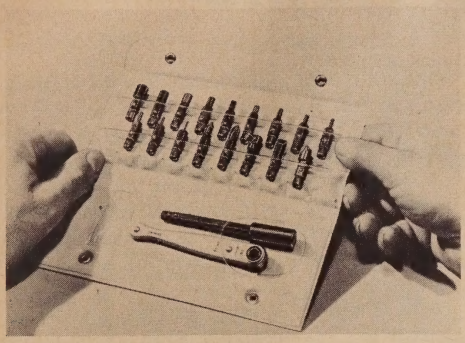
A. In most cases high power is not required on v.h.f., or, for that matter, on the lower frequencies to overcome the normal path losses, etc. Where high power comes into play on the lower frequencies is to override our fellow amateurs who are also running high power. Often very low power will overcome the path losses, but we have to run high power on the lower frequencies to overcome the QRM. Fortunately on v.h.f. most amateurs have realized that low power works quite well, especially where repeaters are used. Since anything more than a full quieting signal into the repeater sounds the same, high power is not normally needed. Of course for long haul DX, EME, and similar efforts high power is needed to overcome the path losses. But, in the case of most f.m. operation the high power is not needed.

Q. I sent you a notice of our f.m. meeting and it did not get published. Why?

A. Simple, all magazines have deadlines. Your announcement arrived less than four weeks before the meeting. At that time *CQ* was already

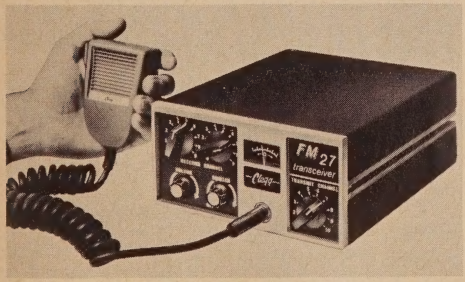
[*Continued on page 82*]

New Amateur Products



Jensen Tools & Alloys

A 20-PIECE miniature reversible ratchet set is available from Jensen Tools and Alloys. The kit (#4320), contains a 20-tooth ratchet, extension, 12 Allen-hex drivers from .050" to 5/16", two regular slotted-head drivers in 1/4" and 3/8" sizes, two Phillips drivers in sizes 1 and 2 and a square adapter for 1/4"-drive sockets. The drivers are made from high quality chrome-nickel molybdenum alloy steel. The ratchet is made of stainless steel and its strength exceeds torque standards set by the military. The kit is priced at $11.00. For further information write: Jensen Tools and Alloys, 4117 N. 44th St., Phoenix, Arizona 85018 or circle B on the Reader Service coupon.



Clegg Division

A SOLID state mobile transceiver (FM-27) has been developed by Clegg Division of IS&CC. The principal feature of the transceiver is the Cristiplexer tuner, a synthesizing system that allows any channel in the two meter band (146-147 mHz) to be monitored with crystal precision—without additional crystals. For example, to monitor 146.94 the first control is set at 9, and the second at 4. Receiver selectivity is rated at 70 db of adjacent-channel attenuation. Sensitivity is rated at better than 0.35μv for 20 db of quieting. The transmitter of the FM-27 is 10 channel solid state with a power output of 20 to 25 w. The unit measures 3½" x 7/8" x 9¾" and weighs less than three pounds. Price, including an anti-theft case, two crystal controlled transmit channels, and a PTT microphone is $449.95. For further information write: Clegg Division, International Signal & Control Corp., Box 388, R.D. #3, Lititz, PA. 17543 or circle A on the Reader Service coupon.



Palomar Engineers

PALOMAR Engineers has announced an IC frequency standard for amateur use. A front panel switch controls the operation of three frequency dividers that are driven by the 100 kHz precision crystal oscillator. Output frequencies are 100, 50, 25, 10 and 5 kHz. The rich harmonic content of the square wave allows the signal to be heard at every 100 kHz (or every 50 kHz, 25 kHz, etc.) throughout the amateur bands to 50 mHz and above. A zero adjustment allows the frequency to be set precisely by comparison to WWV or other known standard. Once set, the accuracy holds for all outputs. List price is $32.50. For further details write: Palomar Engineers, Box 455, Escondido, CA. 92025 or circle C on the Reader Service coupon.

CQ Takes the Pulse of Amateur Radio

For several years now, *CQ*'s publisher has been surveying hams across the country to strengthen our pulse on what you're buying in the way of equipment and accessories. These market surveys have been invaluable in helping us convince numerous manufacturers that the ham market is worth soliciting, as well as in directing our editorial staff toward obtaining the type of material that hams want to read.

On May 1st and 2nd of last year we mailed ten thousand new questionnaires to names selected at random from the *Callbook*; of these, 360 were returned by the Post Office as undeliverable. By October 17th we had received 2801 filled out returns from hams in all fifty states and several possessions. At that time we began to tabulate.

Before going further, we'd like to take this opportunity to thank the hundreds of hams, some *CQ* subscribers—some not, for taking their time to help us with this survey. Most manufacturers who have seen the printed survey reports were quite astounded that such a large number would take the trouble to respond. This fact alone convinced some that hams are a truly dedicated group that shouldn't be overlooked in their product planning for the future.

The questionnaire included thirty-three different questions, mainly asking what equipment had been purchased during the previous twelve months, the price paid, and whether purchased new or used. We also asked responders to list which ham magazines they regularly subscribe to, what test equipment they own, what microphones, etc. Also included were questions on parts, kits, and so on.

Because of the complexity of the tabulation, (thirty-three questions times 2801 responses alone is enormous, and many of the questions were cross-referenced against each other), it took us a full six months to tabulate. The entire tabulation was done by hand rather than by computer for one simple reason. A computer operator who isn't a ham couldn't possible recognize that a TH6DXX is a HyGain antenna or that a TR-4 is a Drake transceiver. And we wanted to be able to guarantee accuracy within one tenth of one per cent. Because the tabulation was done entirely by the *CQ* staff we can positively guarantee that accuracy, and have demonstrated the methods used to obtain this result to the complete satisfaction of several *CQ* advertisers.

As a matter of fact, we even loaded the survey to *CQ*'s *disadvantage* in a very simple fashion. The question on magazine readership was worded as follows: Please check those publications to which you regularly subscribe. Listed were the four amateur radio magazines published in this country. But keep in mind that approximately one third of *CQ*'s readers are newsstand or distributor counter buyers, whereas the other three publications sell predominantly through the direct sub method. This means that *CQ* was at an immediate one third disadvantage on the probability that a returned questionnaire would list us. The responses were somewhat astounding.

The 2801 hams responding indicated that during the preceding twelve month period they had spent $547,539.00 on major ham equipment alone. Of this, $315,561.00 went toward transceivers, $86,850 toward receivers, $55,716 toward transmitters, and $88,512 toward linears. And we repeat, this was for *new* equipment alone, with a huge additional amount for used gear.

The figures for antenna purchases were equally gratifying. 2801 responders spent $80,038 for total new antennas, of which $62,765 was for fixed station and $17,273 for mobile antennas.

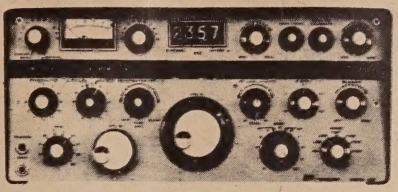
The response on test equipment was incredible. These same 2801 hams own: 3,050 v.o.m.s, 2,558 v.t.v.m.s, 2,131 scopes, 1,417 tube testers, 2,234 signal generators, 3,225 s.w.r. bridges, 1,814 g.d.o.s, and 777 frequency meters or counters. Watch *CQ* for some heavy advertising on test instruments in the months ahead.

Quite naturally, we were most interested in the answer on magazine subscriptions, and

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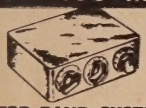


8. Calibration within 100HZ on frequency meter nixie digital counter.
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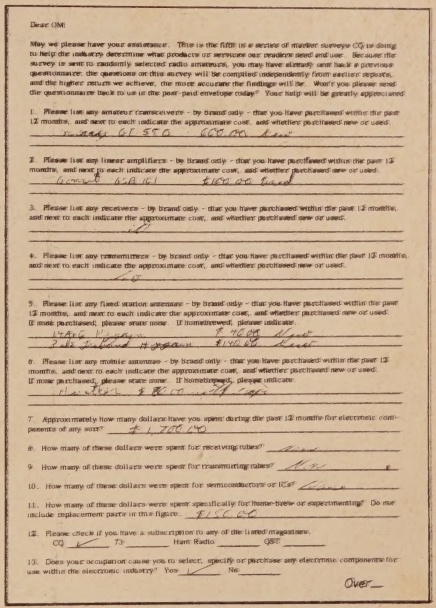
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despite the disadvantage to which *CQ* was placed as indicated earlier, the results were these:

2,389 or 85% subscribed to *CQ*
2,160 or 77% subscribed to *QST*
1,300 or 46% subscribed to *Ham Radio*
981 or 35% subscribed to *73*

But even more gratifying to us were the cross-tabulation figures that indicate that *CQ* subscribers accounted for 88% of all dollars spent on new radio equipment, and 90% of all dollars spent on new antennas.

As this issue goes to press we have not finished tabulating the questions on parts, microphones and kits, but those will be completed shortly. For individuals interested in a more complete breakdown of the figures listed above, we've printed a 33 page complete report, available to any prospective advertiser. Cost has forced us to limit printing to about two hundred copies, so we can only send these to companies who seriously contemplate advertising products or services for the ham fraternity. They are available to business concerns who contact us on a regular company letterhead. Write Dick Cowan, WA2LRO at the *CQ* office if you're interested. ■



Dear OM:

May we please have your assistance. This is the fifth in a series of similar surveys CQ is doing to help the industry determine what products or services our readers need and use. Because the survey is sent to randomly selected radio amateurs, you may have already sent back a previous questionnaire; the questions on this survey will be compiled independently from earlier reports, and the higher return we achieve, the more accurate the findings will be. Won't you please send the questionnaire back to us in the post-paid envelope today? Your help will be greatly appreciated.

1. Please list any amateur transceivers - by brand only - that you have purchased within the past 12 months, and next to each indicate the approximate cost, and whether purchased new or used.
Swan 6A 150 $600.00 New

2. Please list any linear amplifiers - by brand only - that you have purchased within the past 12 months, and next to each indicate the approximate cost, and whether purchased new or used.
Ameco GA 161 $160.00 New

3. Please list any receivers - by brand only - that you have purchased within the past 12 months, and next to each indicate the approximate cost, and whether purchased new or used.
—0—

4. Please list any transmitters - by brand only - that you have purchased within the past 12 months, and next to each indicate the approximate cost, and whether purchased new or used.
—0—

5. Please list any fixed station antennas - by brand only - that you have purchased within the past 12 months, and next to each indicate the approximate cost, and whether purchased new or used. If none purchased, please state none. If homebrewed, please indicate.
Hy-Gain Tribander $ 90.00 Used
2 el. Inland 4 gram $140.00 New

6. Please list any mobile antennas - by brand only - that you have purchased within the past 12 months, and next to each indicate the approximate cost, and whether purchased new or used. If none purchased, please state none. If homebrewed, please indicate.
Plastics & Electronics Corp.

7. Approximately how many dollars have you spent during the past 12 months for electronic components of any sort? $ 1,700.00

8. How many of these dollars were spent for receiving tubes? None

9. How many of these dollars were spent for transmitting tubes? None

10. How many of these dollars were spent for semiconductors or ICs? Some

11. How many of these dollars were spent specifically for home-brew or experimenting? Do not include replacement parts in this figure. $150.00

12. Please check if you have a subscription to any of the listed magazines.
CQ ✓ 73 ____ Ham Radio ____ QST ____

13. Does your occupation cause you to select, specify or purchase any electronic components for use within the electronic industry? Yes ✓ No ____

Over—

The questionnaire mailed by CQ in May 1971 to 10,000 US licensed amateurs. Some 28% returned completed questionnaires.

MATH'S NOTES

BY IRWIN MATH,* WA2NDM

WHILE discussing the new growing breed of "appliance operators" at the offices of *CQ* magazine, the idea arose for a column that would perhaps, spark a return to the "good old days" when just about all hams were avid experimenters and rare indeed was the shack without some homebrew equipment. After discussing the topic for some time, the format and content for such a column slowly developed and, being an advocate of more home built or modified equipment, I volunteered to take the job.

Preliminary research indicated that the current slump in the electronics industry had made large quantities of semiconductors, integrated circuits, and other related components available to the radio amateur and experimenter. These components, unlike their surplus counterparts of the 1940's and 1950's are modern state-of-the-art devices only a couple of years old at the most. Their potentials have not been fully explored and the primary reason that they are available at all is because of the unfortunate financial position of many of the smaller electronic R & D companies.

The opportunity, therefore, of updating equipment to the best available today, building sub-miniature assemblies, and true experimentation is, more than ever before, completely possible and practical.

One of the primary aims of this column will, as a result, be to indicate, on a regular basis, just what is available, from whom, *for how much*, and what it is good for. Whenever possible, examples and circuits will be given. While we will tend to concentrate on the more complex devices such as modules, semiconductors, and integrated circuits, we will also indicate good buys on simpler items such as resistors, capacitors, etc., when they are too good to pass up.

As a result, we will be most anxious to hear from our readers (and dealers) about sources and uses of such industrial surplus materials and will use all appropriate material, giving credit where due, of course.

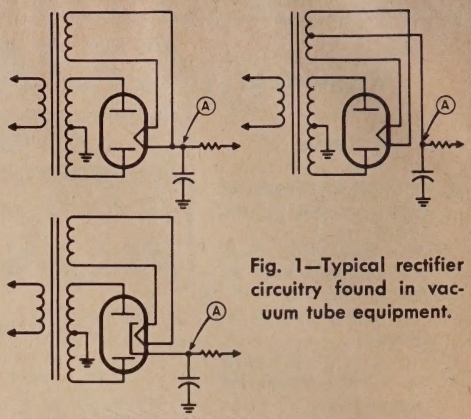


Fig. 1—Typical rectifier circuitry found in vacuum tube equipment.

We also plan to review brand new semiconductor devices that may be of particular interest to the amateur as we become aware of them. At times, we will devote a substantial portion of a column to a discussion of an especially interesting device that has particular merit to the amateur fraternity. While such discussions may at times become technical, at no time will explanations be beyond the scope of knowledge required for the Technician and General class license.

To start the ball rolling, we will take a look at silicon power rectifiers this month. These diodes, perfect replacements for 5U4's, 5Y3's, 5R4's, etc., generate very little heat of their own and, because they require no filament voltage, usually make available a 5 volt, 1-to-5-ampere winding on a power transformer for future solid state accessories not to mention the elimination of 5 to 25 watts of dissipated power in the vacuum tube. Figure 1 shows the "before" circuit and its variations common to almost all transformer operated vacuum tube equipment. Figure 2 shows the "after" circuit.

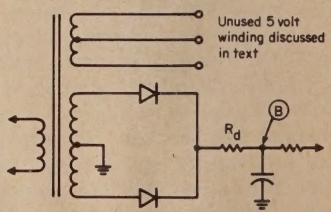
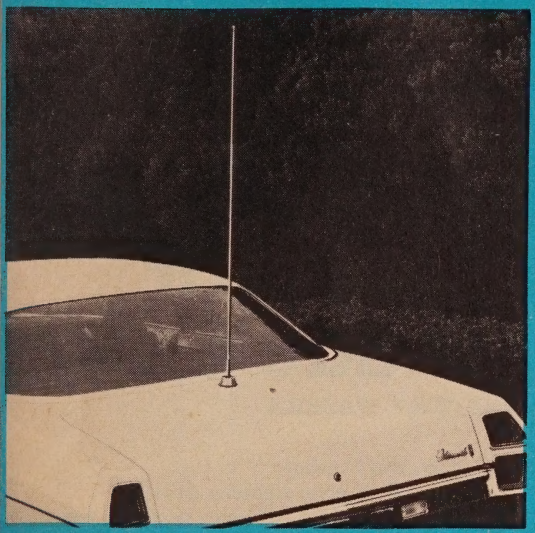


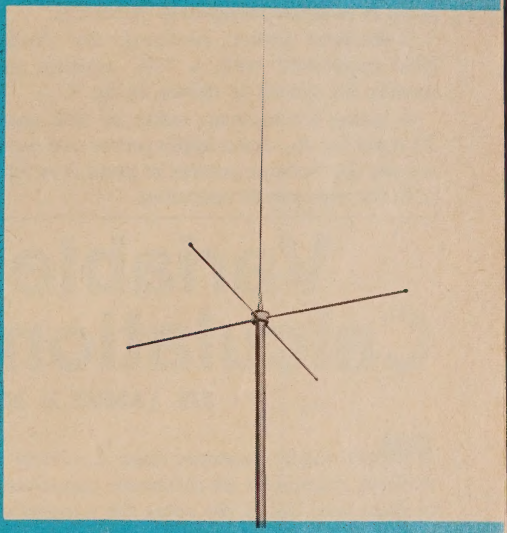
Fig. 2—Solid-state replacement rectifier circuitry discussed in text.

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The only considerations in this case are that the diodes used have a suitable current carrying capability and voltage breakdown specification. To switch from vacuum tube to silicon diode is simple and requires only a soldering iron and v.o.m.

The procedure is as follows:

1. Remove the equipment from its cabinet to expose the bottom of the rectifier tube socket. Be sure power is off.

2. Turn on the power and, after warmup, carefully measure the d.c. voltage present at point A with the equipment operating.

3. Remove power, discharge the electrolytic capacitors with a 10K resistor, and modify the circuit as shown in fig. 2.

4. Using a temporary value of 100 ohms, 20 watts for R_a, again apply power and measure the d.c. voltage present at point B in fig. 2 with the equipment operating.

5. If this voltage is higher than the value measured in the old circuit, increase the value of R_a until it is within 10% of the old value. If lower, decrease the value of R_a.

6. When the proper value of R_a is determined, measure the voltage across it. Using ohms law,
Power = (E across resistor)^2 x R (resistance in ohms) determine how much power is dissipated in R_a.

7. Select a resistor with the closest resistance to R_a possible and with a power rating of at least 1.5 to 2 times that previously calculated and permanently install it. Take the proper precaution for adequate ventilation if the resistor dissipates more than a couple of watts.

This modification will enable you to now have an unused 5 volt winding which can be

[*Continued on page 82*]

Variable Capacitor Calculations Made Easy

BY JAMES E. McALISTER,* WA5EKA

Most radio amateurs have a variety of variable capacitors of unknown capacitance in their junk boxes. By using the nomograph presented here, the maximum capacitance of many types of variables can be quickly determined.

The formula generally quoted for the capacitance of a variable capacitor is

$$C = 0.224 \times K \times A \times (N - 1)/d$$

where

d = plate spacing in inches
A = plate area in square inches
K = dielectric constant of the material between the plates
C = capacitance in picofarads.

This equation is graphically solved by the nomogram, provided that two requirements are met.

First, the plates must be semicircular in shape since. For simplicity, the chart has been designed for only this plate shape. Second, the material between the plates must be air ($K = 1$).

The variables used in the nomograph are D, d, N, and C, where

D = plate diameter in inches
d = width of air space between plates in inches
N = total number of plates
C = unknown capacitance in picofarads.

Example

In order to become familiar with the use of the chart, the capacitance of a 50 plate ($N = 50$) capacitor will be determined. Assume that each plate has a diameter (D) of 2 inches and a plate spacing (d) of 0.10 inches.

First, a line is drawn connecting 2 on the D scale with 0.10 on the d scale. Note that this line intersects the solid diagonal line. Through this intersection point, another line (orginating at 50 on the N scale) is drawn. The point where this second line crosses the C scale represents the capacitance value of the unknown capacitor. In this case C is equal to 173 pf.

If the two sets of plates of any given capacitor are not of the same diameter, the dia-

*216 North 10th St., West Helena, Ark. 72390.

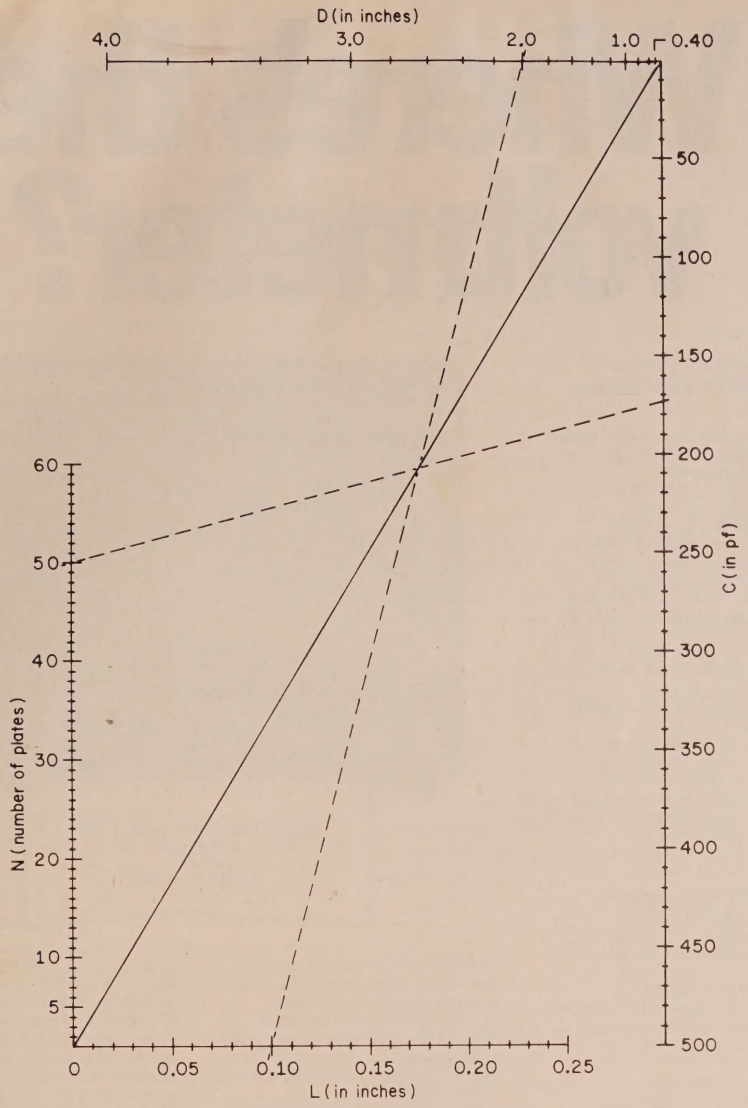


Fig. 1—Nomograph for computing the capacitance of air dielectric variable capacitors.

meter of the smaller set of plates should be used. A spark plug "feeler" gauge can be used to determine plate spacing.

Rolling Your Own

The nomogram can often be worked "backwards" to determine how many plates must be removed from a unit in order that it will have a smaller maximum capacitance value. In this instance, the first line (connecting *D* and *d*) should be drawn as usual. The second line, however, must be drawn from the *desired* value of capacitance to intersect the *N* scale. The corresponding value of *N* represents the number of plates that the new unit must have to give the required capacitance. The excess plates, therefore, must be removed. Be sure that all remaining plates have the original air spacing between them.

The chart presented here is not intended to give exact results. When used within its limitations, however, it will give experimenters a good set of approximate values to work with. ■

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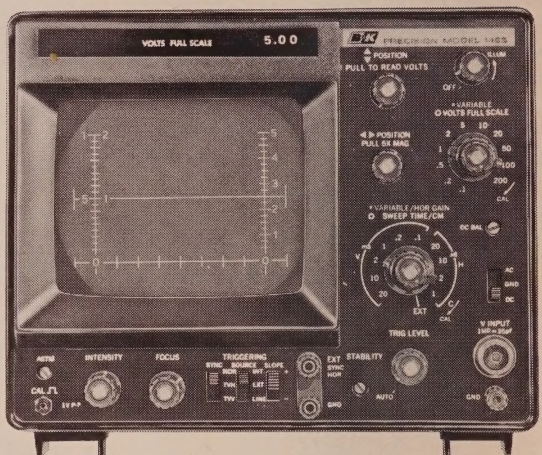
The CALI-BRAIN system increases your efficiency because it lets you measure its peak-to-peak voltage without changing your test set-up. Now you can confirm the manufacturer's service data exactly – checking out typical waveforms and peak-to-peak voltage readings at various test points.

Cali-Brain® in Action

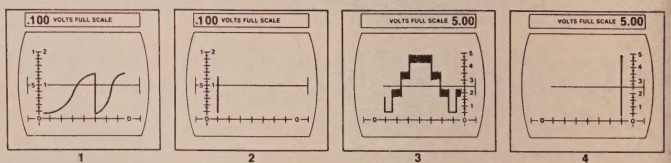
Use CALI-BRAIN when you want to measure peak-to-peak voltage of the waveform displayed on the scope screen. Here's what happens when the CALI-BRAIN switch is activated:

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C. A graduated scale on the graticule overlay is illuminated on either side of the scope screen. The scale corresponds to the full scale voltage indicator in the bezel.
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The entire CALI-BRAIN action is automatic – and takes less than a second. After you have read waveform voltage on the scale, you deactivate CALI-BRAIN system with a single switch, and the waveform is again displayed as before. One probe and one test instrument – lets you concentrate on trouble shooting, not the test equipment!



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To read peak-to-peak voltages utilizing Cali-Brain, note the full scale voltage reading in the bezel above the screen (fig. 1–.100 volts full scale) (fig. 3–5.00 volts full scale). Pull out the Cali-Brain knob and you will notice that the 1st waveform in fig. 2. reads .067 volts P-P and the second waveform in fig. 4. reads 4.95 volts P-P.

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CQ Reviews: The Robyn Digital 500 Transceiver

BY WILFRED M. SCHERER,* W2AEF

THE Robyn Digital 500 is an amateur-band s.s.b./c.w. transceiver which features an electronic counter that provides a visual frequency readout to within 100 Hz displayed by Nixie tubes.

Otherwise the unit is a conventional-type transceiver with such features as full coverage of the 3.5-28 mHz amateur bands in 500 kHz segments with the same tuning rate for each range; three auxiliary-range positions that may be wired for use in other portions of the 3.5-30 mHz range; 2.4 kHz s.s.b. filter with selection of either u.s.b. or l.s.b. on any band; optional c.w. filter available; incremental tuning; r.f. and a.f. gain controls; preselector tuning; choice of slow-, fast- or no a.g.c.; noise blanker; a.l.c.; p.t.t. or v.o.x. operation standard; switch-selected meter functions of a.l.c. level, plate current or relative r.f. output (receiver S-units are automatic); adjustable output loading; operation from 117 v.a.c. with external power supply (furnished) in speaker console. The p.e.p. input is rated at 500 watts. 400 watts input is specified for c.w. A different power supply also is available that functions from a source of 117 v.a.c. *or* 12 v.d.c.

Details

The Digital 500 is a hybrid affair employing both transistors and vacuum tubes as may be determined from the block diagram at fig. 1. Modular construction with individual circuit boards is employed for most sections.

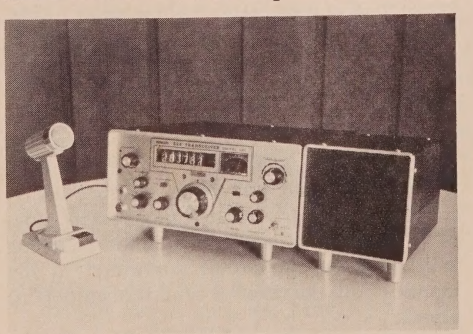
Single conversion is used in conjunction with a 9 mHz i.f. Except on the 3.5 mHz band, pre-mixing of the v.f.o. signal and that of a crystal-controlled oscillator is engaged for heterodyning at the receiver and transmitter mixers. This avoids additional mixing of the s.s.b. signal itself that would otherwise be required, thus enhancing the maintainance of a clean signal.

The r.f.-input stage is conventional and includes a parallel-tuned 9 mHz trap in series with the antenna input in order to minimize i.f. input-signal feedthrough. The i.f. rejection is excellent as indicated by measurements of 63, 50, 60, 70, 75 db on the 3.5, 7, 14, 21 and 28 mHz bands respectively.

The same tuned circuits for the preselector at the input and output of the r.f. amplifier are engaged for the transmitter driver input and output. Good *Q* at these circuits contributes to fine image rejection which was found to be at least 80 db on all bands.

One problem that did exist with spurious signals is that standard-broadcast stations between 660 and 1010 kHz that produce a signal of 1000 μv or more at the receiver location could be tuned in at the same specific points on all bands, even without the receiver's antenna connected! The situation appears to be related to mixing products with the 2nd harmonic of the v.f.o.

An unusual setup is the use of a 6AW8A for the receiver mixer the pentode section of which serves as the converter for heterodyning signals from the oscillator-pre-mixer section of the set. These local heterodyning-oscillator signals are injected at the converter cathode from the triode section of the tube which functions as an impedance-matching



The Robyn Digital-500 Transceiver.

* Technical Director, *CQ*.

amplifier for the signals from the premixer section. The two sections of the 6AW8A are cathode-coupled together using a common cathode resistor. The overall sensitivity with this setup was found to be 0.6 μv for 10 db S+N/N on 3.5 & 7 mHz and 0.35 μv on the other bands.

Oscillator coupling to the transmitter mixer is to the grid of the tube, a 6EJ7, to which the s.s.b. signal also is applied.

The v.f.o. operates over the range of 5.5-5.0 mHz and employs a single-gate FET in a split-Colpitts circuit with an FET source follower coupled to a bipolar transistor amplifier. On 3.5 mHz the v.f.o. signal is applied to the emitter of a transistor amplifier the collector of which is inductively coupled to the output. On the other bands, signals from a crystal-controlled transistor oscillator are applied to the base of the aforementioned transistor which now functions as a mixer in conjunction with the v.f.o. signal, thus premixing the oscillator signals as needed for heterodyning each band to the 9 mHz i.f. The crystal frequencies for operation on the 7, 14, 21 and 28 mHz bands respectively are 21.5, 28.5, 35.5, 42.5, 43.0, 43.5 and 44.0 mHz. The premixer output is the difference between the v.f.o. and crystal-oscillator frequencies.

Separate mechanical filters are used at the i.f. input for either u.s.b. or l.s.b. operation. The frequency of the b.f.o./carrier oscillator is placed midway between the bandpass of the two filters and thus does not have to be altered when sidebands are switched as neither does the frequency of the v.f.o. The filters are cut in or out for proper sideband selection by means of diode switches operated by a d.c. potential of the proper polarity selected by the mode switch. An unwanted-sideband suppression of at least 50 db is obtained at 1 kHz.

There are three i.f. stages for the receiver, one an FET, the others are bipolar transistors. The product detector is a four-diode ring type.

Unlike most transceivers, the transmitter i.f. amplifier is not common with one of the receiver i.f.'s, but instead is a separate entity using a single-gate FET which is capacitively-coupled to the transmitter mixer. The sideband filters, however, are common elements with their output circuit connected to the input of both the receiver- and transmitter-i.f. inputs.

The balanced modulator is an individual four-diode ring type followed by a single-gate FET amplifier ahead of the sideband filters. Carrier suppression was at least 50 db.

Amplified a.g.c. for the receiver is obtained from voltage-doubling diodes followed by a transistor d.c. amplifier. The a.f. output level held to within 7 db with a signal input level change of 8 db (at 1-10 μv) and to within 2 db with an 80 db r.f. input change at 10-100,000 μv. 3.5-9 μv were required (depending on the band) for an S-9 meter reading.

Transmitter

The constants for the Pi-network at the p.a., which employs 6KD6's, are well chosen for optimizing plate-impedance matching which along with other particular operating potentials results in somewhat lower distortion products than usually experienced with TV-sweep tubes, as evidenced by measurements of 3rd-order distortion 26 db below the peak amplitude of two equal-amplitude test tones of 1000 and 1700 Hz (at maximum p.e.p. level or at a.l.c. threshold).

An unusual feature for a transceiver is a blower for forced-air cooling of the p.a. tubes. The a.l.c. is a conventional setup.

Except on the 28 mHz ranges, the p.e.p. input was found to run between 450 and 550 watts with p.e.p. outputs of 200-300 watts depending on the band and on the particular portion of a band. This was due to lower drive at some frequencies, evidently caused by misalignment or inadequate tracking of the preselector/driver circuits. For the 28 mHz bands, the p.e.p. input varied between 125 and 300 watts with outputs of 60-145 watts. C.w. power levels were one-third less than those given for p.e.p.

The speech amplifier in the Model 500 was not able to handle a.f.-input levels higher than 10 m.v. without creating in-band distortion. Unfortunately, a hand-held microphone that was supplied with the unit provides output in excess of this limitation, besides which it has somewhat of a nasal quality. Operation with a standard lower-level and higher-quality mic, however, is more satisfactory.

C.W. and Incremental Tuning

For c.w. and tuneup a sidetone-oscillator signal is fed not only to the receiver a.f. system, but also to the transmitter a.f. input, causing the c.w. frequency to be higher than that of the s.s.b. signal and that of the receiver by an amount equal to that of the sidetone which is about 1 kHz.

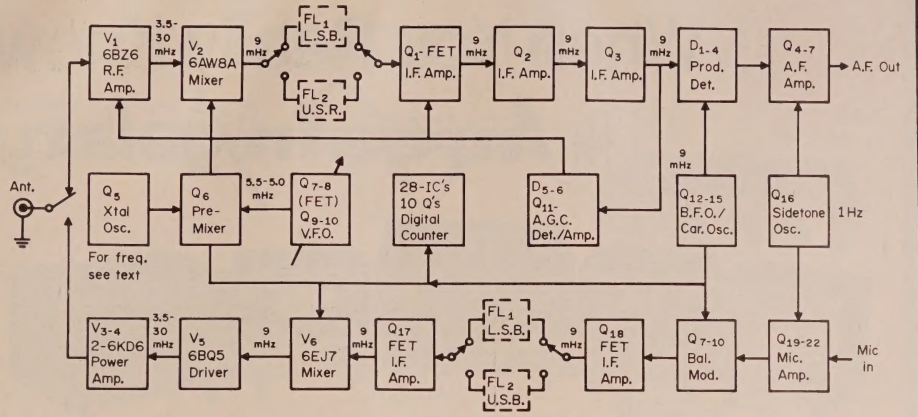


Fig. 1—Block diagram for the Digital-500. The two filters are common to both transmitter and receiver. V.o.x. setup is not indicated. Other details are given in text.

Block-grid keying is employed with manual operation using a toggle switch on the panel. There are no provisions for break-in operation with the v.o.x. system or otherwise.[1] Fine keying characteristics were experienced without key clicks.

Incremental tuning of the receiver, which is especially useful with c.w. operation, is handled by a Varicap diode at the v.f.o. that is cut in or out with a diode switch. The incremental-tuning control is engaged by depressing a panel button at which time an indicator lamp lights.

Frequency Counter

Probably one of the most interesting features of the Digital 500 is the frequency-counter setup, but unhappily the manual does not contain a complete schematic on it or give other technical data. About all we can garner is that it is a conventional type for which the outputs of all the transceiver's oscillators are obtained from oscillator-buffer amplifiers and mixed, the summation of which is the operating frequency.

The Nixie-tube readout may be obtained to 1 kHz, or by depressing a button another range may be engaged for a readout to 100 Hz. When the set is tuned outside of the normal range for each r.f. band, the readout goes way off; however, when this occurs, a lamp lights either side of the tuning knob, apprising the operator of the fact that the readout is not then correct.

When the 100 Hz readout range is used, the last digit indicates the 100 kHz increment by a plus-or-minus one-count which usually causes this digit to blink accordingly. Resetting the receiver tuning for a particular frequency, as indicated by the counter, may thus require a slight readjustment for exact coincidence with an s.s.b. signal. From a practical standpoint, however, this may not be too serious, as the signal still might be read. This situation would be the case with any counter-equipped receiver where the readout is limited only up to an accuracy of 100 Hz.

Noise Blanker

The noise blanker will not be described at this time, since the one provided in the transceiver we had for evaluation was not too effective. Late word from the supplier is that the Model 500's now being shipped incorporate an entirely new noise blanker purported to be highly effective. Other information is that the other shortcomings, as reported herein, have been corrected and v.o.x.-type c.w. break-in also is incorporated.

A still newer unit, the Model 500A, will supplant the Model 500 and will have the ad-

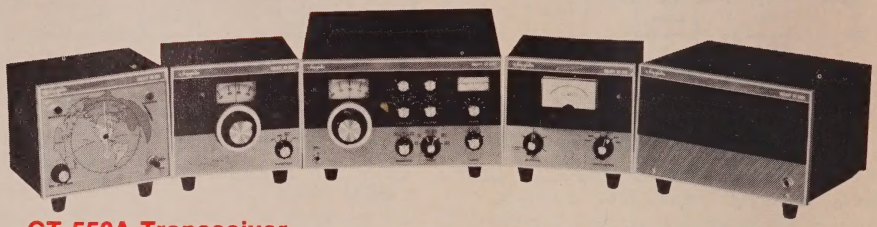
[*Continued on page 81*]

[1] With v.o.x. operation on s.s.b., an r.f. spike was evidenced at the initial attack during an r.f.-envelope display on an oscilloscope; however, this was not noticed by listeners during on-the-air operation.

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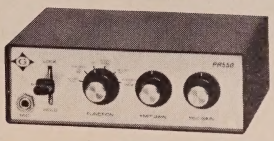
SC-550A Speaker Console

- Matching speaker with headphone jack for the transceiver, complete with cable
- AC-400 power supply mounts inside console

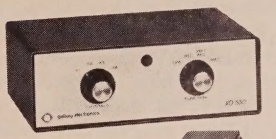
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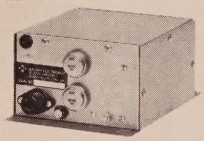
Crystal Controlled Adaptor XO-550
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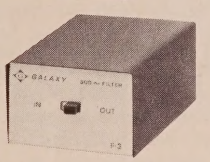
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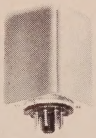
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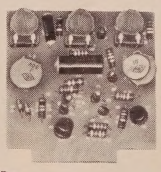


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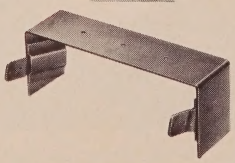


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DX

BY JOHN A. ATTAWAY,* K4IIF

THE *CQ* DX Award Honor Rolls are now one year old, and a clear pecking order has been established among leading operators.

At the beginning we predicted that the top slots would be a strictly Atlantic coast affair because of better propagation conditions into Europe, Africa, and the Middle East. This proved to be true for the two way s.s.b. race where W2TP, WA2RAU, and WA2IZS have been battling it out with DL9OH and TI2HP for the number one spot. However, the two way c.w. Honor Roll has been completely dominated by Californians W6ID and K6EC. This is a remarkable achievement by two fine operators who have to struggle with short openings to areas considered routine on the east coast. They richly deserve their title of world's top c.w. DXers.

De Extra

Guest commentary this month is Buckshot from the Twin City DX Association *Scattergun* —Don Tyrrell, WØMYK, of Minnetonka, Minnesota. Don has the following words of wisdom:

"Let's stop worrying about the 'Novice accent' and concentrate on the 'old timer's accent,' which is where the Novices get their bad habits in the first place.

"For example, the next time you hear someone calling 'CQ 20 meter phone,' ask him why he said the words '20 meter' and 'phone.' He won't be able to tell you. Maybe he thinks someone might answer him on 15, or perhaps he thinks you don't know where your receiver is tuned. Then again maybe he's afraid someone will answer him with c.w. on 14.3 and he won't be able to recognize his own call. The reason for these trite sayings is buried in antiquity, but we continue to use them from force of habit.

"And for another case, how about the so-called DXer who takes 3 or 4 minutes to tell a DX station he won't hold him because there are many stations calling. Why waste such time? The DX station darn well *knows* there is a pileup so just give your report and sign.

"A couple of other interesting cliches come to mind:

'Old Timerism'—CQ DX with the beam on the Pacific—

Comment—Does this mean the guy wouldn't accept a call from a 5X5 or FL8 off the back of the beam, or is he just impressing people with the fact he has a beam?

'Old Timerism'—We would appreciate a clear frequency for a phone patch, thank you gentlemen.

Comment—*Anyone* wants a clear frequency for *any* QSO.

"There are many such trite phrases making up the 'old timers accent.' Let's get with it and put meaning in our QSO's."

Activity from the Rare Zones

We have a number of reports from the more difficult zones this month. The letter in parentheses after the report indicates the location of the reporting station which is important to you if you wish to listen for the station reported. The meaning of the letters is as follows: E = east coast, M = central U.S., W = west coast, and Eu = Europe.

The WAZ Program

S.S.B. WAZ

952.....K4SKI	955.....WA9VIZ
953.....DL9VS	956.....KC6WS
954.....K6OJO	957.....K6GAK

C.W.—Phone WAZ

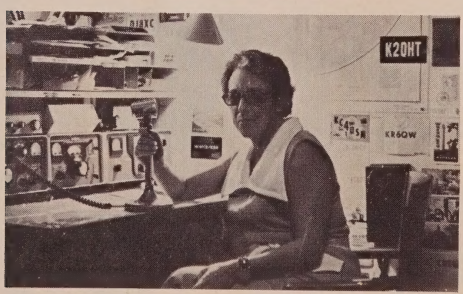
3301.....WØDBC	3306.....EA2IA
3302.....DJ8JY	3307.....EA8BK
3303.....DL6MI	3308.....WA4DRU
3304.....WAØKVL	3309.....DJ9IA
3305.....W4BRB	

Phone WAZ

469.....F3KE	470.....DJ8BQ

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.

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



Jacqueline, YS1JSL during her visit in Oct. 1971 to the shack of K2QHT. Her OM, YS1JL was camera-shy.

Zone 18: UA9VB, 14209 kHz at 0200Z (E); UAØOKS, 14010 at 0035 (E); UKØKAA, 14009 at 0130 (E), and 14032 at 0800 (E); UKØKAG, 7010 at 1535 (W); and UKØKTG, 7010 at 1540 (W).
Zone 19: UAØCBI, 3515 kHz at 1440Z (W); UAØFAA, 14030 at 0720 (Eu); UAØFAX, 7020 at 1510 (W); UKØFAA, 14210 at 0105 (W) and 21034 at 0025 (W); UKØKAI, 7007 at 1510 (W); UVØAB, 14005 at 0020 (E); UWØIE, 14220 at 0130 (W); UWØIQ, 14230 at 0040 (E); UWØJC, 14215 at 0200 (W); and UWØLO, 14010 at 0100 (E).
Zone 23: JT1AD, 14025 kHz at 1200Z (E); JT1AG, 14210 at 0200 (E); JT1AH, 14029 at 0030 (E); UAØYAE, 14007 at 0640 (Eu), 14039 at 0140 (W), and 14017 at 0210 (W); UAØYD, 14032 at 0740 (Eu); and UAØYT, 21023 at 0720 (Eu).
Zone 34: SU1IM, 14057 kHz at 1500Z (W), and 14050 at 1500 (E); and SU1MI, 14029 at 1540 (W).

Amateur Radio in Other Countries

This month we feature amateur radio in Bajo Nuevo. Information was provided by Prof. Jerzy Ostermond-Tor, ex-YM4XB.

The predominantly island Republic of Bajo Nuevo, located in the western Caribbean near 16° north, 79° west, is one of the smallest countries in the West Indies. With an area of about 24,000 square feet it is substantially smaller than the regions major powers such as Navassa or Serrana Bank. The capital lies in the coastal plain.

Bajo Nuevo is a Columbian protectorate, and for many years Columbia has handled its diplomatic affairs and consular representation abroad. The two countries share customs, postal, and amateur radio licensing systems. Columbian coinage is most generally used, but the dollar finds ready acceptance. As is the case for many West Indian countries, most visitors are tourists of a rather specialized sort. Elementary education is not compulsory.



Looking north to south one sees the entire panorama of Bajo Nuevo in this view of the HKØAB station location during the 1962 population explosion. (photo courtesy W4CKB)

The official, spoken language in Bajo Nuevo is Spanish, but visitors have reported a preponderance of English on occasion and it is reasonable to consider the inhabitants multilingual.

Tourists provide the greatest source of income in Bajo Nuevo as attempts to develop a viable agricultural economy have hitherto been unsuccessful. The fine, sandy soil is not suitable for most conventional crops and the level of the water table is quite uncertain, varying from drought to flood at irregular intervals. Fresh water is in short supply, and the only crop which has been successfully introduced are poles which normally grow to a height of 20-30 feet. After time intervals which may vary from 2 days to 2 weeks, these poles are exported to either the U.S. or South America by way of San Andres. Bajo Nuevo has little industry.

The CQ DX Award Program

C.W. DX

80.....K6LEB	83.....WA7JCB
81.....DK3FD	84.....WB6WAV
82.....G3DPX/W6	

S.S.B. DX

180.....W6REH	183.....WA6TAX
181.....G5CP	184.....W6DQX
182.....K8CMO	

CQ DX Endorsements

C.W.: K6LEB—300 and DK3FD—150.
S.S.B.: W9ILW—320, W6REH—310, W8ZOK—250, and K8CMO—200.

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 self-addressed, stamped envelope to the Award Manager, P.O. Box 1271, Covina, CA 91722 or to the DX Editor.



Here are some of the SV1SV gang at their club meeting in Athens, Greece. The club has about 200 members and meets each Wednesday at its new club house and shack near the center of Athens. Left to right are SV1DC (Vice President), SV1DU, SV1FH, SV1AG (President), K3AFO (behind SV1AG), SV1CC, SV1EC, and SV1EQ. (Photo courtesy K3AFO)

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. Effective after this listing the Phone WPX Honor Roll is being discontinued as the Phone WPX Award is no longer issued.

MIXED

W4OPM	Joe Hiller	1162
W8LY	Michael A. Bakos	894
ON4QX	Bob Berge	848
K1SHN	Chuck Banta	835
W8ROC	Frederick W. Riecks	831
VE3GCO	Garry V. Hammond	825
W3PVZ	Joseph Olnick	815
W9WHM	John R. Leary	811
G3DO	D. A. G. Edwards	810
DL1MD	Heribert Rechl	809
DJ7CX	Leonhard Poelt	808
W4IC	George Mack	803
WA6MWG	John Billon	779
W3GJY	John F. Wojtkiewicz	778
YU1AG	Djura Borosic	772
I6SF	Serafino Franchi	757
W4BQY	G. B. Fisher	756
W4CRW	Robert C. Sommer	753
WØAUB	Bill Bergmann	752
CT1LN	Paulo J. S. Coelho Verira	749
KØBLT	Frank Cahoy	733
K8UDJ	Charles L. Hutchinson	712
DL1MD	Heribert Rechl	702
WA5LOB	James Edwards	699
PY4AP	"Biu" Marra	685
W8GMK	John Marhefka	683
SM7TV	Boris Goransson	674
WA6EPQ	Larry Brockman	663
WAØCPX	Edward Gray	656
K2AAC	J. O. Archibald	652

SSB

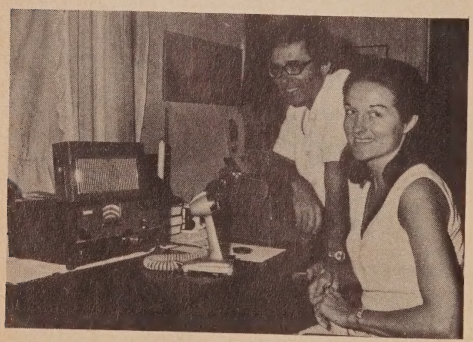
W4OPM	Joe Hiller	1050
W4NJF	Gay E. Milius	933
DL9OH	Karl Muller	813
HP1JC	Juan G. Chen	750
I8KDB	Giampaolo Nucciotti	743
W9DWQ	Edward A. Goodbout	741
K2POA	Arthur Johnson	733
WØYDB	W. C. "Bill" Higgins	721
G3DO	D. A. G. Edwards	719
IØAMU	Alfonso Porretta	715
W4IC	George A. Mack	702
K1SHN	Chuck Banta	697
W3DJZ	Arden B. Hopple	694
WA5LOB	James D. Edwards	692
F2MO	Michel Dort	686

CW

W4OPM	Joe Hiller	950
W8LY	Michael A. Bakos	891
W8KPL	William W. Simpson	853
W2AIW	Charles W. Rogers	813
DL1QT	Helmut Baumert	810
VK3AHQ	Henry Denver	809
W2HO	W. Vollkommer	802
ON4QX	Bob Berge	790
W9FD	W. W. Johler	740
WB2FMK	Robert J. Rasche	700
OK2DB	Jaroslav Dufka	693
DJ7CX	Leonhard Poelt	680
K1SHN	Chuck Banta	673
G2GM	F. D. Cawley	667
W4IC	George A. Mack	662
YU1AG	Djura Borosic	643
W8GMK	John Marhefka	628
K2AAC	J. O. Archibald	625
I6SF	Serafino Franchi	622
VO1AW	Clarence Mitchell	605
VE4OX	D. E. McVittie	600

PHONE

CT1PX	Manoel F. De Almeida	894
W9WHM	John R. Leary	813
G3DO	D. A. G. Edwards	794
PAØSNG	Gerrit Mulder	754
W3DJZ	Arden B. Hopple	728
CX2CN	Samuel C. Barreiro	720
CT1LN	Paulo J. S. Coelho Vieira	710
I1YRK	Gennaro Casaburi	650
I6SF	Serafino Franchi	635
OE2EGL	Eugene Goffriller	601



Bruce, W2GBX/SM7 and XYL Kris operating from Sweden. Bruce and Kris are ex-TA3GB and TA3KE respectively. They are now on Malta where Bruce is active as 9H3B. QSL to VE3MR.

Transportation is not a major problem for Bajo Nuevo, as all important points within the country are readily accessible.

Geographers and social scientists have long been puzzled by an apparently direct relationship between the total population of Bajo Nuevo and the number of amateur radio operators in residence. In cooperation with mathematicians at a large eastern university they are reported to be constructing a theoretical, socioeconomic model from which they hope to develop an equation to explain this phenomenon. The population of Bajo Nuevo at this exact moment in time is uncertain. However, because of established and predictable trends, university scientists forecast that it will vary by several hundred percent at least once during 1972.

Oh come now! This is the *first* time the DX Department has done a "special" for the April issue. We all need to relax a little don't we?

Most Wanted Countries

The last list we published of the countries in greatest demand for the *CQ* DX Awards had a European flavor as it was compiled by the German Amateur Radio Club (D.A.R.C.). To put a U.S. accent on things, the *CQ* DX Award's Advisory Committee was asked to prepare a list of the ten countries most needed on c.w. and the ten countries most needed on s.s.b.

All 14 non-staff members of the Committee responded during November and December, 1971. Some simply sent their own personal need list. Some consulted several members of their DX club. One, Gary Stillwell, W6NJU, polled 87 members of the Southern California DX Club who listed their most wanted countries without regard for mode. As Gary's list is so thorough it deserves to stand alone and will be presented separately.

In evaluating the returns from the Committee (omitting the W6NJU ballot), a country was given 10 points for each listing as the one most needed, 9 points for second choice, 8 for third, and so on to only 1 point for tenth place. Using this system, the rankings and points were as follows:

Most Needed on C.W.

1. FO8, Clipperton—50
2. 3Y, Bouvet—39
3. AC, Tibet—36
4. XU, Cambodia—35
5. YI, Iraq—31 (tie)
   8Z4, S.A./Iraq N.Z.—31 (tie)
7. 1S, Spratly—29
8. VP8, South Sandwich—27
9. AC5, Bhutan—24
10. VS9, Kamaran—19

Most Needed on S.S.B.

1. FO8, Clipperton—76
2. YI, Iraq—48
3. XU, Cambodia—45
4. 3Y, Bouvet—39
5. BY, China—36 (tie)
   VP8, South Sandwich—36 (tie)
7. AC4, Tibet—34
8. 1S, Spratly—29
9. 8Z4, S.A./Iraq N.Z.—26
10. HKØ, Malpelo—22 (tie)
    TN, Congo Republic—22 (tie)

Others scoring 10 or more points in the c.w. poll were: 1M, Minerva—17; AC3, Sikkim—14; TN, Congo Republic—13; SVØ, Rhodes—13; XZ, Burma—12; and 3W8, Viet Nam—11. The absence of BY, China from the c.w. poll is presumably the result of the DXpedition arranged by Don Miller a few years ago.

Other high scorers on s.s.b. were: XZ, Burma—18; VS9, Kamaran—18; AC5, Bhutan—17; and FB8, Crozet—17. The total vote on s.s.b. was divided between fewer countries than on the c.w. poll.

W6NJU's poll of 87 members of the Southern California DX Club came out like this:

1. YI, Iraq
2. 3Y, Bouvet

The WPX Program

S.S.B. WPX

660.....IT9JT 663.....WA5RXT
661.....JA1HBC 664.....WAØLYO
662.....WA9ZAK

C.W. WPX

1139.....VK3APN 1140.....OE1KU

Mixed WPX

316.....W3GJY 317.....W3YHR

Phone WPX

208.....CT1UA

WPNX

41.....WN4UKA

WPX Endorsements

S.S.B.: I8KDB—750, K1SHN—700, IT9JT—600, W4WSF—550, JA1HBC—350, K8BGZ—300, WA8TDY—300, JH1HWN—300, WA9ZAK—300, K1DRN—250, and WA5RXT—250.

C.W.: K1SHN—700, W4WSF—450, K2QBW—350, and WB8AAX—350.

Mixed: K1SHN—850, W4CRW—750, W3GJY—750, and WB4KZG—600.

Phone: CX2CN—750, WB2RLK—600, W4WSF—600, WA6TAX—550, and CT1UA—550.

80 Meters: W4CRW and OK1MP

40 Meters: OK1MP and VK3APN

15 Meters: OK1MP and W3YHR

10 Meters: OK1MP

Africa: OK1MP and IT9JT

Asia: IT9JT

Europe: W9KAA WB8AAX, SM4-3958, and IT9JT

North America: W4WSF

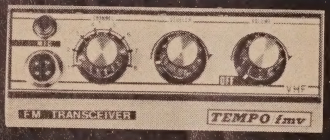
Oceania: IT9JT

Complete rules for WPX, WPNX, and VPX may be found on pgs. 66-67 of the June, 1970 issue. Application blanks and reprints of the rules may be obtained by sending a self-addressed, stamped envelope to Award Manager, P.O. Box 1271, Covina, CA 91722, or to the DX Editor.



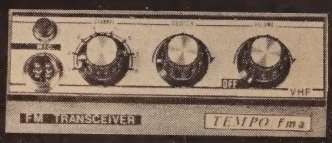
HB9AMY, the station of Lele Defilippis, was operated by this group during the JOTA Jamboree, Oct. 16 & 17, 1971 in the San Gottardo scout section. QSL to P.O. Box 768, Lugano 1, Switzerland.

the world's most complete line of advanced 2 meter fm equipment



TEMPO/fmv

A true value in 2 meter FM, the Tempo fmv is the father of the Tempo VHF line. This small package offers operation at 12 volts, or with the accessory power supply, at 110 volts, for 10 watts output. An unmatched design at any price, the fmv offers high quality and top performance at a reasonable cost.
The Tempo fmv . . . $249.00



TEMPO/fma

The Tempo fma is the top of the Tempo VHF line. This transceiver offers all of the famous Tempo quality and performance at 25 watts of power output. The unit also features a low power position for 10 watts output to conserve battery power. Here is a true value in VHF FM; high power operation at a reasonable price. The Tempo fma . . . $349.00

TEMPO



TEMPO/fmp

Truly mobile, the Tempo fmp-3 watt portable gives amateurs 3 watts, or a battery saving ½ watt, FM talk power anyplace at anytime. With a leather carrying case included, this little transceiver will operate in the field, in a car, or at home with an accessory AC power supply. The battery pack is of course included with every unit. This handsome, versatile little package is available only from Tempo. The Tempo fmp . . . $225.00



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Tempo also offers a full line of 2 meter FM amplifiers for mobile or base station operation. Output ranges from 25 to 130 watts for drive power of 1 to 25 watts. Blends state-of-the-art technology with Tempo reliability. Tempo 1002-3 10-25/120-130 VHF amplifier $220. Tempo 802 5-12/70-90 VHF amplifier $165. Tempo 252A 1/25 VHF amplifier $85. Plus six other amplifiers for use with all current FM transceivers.

Tempo amateur two meter FM equipment is available from select dealers throughout the United States. Or you can order direct. Call or write for specifications and terms.

Henry Radio

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931 N. Euclid, Anaheim, Calif. 92801 714/772-9200
Butler, Missouri 64730 816/679-3127

3. FO8, Clipperton
4. FO8, Maria Theresa
5. VS9, Kamaran
6. VP8, South Sandwich
7. 8Z4, S.A./Irak N.Z.
8. AC4, Tibet
9. AC5, Bhutan
10. XU, Cambodia

The absence of Maria Theresa from the Committee list was interesting. Many seemed to feel that this country no longer exists and will eventually be dropped. However, regardless of the list you prefer, it is obvious that any intrepid soul who succeeds in activating Clipperton, Bouvet, Iraq, Tibet, or Cambodia will find plenty of people willing to "exchange signal reports."

Pardon Our Goof

The gent pictured adjusting the GB3SX beam on page 62 of the Feb. issue is Alan Taylor, G3DME, Editor of *Quax*. We incorrectly identified him as Eric, G3TXF. Our apologies to this hard working 10 meter booster. For those unfamiliar with *Quax*, it is a special newsletter for 10 meter enthusiasts. A free sample copy with latest subscription rates can be obtained from Bob Hatter, K7RDH, or directly from G3DME.

QSL Information

A2CAB—Via W2RHK
BV1AA, BV2A, BVØAA and BV1USE—To JH1HWN
C21TL—c/o Box 32, Nauru Island, Pacific Ocean
CR7FR—Via W7VRO
CT2BC—To W4SYL
DJ6RX/W6—c/o DL1KS
DL4LG—Via WB9EAK
ET QSL Bureau—Telephone Amateur Radio
ET QSL Bureau—Telecome Amateur Radio Club, P.O. Box 1047, Addis Ababa, Ethiopia
ET3GK—To Box 472, MAAG, APO New York, N.Y. 09319
ET3USC—c/o WA4AGT
FB8XX—Via F2MO
FB8ZZ—To F8US
FYØKP—c/o DJ5AY
G5AWE—Via WB9EAK
GC3EML—To K9KLR
HKØBKX—c/o WA6AHF
IG9XGY—Via W2GHK
JT1AG—NOT via W3HNK. He no longer handles JT1 cards.
KB6DB—To K3RLY
KS4CJ—c/o KV4AM
MP4TDA—Via G3LQP
PJ4HT—To PJ2HT, Box 879, Curacao
PJ9BE—c/o W2CCE
PJ9JT—Via W1BIH
SVØWII & SVØWJJ—To WA1HAA
TR8DG—P.O. Box 2272, Libreville

[*Continued on page 84*]

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ADIRONDACK RADIO & TV SERVICE Lewis, N.Y. 12950, 873-2054

ADVANCED ELECTRONICS 804 Dupont St., Bellingham, Wash. 98225 734-3400

AMATEUR RADIO CENTER 2805 N.E. 2nd St., Miami, Florida 33137 374-4101

AMATEUR ELECTRONIC SUPPLY 4828 W. Fond du Lac, Milwaukee, Wis. 53216, 442-4200 • 17929 Euclid Ave., Cleveland, Ohio 44112, 486-7330

BRISTOL RADIO ELECTRIC 420 Hope Street, Bristol, Rhode Island 02809, 253-7105

STAN BURGHARDT 315 10th Ave. N.W., Watertown, S.D. 57201 886-3767

DOUGLAS ELECTRONICS 1118 S. Staples, Corpus Christi, Texas 78404 883-5103

ERICKSON COMMUNICATIONS 4657 N. Ravenswood, Chicago, Ill. 60640 334-3200

HARRISON Rt. 110 at Smith, Farmingdale, N.Y. 11735 293-7990 8 Barclay St., N.Y. City 227-7922

HAM RADIO OUTLET 999 Howard Ave., Burlingame, Ca. 94010 342-5757

HIRSCH SALES CO. 219 Calif. Dr., Williamsville, N.Y. 14221 632-1189

JRS DISTRIBUTORS 646 W. Market St., York, Penn. 17404 854-8624

ED JUGE ELECTRONICS, INC., 3850 S. Freeway, Fort Worth, Texas 76110 926-5221

KASS ELECTRONICS 2502 Township Line Rd., Drexel Hill, Penn. 19026 449-2300

LAND OF ELECTRONICS 400 S. Main, Lombard, Ill. 60148, 495-1234

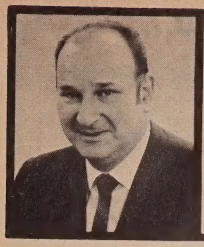
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PORTLAND RADIO SUPPLY 1234 S.W. Stark St., Portland, Or. 97205 228-8647

RADIO COMMUNICATION CO. 10,000 Alkire St., Arvada, Colo. 80002, 466-3000

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WORLD RADIO LABS 3415 W. Broadway, Council Bluffs, Iowa 51501 328-1851



Propagation

BY GEORGE JACOBS,* W3ASK

DURING April, 20 meters is expected to be the optimum band for DX propagation conditions during most of the daylight hours, and into the early evening hours as well. Some fairly good 15 meter openings are also forecast, especially during the late afternoon hours, but conditions on this band are expected to be considerably below those observed during the winter months. Very few good 10 meter DX openings are expected during April, but some may occur during the daylight hours on paths to South America and other southerly regions.

After sunset it should be a toss-up between 20 and 40 meters for the title of optimum DX band, with fairly good conditions predicted for both bands. During many nights, 20 meters is expected to remain open, especially to areas in a southerly direction. For openings to the east and to the west, 40 meters is likely to have the edge. Some fairly good 80 meter DX openings should also be possible during the hours of darkness and the sunrise period, and there is also a chance for an occasional DX opening on 160 meters during this same time period.

Ionospheric absorption continues to increase in the northern hemisphere during April, as the sun rises higher in the northern sky. This should result in somewhat *weaker* DX signal levels during daytime openings on all bands. Static levels are also expected to increase during April, as thunderstorms become more numerous. This should result in somewhat higher noise levels, especially on 40, 80 and 160 meters.

DX propagation forecasts for each amateur band between 10 and 160 meters for the period April 15 through June 15, 1972 appear in the *DX Charts* on the following pages. For predictions of short-skip openings between distances of 50 and 2400 miles, refer to the *Short-Skip Charts*, which appeared in last month's column.

V.H.F. Ionospheric Openings

Fairly good v.h.f. ionospheric openings are expected during April, with seasonal increases in sporadic-E propagation, a seasonal improvement in trans-equatorial scatter propagation, and the expectation of a major meteor shower.

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

LAST MINUTE FORECAST

April, 1972

Days	Rating & Forecast Quality (4)	(3)	(2)	(1)
Above Normal: 10, 18, 20, 23-24, 26	A	A	B	C
Normal: 1, 3-5, 9, 11, 14-15, 17, 19, 21-22, 25, 27, 30	A	B	C	D
Below Normal: 2, 6-8, 12, 16, 28-29	C	D	D	E
Disturbed: 13	D	D	E	E

How To Use These Charts

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

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

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

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

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

4—This month's DX Propogation Charts are based upon a transmitter power of 250 watts c.w.; 1 kw p.e.p. s.s.b., or 1000 watts d.s.b., into a dipole antenna a quarter-wave above ground on 160 and 80 meters a half-wave above ground on 40 and 20 meters, and a wave-length above ground on 15 and 10 meters. For each 10 db gain above these reference levels, reception quality shown in the "Last Minute Forecast" will improve by one level; for each 10 db loss, reception will become poorer by one level.

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

6—The Eastern USA Chart can be used in the 1, 2, 3, 4, 8, KP4, KG4 and KV4 amateur call areas; The Central USA Chart in the 5, 9, and 0 areas, and the Western USA Chart in the 6 and 7 areas. The charts are valid from April 15, 1972, through June 15, 1972 and are prepared from basic propagation data published monthly by the Institute For Telecommunication Sciences of the U.S. Dept. of Commerce, Boulder, Colorado.

Sporadic-E propagation generally begins to increase during April, and continues to do so through the spring and summer months. This is expected to result in a noticeable increase in the number of short-skip openings on the 10 and 6 meter bands, between distances of approximately 750 and 1300 miles, and occasionally up to 2400 miles. During periods of intense sporadic-E ionization, openings on 2 meters may also be possible over distances between approximately 1200 to 1400 miles. While sporadic-E

propagation may occur at any time of the day or night, there is a tendency for it to peak between 8 A.M. and Noon and again between 5 and 8 P.M., local standard time.

A seasonal increase in trans-equatorial (TE) openings is also expected during April. TE openings are most likely to occur between 8 and 11 P.M. local time, on long north-south paths which

[*Continued on page 86*]

April 15-June 15, 1972

Time Zone: EST (24-Hour Time)

EASTERN USA TO:

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

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

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

CENTRAL USA TO:

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

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

Time Zone: PST (24-Hour Time)

WESTERN USA TO:

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

The President has asked us not to raise prices...



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Contest Calendar

BY FRANK ANZALONE,* W1WY

Calendar of Events

Mar.	**25-26**	**CQ WW WPX SSB Contest**
Mar.	25-26	Rocky Mountain QSO Party
Mar.	25-27	BARTG Spring RTTY Contest
Mr.	25-Ap. 2	IARC Propagation Phone
Apr.	1-2	SP DX C.W. Contest
Apr.	1-2	Florida QSO Party
Apr.	8-9	Novice QSO Party
Apr.	7-10	SSB County Hunters Contest
Apr.	15-16	Helvetia 22 Contest
Apr.	22-23	Bermuda Phone Contest
Apr.	29-30	PACC DX Contest
Apr.	29-30	WAE RTTY Contest
Apr.	29-30	New York State QSO Party
May	6-7	Bermuda C.W. Contest
May	13-14	USSR C.W. Contest
May	13-15	Georgia QSO Party
May	20-21	YL ISSBers C.W. Contest
May	27-29	YL ISSBers Phone Contest
June	2-5	CHC/FHC/HTH QSO Party
Aug.	5-6	European C.W. DX Contest
Sept.	9-10	European Phone DX Contest
Oct.	**28-29**	**CQ WW DX Phone Contest**
Nov.	**25-26**	**CQ WW DX C.W. Contest**

CQ World Wide WPX SSB Contest

Starts: 0000 GMT Saturday, March 25
Ends: 2400 GMT Sunday, March 26

Complete rules in last month's issue. Same as in previous years, no changes.

Mailing deadline for logs May 1st to: CQ WPX SSB Contest, 14 Vanderventer Ave., Port Washington, L.I., N.Y. 11050.

Rocky Mountain QSO Party

Three Periods (GMT)
2200 March 25 to 0100 March 26
0200 to 0600 and 1800 to 2200 March 26

Complete rules in last month's CALENDAR.

Mailing deadline May 1st to: Bill Wagemann, K5MAT, 35 San Juan, Los Alamos, N.M. 87544.

B.A.R.T.G. Spring RTTY Contest

Starts: 0200 GMT Saturday, March 25
Ends: 0200 GMT Monday, March 27

Complete rules in last month's CALENDAR.

Logs must be received by May 31st and go to: Ted Double, G8CDW, 89 Linden Gardens, Enfield, Middlesex, England.

IARC Propagation Phone

0001 GMT March 25 to 2400 GMT April 2

Completely covered in February's CALENDAR.

Logs go to: L. M. Rundlett, 2001 Eye Street, N.W., Washington, D.C. 20006.

SP DX C.W. Contest

Starts: 1500 GMT Saturday, April 1
Ends: 2400 GMT Sunday, April 2

It's the world working the SP's in as many Polish powiats on all bands 3.5-28 mHz.

There are three categories; single operator, single and all band; multi-operator, all band only; and s.w.l.

Exchange: RST report plus a 3 figure QSO number starting with 001 for foreign stations. Polish stations send RST plus their powiat letters. (*ie:* 579 WA and etc.)

Scoring: Each QSO with a SP/SQ/3Z station counts 3 points. Score a multiplier of 1 for each different powiat worked.

Final Score: QSO points multiplied by sum of different powiats. The same station may be worked on each band for QSO points, but a powiat may be counted only *once* as a multiplier.

Awards: Certificates to the top scorers in each category, in each country, with 2nd and 3rd place awards where returns justify.

Contest contacts may be credited for the PZK 100 Powiat award in lieu of QSL cards, provided they are verified in the logs of the SP stations. Make your application with your contest log, include a fee of 7 IRCs.

Use a separate sheet for each band and include a summary sheet with all the scoring information and a signed declaration. The usual disqualification rules will be observed, including excessive duplicate contacts.

Mailing deadline is May 1st to: PZK Contest Committee, P.O. Box 320, Warszawa 1, Poland.

Florida QSO Party

Three Periods: (GMT)
1500 to 2000 Saturday, April 1
0000 to 0500 Sunday, April 2
1400 to 2359 Sunday, April 2

Florida Skip, the amateur radio publication announces its 8th annual QSO party.

*14 Sherwood Road, Stamford, Conn. 06905

Phone and c.w. are separate contests. The same station may be worked on each band for QSO points. Florida stations may work in-state stations *only* for QSO points.

Exchange: RS/RST and county for Florida; RS/RST, state, province or country for others.

Scoring: 1 point per QSO. Fla. stations use states (49), provinces (12) and DX countries (11) for their multiplier. (max. mult. of 72. No more than 11 DX countries may be used.) Out-of-state stations use Fla. counties for their multiplier. (max. of 67).

Frequencies: C.W.—1807, 3572, 7072, 14072, 21072, 28072. Phone: 1817, 3972, 7272, 14317, 21372, 28572.

Awards: Certificates both phone and c.w. to the top scorer in each state, province and DX country, and in each Florida county, single and multi-operator. There are also 5 Trophies as follows: Top single operator station on c.w. and phone in Florida, and out of state, and high club aggregate entry.

A summary sheet is requested with your log showing the scoring and other pertinent information, and a signed declaration that all rules and regulations have been observed.

Mailing deadline is April 30th to: **Florida Skip** Contest Committee, P.O. Box 501, Miami Springs, FL 33166. Include an 8¢ stamp for issue with the results.

Novice QSO Party

Starts: 0001 GMT Saturday, April 8
Ends: 2400 GMT Sunday, April 9

The International Novice CHC Chapter #11 is again sponsoring this one. Novices may work anyone but only Novice stations may be worked by others. The same station may be worked on each Novice band for QSO points. Call "CQ NV" to identify your interest.

Exchange: QSO no., RST, county and state. DX stations give their city.

Scoring: One point per QSO. Multiply total QSOs by sum of states, DX countries and continents worked for your final score.

Frequencies: 3710, 7160 and 21140. (plus or minus 10 kHz).

Awards: Certificates to the highest scoring station, both Novice and non-Novice, in each state, DX country and continent. There are also separate categories for Novice, higher classes, B/P, s.w.l. and mobile stations.

Mailing deadline May 30th to: International Novice CHC Chapter #11, c/o T. A. Winkel, WB9AHJ, 607 East Street, Madison, IN 47250

SSB County Hunter's Contest

Starts: 2200 GMT Friday, April 7
Ends: 0500 GMT Monday, April 10

The Mobile Amateur Radio Awards Club is sponsoring this one. The objective being to activate as many U.S. counties as possible during the test.

CARTG 1971 RTTY Results

U.S.A. Single Operator

W3KV	**1,188,996**	WØHAH	189,400
W4YG	**966,652**	K7BVT	185,544
WA2YVK	**790,436**	W6JOX	168,760
WA3KEG	785,390	WØMT	123,150
VE2L0/W6	**707,534**	WA5LJZ	100,875
K7MNZ	**577,890**	W7RGL	73,365
W4EGY	493,755	K6RTV	68,890
W7TZL	490,248	W6AEE	53,200
WAØTLT	**443,478**	K8KAG	28,880
W1KJL	**393,315**	WA7CIP	19,220
W8CQ	**365,112**	K1SGU	16,760
K6YUI	319,044	K2RYI	16,546
WB6IMP	313,306	WAØCWH	11,604
W3CIX	274,488	WA6WGL	7,148
W9YGN	**267,060**	W9WYL	2,148
K5ARH	**249,622**	W7GNP	1,730
WB6RXM	237,842	W8TCO	122
W1GKJ	208,796		

I1KG with 1,595,370 was world high.
W3KV was 2nd world high.

Multi-operator

VE2LO/W6	709,370
WB6SCH	323,205
W5CEG	116,460

Exchange: QSO no., RS, county and state. (country for DX) Mixed mode permitted.

Scoring: Each completed contact with a fixed station, 1 point; with a mobile, 2 points. A station may be worked only once per band in each county, but can be worked again if location is changed to another county.

Your multiplier is number of different U.S. counties plus DX countries worked (DXCC list).

Note: Contacts with mobiles on a county line count as 2 multipliers credits, but only one contact credit.

Final Score: Total QSO points × (counties + DX countries).

Frequencies: 3925-3975, 7250-7275, 14275-14300, 21350-21375, 28575-28600. No credit will be given for QSOs on net frequencies, 14336, 14340, 3943.

Stations making over 200 QSOs and/or 100 multipliers are required to submit a check list. List counties by states, countries by prefixes.

Awards: Plaques to the top scoring fixed, mobile and DX station. Certificates to the three top fixed and mobiles in each U.S. call area, and fixed in each VE call area and DX country. Multi-op and other certificates as merited. (Results will appear in *CQ*).

Mailing deadline May 1st to: Richard C. Roth, K1OME, 56 Harrington St., Watertown, Mass. 02172.

Helvetia XXII Contest

Starts: 1500 GMT Saturday, April 15
Ends: 1700 GMT Sunday, April 16

The HB boys make every effort to activate all 22 Cantons so this offers an excellent opportunity

WAEDC 1971 C.W. Results

U.S.A. Single Operator

W1BPW	**269,850**	WB4OGW	9,399
W1PL	**151,875**	W4JUK	4,988
K1CPF	67,864	K4CAX	4,116
WB2KTO	**69,706**	W4WSF	3,080
WA2HLH/2	36,456	WB4JYB	2,080
K2MFY	34,410	W4KMS	1,080
W2MYK	28,917	**W5WMU/5**	**113,472**
W2NEP	18,700	WB5BHN	880
W2CP	6,265	**W6MAR**	**20,250**
W2CKR	2,565	W6DQX	10,830
W2CYW	980	W6UA	9,960
W3AU	**252,704**	K6CNV	1,460
WA3HRV	**248,345**	WA6BKR	1,080
W3GM	**207,706**	W6KPJ	308
K3YUA	13,572	W6KYA	264
W3MDO	11,826	W6RQZ	45
W3AXW	8,694	**W7NQ**	**2,340**
K3RDT	2,820	W7RT	1,575
W3TV	1,818	**WA8VBY**	**112,784**
W3ARK	752	WA8TBQ	43,200
WA3QBF	72	W8DSO	4,992
K4SHB	**143,880**	W8CL	1
W4HOS	51,528	**WA9YIJ/9**	**7,524**
K4BAI/4	32,616	W9HE	4,250
K4LDR	28,582	**WAØKDI**	**21,456**

U.S.A. Multi-Operator

WB2SQN	**143,510**	**WB8EUN**	**50,160**

Top Single Operator

European		Non European	
DJ8SW	302,260	W1BPW	269,850

Top Multi-Operator

YU1AFQ	258,269	UK9ABA	382,956

to work some of the rare cantons for the attractive H 22 Certificate.

Contacts may be made on all bands 1.8 thru 28 mHz. The same station may be worked on each band and mode for QSO and multiplier credit.

Exchange: The RS/RST report plus a progressive contact number starting with 001. Swiss sation will also include their Canton. (*ie:* 579001/ZH).

The 22 Cantons are: AG, AR, BE, BS, FR, GE, GL, GR, LU, NE, NW, SG, SH, SO, SZ, TG, TI, UR, VD, VS, ZG, ZH.

Scoring: Each contact counts 3 points. The multiplier is the sum of cantons worked on each band, a possible 22 on each band.

Final score: Total QSO points multiplied by the sum of Cantons from all bands.

Awards: Certificates to the top scorers in each country. *(VE and W/K call areas)*

Logs: Indicate a Canton the first time it is worked, check your log for duplicates and include a summary sheet showing the scoring and other information. Your name and address in BLOCK LETTERS and the usual signed declaration is also requested.

Mail your log within 30 days to: Al F. Egli, HB9AAA, USKA Traffic Traffic Mgr., Box 17, 2500 Bienne 4, Switzerland.

Bermuda Contest

Phone: April 22-23 C.W.: May 6-7
Starts: 0001 GMT Saturday
Ends: 0200 GMT Sunday

Trying to establish a permanent spot in an already overcrowded calendar of events, the BARS has moved its popular activity to a month earlier. And the United Kingdom is now a permanent part of this competition.

The W/Ks and VEs may work the U.K. and VP9s only. U.K. stations may work W/K, VE and VP9s. Phone and c.w. are separate contests with separate awards, and participation is for single operator only.

Exchange: RS/RST report plus QTH. State for W/K, province for VE, county for the U.K. and Parish for the VP9s.

Scoring: Each completed QSO counts 3 points. The multiplier is determined by the number of Bermuda Parishes worked on each band. (A max. of 9 per band, 3.5 thru 28 mHz).

Awards: A Trophy will be presented to the winner in each section of the contest, in N.A. and the U.K. Certificates signed by His Excellency, The Governor of Bermuda, will be awarded to the highest scoring station in each call area of the U.S. and Canada, and each U.K. country. (G, GC, GD, GI, GM, GW).

The Trophies will be presented to the winners at the Radio Society of Bermuda's Annual Banquet to be held October 19th in Bermuda. Transportation and accommodations for a week's stay at one of Bermuda's leading hotels will be provided by the Society.

Trophy winners are ineligible for the same award for a period of two years.

Contestants are expected to compute their own score, check logs for duplicates and sign a declaration that all rules and regulations have been observed.

Parish abbreviations: DEV, HAM, PAG, PEM, SAN, SMI, SOU, STG, WAR.

Logs go to: The Radio Society of Bermuda, P.O. Box 275, Hamilton, Bermuda. And must be received no later than June 30th, 1972.

Trophy winners in the 1971 contest were G3LNS and VE3KZ on phone, and G3HCT and K2BK on c.w.

PACC DX Contest

Starts: 1200 GMT Saturday, April 29
Ends: 1800 GMT Sunday, April 30

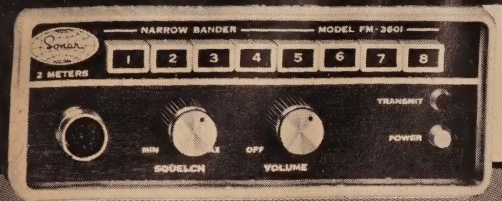
Once again it's the world working the PA's on 1.8 thru 28 mHz both c.w. and phone. (c.w. only on 1.8) Separate logs for each mode.

Exchange: RS(T) plus a progressive QSO number starting with 001. PA/PE/PI stations include their province. (579001/GR).

There are 11 provinces: DR, FR, GD, GR, LB, NB, NH, OV, UT, ZH, ZL.

FOR THE PROFESSIONAL AMATEUR

SONAR (2 meters)
TRANSMITTER RECEIVERS (from 144 to 148 MHz)
COMPLETE FLEXIBILITY FOR FOR MOBILE — BASE — HAND HELD



model FM3601 10 watts

- 8 Channels with Instant Push Button switching
- Solid State—using the finest quality silicon transistors
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$299.95

Complete with microphone, mobile mounting tray and 2 pair of crystals, (146.94T/146.94R and 146.34T/146.94R)
Model PS-2923 AC Regulation Power Supply . . . $39.95



MODEL 2307 VHF–M TRANSCEIVER
3 CHANNELS
HAND HELD PORTABLE
1.6 W OUTPUT MINIMUM

- Provides immediate voice contact with Base Stations, Mobile Units and other portable transceivers • Compatible with ALL 2-way communications systems • Snap-in Nicad Battery Pack cartridge • Receiver and transmitter can be operated on independent frequencies • Electronic mode switching/no relays • Receiver and transmitter sections are individual modules for easy servicing • Sensitive adjustable squelch

$450 complete with collapsible antenna and shoulder strap
Less crystals & battery cartridge*

Sonar Radio Corporation 73 Wortman Avenue, Brooklyn, N.Y. 11207

Scoring: Each completed QSO counts 3 points. The same station may be worked on each band for QSO and multiplier credit.

Final score: Total QSO points multiplied by the sum of provinces from all bands. (max. of 88).

Awards: Certificates to top scorers in each country and each call area in W/K, VE/VO, CE, JA, PY, VK, ZL, ZS. Also s.w.l. awards.

Logs: Date/time in GMT, station worked, serial number sent/received, multiplier column for each band and QSO points. (indicate multiplier only first time worked).

Include a summary sheet showing the scoring and other information, and your name and address in BLOCK LETTERS. Include a signed declaration that all rules and regulations have been observed.

Contest contacts may be credited for the PACC 100 Award in lieu of QSL cards, provided the log of the station worked is also received. Send application with 5 IRC to VERON Traffic Bureau, P.O. Box 9, Amsterdam.

Mailing deadline is June 1st to: Mr. L.v.d. Nadort, PAØLOU, Contest Mgr., Bospolderstraat 15, Nieuwerkerk, a/d Ysel, The Netherlands.

WAE RTTY Contest

Starts: 0000 GMT Saturday, April 29
Ends: 2400 GMT Sunday, April 30

This is the 4th annual RTTY contest sponsored by the DARC. Only 36 hours out of the 48 hour contestperiod are permitted for single operator stations. The 12 hours of non-operating may be taken in one but not more than 3 periods anytime in the contest.

Both single and multi-operator stations permitted on all bands, 3.5 thru 28 mHz.

Exchange: QSO no. and RST report.

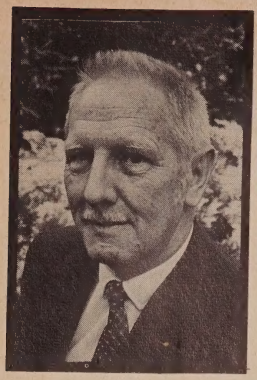
Points: Contacts within one's own continent 1 point, other continents 3 points. However, non-Europeans get 5 points for each EU contact. Like other WAE contests the QTC feature is also used. Each QTC exchange is worth 1 point. (See July 1971 CALENDAR for details and European country list.)

Multiplier: Is determined by number of countries worked on each band. The WAE and ARRL lists are the standard. In addition the Europeans will use call areas in following countries as a multiplier. JA, PY, VE/VO, VK, W/K, ZL, ZS, UA9, UAØ.

Final Score: Total QSO points, plus QTC points multiplied by sum total countries from all bands.

Awards: Will be made to stations use less than 200 watts, and over 200 watts, in each country and call areas shown above. S.w.l. and continental leaders will be also honored.

[*Continued on page 86*]



THE awards PROGRAM



BY ED HOPPER,* W2GT

Special Honor Roll
All Counties
#70—Garry Medford, W2EQK, 12-10-71.

THE April, "Story of The Month" is:

Frank Gerratana, WA1CXE
(All Counties #68, 12-2-71)

Frank's early memory of radio was reading a Tom Swift book about it (Yes, I remember him) but no special interest was aroused until the late 1940s when his company had a two way radio installed in his car. That started him thinking about becoming an amateur, but it was 1963 before a Novice license was acquired, and an Advance license is now in his possession.

The first rig was an Eico 730 transmitter and an HQ-170 receiver. A General license was obtained and Frank graduated to an NCX-5. The present equipment includes the Collins "S" Line, Mosley Classic tribander antenna, a Swan 500C mobile and a 2 meter f.m. rig.

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



Well equipped shack of WA1CXE.

In the begining DX was chased with much enthusiam, but shortly, after making DXCC, Frank checked into the Independent County Hunters Net and became hooked on County Hunting, and forgot about DX.

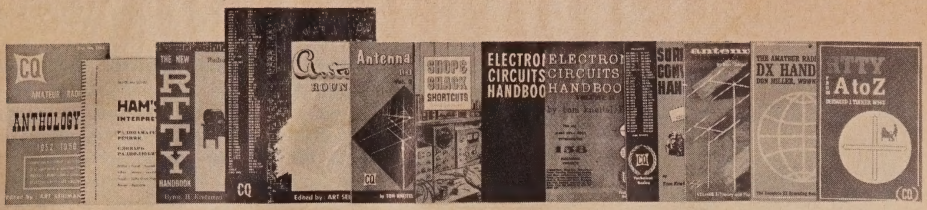
Other interests are flying (he is a licensed pilot), stamp collecting and photography.

Yes, Frank's vocation and avocation (among other things) is photography. He became a photographer by a most unusual route. In 1942 he was involved in his family's dressmanufacturing business and his hobby was stamp collecting. A friend suggested that he photograph his valuable collection. An inexpensive camera was obtained and Frank started taking pictures. Soon he was more interested in photography and sold the stamps and used the money to study photography at the Clarence White School in New York.

Frank started sending entries to his hometown paper for a national snapshot contest. His fine fotos were consistently winning prizes. When the paper advertised for a staff darkroom man, Frank applied.



Mr. Joseph Schwartz, K2VGV, President of the new York Chapter of the National Awards Hunters Club was presented with a plaque as Amateur of the Year. He was re-elected as President for the fifth term. Left to right: K2VGV accepts plaque from Daniel Patterson, WB2PBQ, Secretary/Treasurer.



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

CQ Binders

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

The New RTTY Handbook

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

Antenna Roundup II

Ten big theory articles backed up by 82 detailed and illustrated construction projects from VLF to microwave, long wires to 17 element beams and Sterba Curtain arrays. $4.00

Shop & Shack Shortcuts

A volume packed with hundreds of hints & shortcuts collected by Don Stoner, this will help anyone to dress up his shack, improve shop techniques and increase efficiency and equipment. $3.95

CQ Anthology II

1952-1959 250 pages of more recent but still hard-to-get important articles from glorious yesteryear. $3.00

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RTTY From A To Z

This new RTTY Classic has been produced to fill the gaps in RTTY knowledge among amateurs and professionals alike. 16 chapters and 224 pages. This book is a must in your technical library. $5.00

103 - Simple Transistor Projects

The aim of this book is to familiarize the beginner and advanced experimenter with the handy source of reference circuits. $3.45

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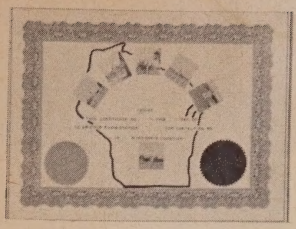
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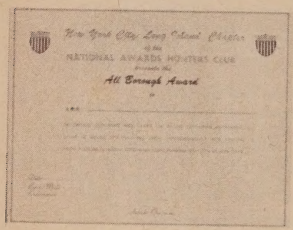


K9DCJ Wisconsin Award.

Frank enjoyed newspaper photography and has been active in the field ever since, eventually becoming chief photographer for the *Connecticut Sunday Herald.*

He has photographed every President since Roosevelt and been on campaign tours with Truman, Stevenson and Eisenhower. Among the many major stories he covered were the tragic Hartford circus fire and the keel-laying ceremonies for the first atomic submarine.

To keep fresh and gain new ideas and techniques, Frank continued to study photography, with Alexey Brodovitch, advertising photographer Roy Pinney, photojournalist Ray Shorr,



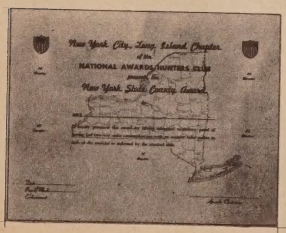
Worked All Boroughs (N.Y.) Award.

and at the Fashion Institute. Active in professional groups, too, Frank is a charter member of the National Press Photographers Association and served as president of the Connecticut News Photographers Association. He was also connected with the Famous Photographers School.

In March 1968, Frank sent his first application and received. USA-CA-500-#704-All S.S.B., All 14; All 3.9. USA-CA-1000-#152-All S.S.B.; All 14. USA-CA-1500-#89-All S.S.B.; All 14. USA-CA-2000-#60-All S.S.B.; All 14.

He then waited until December 2, 1971 and received: USA-CA-2500-#123-All S.S.B. All 14. USA-CA-3000-#89 All S.S.B. and All Counties-#68-All S.S.B.

Other awards/memberships include: WAC, WAS, DXCC, YLSSB #5384, OGS 496, NC#20 and A1 Op.



New York State County Award.

Helenmae and I had the pleasure of meeting Frank and Evelyn last May at the wonderful get-together at W2KXL (as described in Sept. '71 *CQ*) and Frank took that FB photograph of most of the group that appeared on page 86 of Sept. '71. Yes, Frank did tricks and slipped his foto and the foto of WB6AUA into the big foto. Also Frank took (at that time) the photo of W2GT that appears at the top of this column.

Frank and Evelyn have two children and two grandchildren, their youngest is now completing his second years at the University of Connecticut Medical School.

Frank sends *thanks* to the many friends that made it possible for him to complete All Counties, especially to Ed, WAØSBR who made a trip to Campbell County, S.D., to give him the next to last one, and to Jack, WØSJE who gave him the last one needed, in Missouri.

Awards

See item under Notes regarding Radio Society of Great Britain Awards.

K9DCJ Wisconsin Award: Here is a new award for working Arnie, K9DCJ in Wisconsin Counties. Basic award for working Arnie in 50 counties, seals for 61 and 72. There will be no charge, no GCR, just a list of the counties worked and the date worked. An s.a.s.e. for the seals would help, don't send the QSLs. Apply to: Arnold C. Bachmann, K9DCJ, RFD 1, Blue Mounds, Wisconsin 53517.

The New York Chapter of National Awards Hunters Club offers these four awards:

Worked All Borroughs (N.Y.) Award: Stations less than 25 miles from New York City work 20 stations in the following proportions: 2-Bronx, 7-Brooklyn, 2-New York, 7-Queens, and 2-Staten Island. Stations over 25 miles from New York City work 5 stations—one each in Bronx, Brooklyn, New York, Queens, Staten Island.

New York County Award: Issued in 5 Classes. Class 5 (basic award) for working 15 New York counties. Gold Seal endorsements for each additional 15 counties up to full 62. Class 5 is 15 counties; Class 4 is 30 counties; Class 3 is 45 counties; Class 2 is 60 counties; and Class 1 is 62 counties.

Worked All Members Award: Basic award for working 5 members with seals for 15, 25, 50 and 100. These three aforementioned awards will be endorsed all band and modes and each costs $1.00.

Net Sign-In Certificate: Basic award for 25 sign-ins, with seals for 50, 100 and 150. Stations over 100 miles may sign-in via telephone or QSL and only one such sign-in is required. Cost of this

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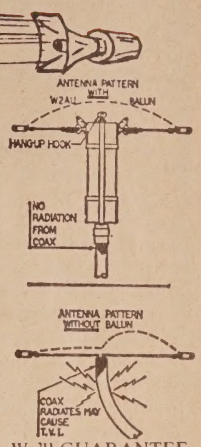
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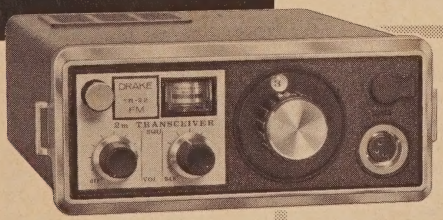


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Completely transistorized, compact, portable. Capacity for 6 channels. Built-in telescoping antenna, and connector for external antenna. Use barefoot or with accessory amplifier. External 12 VDC or internal ni-cad batteries, built-in 120 VAC battery charger.

Complete with: Dynamic Mike, O-T-S Carrying Case, 120 VAC and 12 VDC Cords, Speaker/ Headphone Plug and 10 Ni-Cad Batteries.

$199.95 Amateur Net

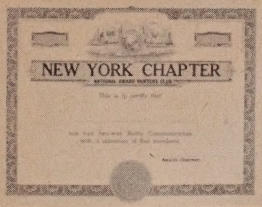
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MMK-22 Mobile Mount $6.95
BBLT-144D Hustler Ant. $27.95

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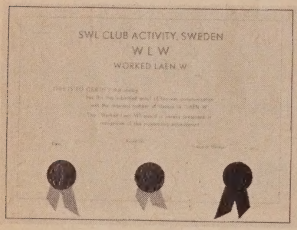
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Worked N.Y. Chapter NAHC Award.

award is 25 cents in coin or stamps. (Remember the other Awards cost $1.00). Send data (GCR) and fee to: Awards Custodian, Joseph Tricarico, WA2MWO, 338 Madison Ave., West Hempstead, N.Y. 11552. Information on other National Awards Hunters Club Awards may be received by sending s.a.s.e. to WA2MWO.

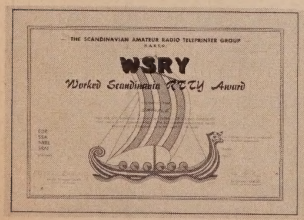
Worked Gotland Award 21: This Award issued by The Radio Amateur Society of the Island of Gotland (GRK), in the southern part of the Baltic Sea, and is available to every licensed radio amateur who complies with the rules. All contacts with SM1 (or SK1 or SL1) stations after 30th of June 1970, 2359 GMT, on all bands, are valid. The contacts shall be 2-way (not cross-band) and in any mode which is legally allowed for the band used.



Worked Laen "W" Award.

Each QSO counts for the following number of points (21 are required):

Band (M)	For Scandinavians	For other Europeans	For non-Europeans
80	1	2	5
40	2	2	4
20	3	2	3
15	4	2	3
10	5	2	3
2	2	5	6
0.7 or lower	5	6	10



WSRY—RTTY Award.

Yes, *21* points are required. Applications should be sent to the Awards Manager, Radio Amateur Society of Gotland (GRK), P. O. Box 461, S-62104 Visby 4, Sweden. Enclose excerpts of your log, certified by two licensed amateurs (GCR rule). The cost is 10 IRCs or 7.50 Swedish Kronor or U.S. $1.50. If you desire the award by registered post, enclose 3 additional IRCs or corresponding amount. Note: Amateurs in the JW, JX, OX, OY and TF areas are considered as "other Europeans." On July 1-7 incl., each year most of the active amateurs of Gotland are participating in a special activity week on all bands. There are over 40 amateurs in Gotland and at least half of these are active. Visitors to Gotland from other parts of Sweden use the epifix /1, as in SMØOY/1, visitors from other countries with temporary licenses in Sweden use the epifix /SM1, as in OHØNI/SM1. For WAS II, Gotland is laen I, WAZ 14, and ITU Zone 18.

Bollnas Award: This WABRA Award, issued by Bollnas Radio Amateurs, is in the form of a pin. European stations need 8 points, DX stations need 4 points. You gain 1 point for each club member worked on one band after January 1, 1966. Send application containing list of claimed contacts and 1 U.S. dollar or 10 IRCs to: Bollnas Radio Amateurs, Awards Manager, Box 6036, S-821 00 Bollnas, Sweden. QSLs received from Members will be marked. Members include: SM3-AGO, ALR, ALW, AYX, BCZ, BWU, CAG, CFV, DSO, DXC, DYB, UL, VE; SM4ENS; SM5CHE; SM5EPG and SK3BR.

Worked Laen W Award: Issued for working the required number of stations in "Laen W," Province of Dalecarlia, Sweden. Also offered to s.w.l.s on a heard basis. Class A—European stations work 20, rest of world work 15. Class B—Europe work 15, others work 10. Class C—Europeans work 10, others work 6. Class D—Europeans work 5, others work 3. Contacts must have been made after August 15, 1967, on any band, any mode. Fee for basic award is $1.00, 5 Sw Crs or 10 IRCs. Seals for higher classes cost 1 IRCs. Submit application with GCR, listing call, date, time, band and mode for the claimed contacts. Send application and fee to: Awards Manager, SWL Club Activity, P. O. Box 209, S-780 24, Idkerberget, Sweden.

Worked Scandinavia RTTY-Award: This WSRY Award for required number of RTTY QSOs (two-way) with Scandinavians is sponsored by the Scandinavian Amateur Radio Teleprinter Group, S.A.R.T.G. Scandinavians need 25 QSOs; Other Europeans need 16 QSOs; and Non-Europeans need 8 QSOs. All QSOs after 1st May, 1970 count and all amateur bands may be used. Send a list of contacts (No QSLs needed) with all information, date, time (GMT), band and U.S. $1.00 (SKR 5:-) or 10 IRCs to: S.A.R.T.G. Contest & Awards Manager, Bo V. Ohlsson,

[*Continued on page 86*]

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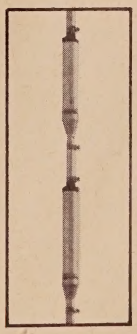
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New, from the inventors of wideband verticals.

Pack some punch! All the omnidirectional performance of Hy-Gain's famous 14AVQ/WB...plus 80 meter capability! Unrivaled performance, rugged extra heavy duty construction, and the price you want...all in one powerful package!

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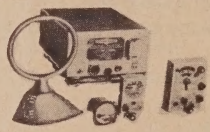
High impedance adaptor for above 69

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TRANSMITTERS	Complete with Tubes			
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ARC-R11A Modern Q-5 Receiver 190-550 Khz $10.95
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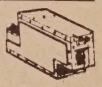
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MN-26 LB Compass & Communications Receiver, 200-410 Kc 550-1200 Kc; 2.9-6.0 Mc. Works on 24 VDC. Complete with Tubes and Dynamotor.

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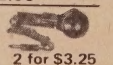
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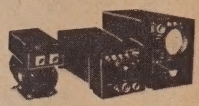
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SURPLUS sidelights

BY GORDON ELIOT WHITE*

I was browsing through my friendly local surplus store last winter, after Christmas, on a Saturday when other people were going to post-holiday sales, watching the last football games of the season, and was rewarded by the sight of one of the rarer Command Sets sitting on a table in a pile of otherwise junk equipment. What caught my attention was an R-113/ARC-5 receiver which covers 125-156 mc.

Most amateurs are familiar with the Korean War vintage v.h.f. command sets, painted gray, without dials, but otherwise physically similar to the well-known WW II AN/ARC-5 and SCR-274(N) command equipment. The R-113 receiver was the last of the WW II sets, and the R-15 and R-19 (Type 12) and AN/ARC-60 receivers are merely updates upon it.

The R-112 and R-113/ARC-5 were the "missing links" in the Command Set development. If the Navy had judged correctly, it could have had inexpensive, reliable, VHF Command Sets early in the War, rather than the series of missteps and blunders perpetrated upon U.S. fliers. Seeing the R-113 pop up at me—only fifty were made in contrast to a million of the high frequency sets—led me to a bit of nostalgia.

So much of the gear that turns up as military surplus is heavy, crudely-made, badly-designed or over-specialized, that the Command Sets stand out as a classic. Even today, only a few state-of-the-art receivers deliver more than the 1 microvolt sensitivity of the AN/ARC-5 receivers, and no tuneable receiver I am aware of—and few crystal-controlled—exceed the stability of the set. The other command receivers, covering 190 kHz to 27 mHz in eight bands, also outperform a lot of the equipment built in the 35 years since the Command Sets took shape on the breadboards of tiny Aircraft Radio Corp., in Boonton, New Jersey.

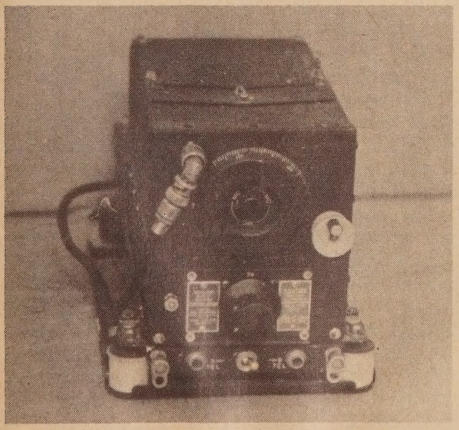
The design grew out of the failure of existing Army and Navy radio equipment to prove usable in 1933, when F.D.R. ordered the Army to fly the Air Mail, after a scandal in the commercial Air Mail contracts. So many Army pilots died in crashes and forced landings that the white house ended the political experiment. It was no wonder the equipment failed. Designed in 1928, the SCR-183 sets were tuned-radio-frequency receivers and badly obsolete M.O.P.A. transmitters, built for short-range, plane-to-plane work. Over long distances, at night, they were simply worthless. Too many desperate pilots called helplessly into the void on mis-tuned transmitters, or listened in vain to receivers which had drifted off-frequency.

In 1935, Aircraft Radio Corp., a little 10-man company, set to work on a replacement.

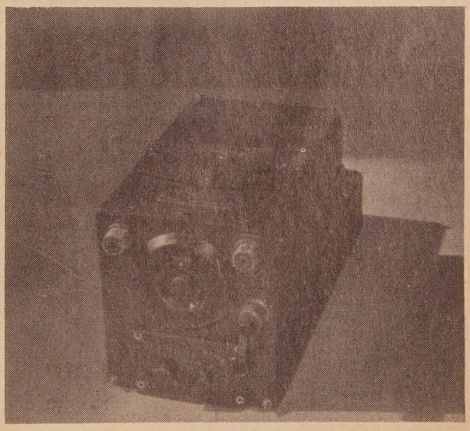
Dr. Paul Drake and Paul Farnham designed the Type K set, using what have come to be known as modular techniques, with plug-in components in the receivers, and racks into which entire receivers and transmitters could be rapidly inserted or removed.

Anyone who has peered through the tangled plumbing of the RBB, RBC Navy receivers, or the SCR-522 Army set, can appreciate the neat

*1502 Stonewall Road, Alexandria, Va 22303.



An R-13 tuneable later-model v.h.f. receiver, to which a dial has been added from a junked low-frequency set.



The R-113/ARC-5 tuneable v.h.f. Command receiver, discovered in a surplus shop a few months ago, still 30 years young.

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AN/USM-32 Navy 3", 10 Hz to 4 MHz only	87.50
Hewl-Pack 122AR 2-trace, no plugins needed	295.00
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RM503 swp & X-Y; 1 mv/em; no plugins need	475.00
Tekt 535 has calib. variable delay, OHC'd	495.00
Tekt. 536 with T, use as standard or as X-Y	450.00
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Tekt RM545B dc-33 MHz, calib. var. delay	875.00
Tekt 551 dual-beam dc-27 MHz $2200 value	750.00
555: 2 545B's in 1 case: 2 beams, 2 swprs	950.00
Tekt 570 tube curve tracer $1100 value	195.00
Tekt 575 semiconductor curve tracer	675.00
581/80/P80/81 includes plugin DC-100 MHz	750.00

And many more! No space to list them all!
Other's being purchased almost daily.

Tektronix Plugins

B: 5 mv/cm & up, calib., dc-22 MHz	50.00
CA: 2-trace, 24 MHz, sold only with a scope	125.00
D: Differential, high gain, from 1 mv/em	40.00
E: 50 microvolt sensitivity differential	60.00
G: 20 MHz differential, 50 mv/em, OHC'd	60.00
L: 5 mv/em, dc-30 MHz; all-purpose 1 trace	75.00
M: Sampler, makes any scope dc-1000 MHz	175.00
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and logical design and wiring of the design that Dr. Drake laid out in 1935.

Although working for the military between the wars was a chummy kind of enterprise, it was not until the war in Europe had begun that the first superhetrodyne Command Set was accepted by the Navy. It was not until 1940 that the Army abandoned its SCR-240 boat anchor, to adopt the Navy's command equipment. One of the fascinating incidents of the period was the "let 'em eat cake" order of the chief of the Air Corps, who ruled that the SCR-240 was too heavy, so the Corps should go back to the SCR-183, circa 1928.

The RAT, RAV, ARA/ATA, SCR-274N, and the AN/ARC-5 Command Set series were excellent units which came along just in time to save the bacon for the allies.

Unfortunately, high-frequency communications became obsolete for combat aircraft early in the War. The British proved as much with Fighter Command, in 1940.

The Tizard Mission, which brought the Cavity Magnetron here from Britain and made modern radar possible, also brought v.h.f. radio. The upshot of that mission was a crash program to build chinese copies of the British v.h.f. equipment, and to develop our own "v.h.f. command set."

The chinese copies became the SCR-522, well-known to radio amateurs of the postwar period. Though built here, these transceivers bore the red crown insignia of the Royal Air Corps Signal Establishment.

At Aircraft Radio Corp., Drake and Farnham in 1942 designed their version of a v.h.f. Command Set which became the R-112 and R-113 receivers, and the even more rare T-89 and T-90 tuneable v.h.f. transmitters. Due to a lack of clout with the wartime powers in Washington, the A.R.C. design was pushed to the back burner. What emerged was the Western Electric design, the BC-642 and BC-650 receiver and transmitter, and their JAN counterparts, T-23 and R-28/ARC-5. These were bulky, mechanically-complex sets that are also familiar to the surplus fanatic.

With more prescience, the better Drake design could have been adopted in 1942, but through incredible snafus the sets were never produced in quantity, and were not even thoroughly tested until 1945.

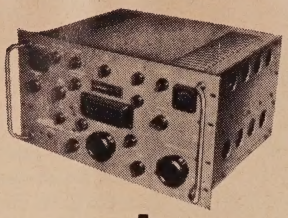
The receiver design did become the first modern aircraft navigation set, using the C.A.A. "Omnirange," the successor to the old dit-dah/dah-dit low frequency radio "ranges," and it served in light aircraft and helicopters into and through the Korean War.

Quite a few Command Receivers can still be found in older military planes. The 190-550 kHz BC-453 is used in overseas flying, where low-frequency navigation still is followed, and the v.h.f. receivers are still used, along with a minia-

[*Continued on page 81*]

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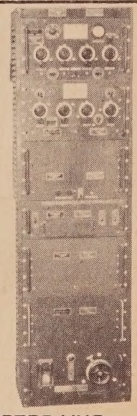
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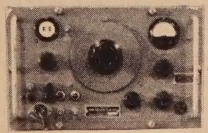
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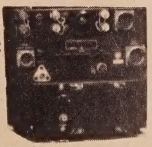
AUDIO OSCILLATOR

TS-382-C - 20CPS to 200KC
Var. 0-10volts -power 110v,60cy

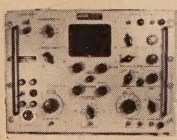


17" x 10" x 11" - Shp Wt 45 lbs.
Used, good condition - **$65.00**

RECEIVER–TRANSMITTER RT-11A/APN-12 160-240 MC



The transmitter interrogates a remote radar beacon by pulse type RF signal. The pulse reply is received and displayed on an indicator. Contains 1-24Vdc, gearhead motor blower, 115V, 400cy, 4500rpm. Tubes: 2x2, 2C26A, 6ES, 6AC7, 6SN7, 6V6, 6SL7, 6AK5, 5R4, 9002. Excellent condx. **$18.95** ID-169 Indicator Used With Above - **$14.95**



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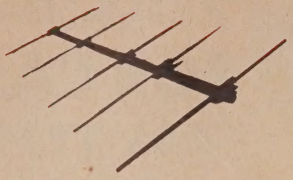
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M720	7 ELE. 20 METER BEAM Gain 14 DB. Boom length 58.5 ft. 3" OD .200 wall to .065 wall.	$389.95
M620	6 ELE. 20 METER BEAM Gain 13 DB. Boom length 50 ft. 3" OD .200 wall to .065 wall.	$299.95
M520	5 ELE. 20 METER BEAM Gain 12 DB. Boom length 40 ft. 3" OD .065 wall.	$169.95
M420	4 ELE. 20 METER BEAM Gain 10 DB. Boom length 30 ft. 3" OD .065 wall.	$139.95
M320	3 ELE. 20 METER BEAM Gain 8.5 DB. Boom length 20 ft. 3" OD .050 wall.	$ 89.95
M715	7 ELE. 15 METER BEAM Gain 14 DB. Boom length 40 ft. 3" OD .065 wall.	$169.95
M615	6 ELE. 15 METER BEAM Gain 13 DB. Boom length 32 ft. 3" OD .065 wall.	$139.95
M415	4 ELE. 15 METER BEAM Gain 10 DB. Boom length 20 ft. 3" OD .065 wall.	$ 89.95
M810	8 ELE. 10 METER BEAM Gain 14.5 DB. Boom length 40 ft. 3" .065 wall.	$169.95
M510	5 ELE. 10 METER BEAM Gain 12 DB. Boom length 20 ft. 3" .065 wall.	$ 89.95

WILSON DUO BAND BEAMS

DB62	6 ELE. 20 & 2 ELE. 40 INTERLACED BEAM Gain 13 DB—20 5.5 DB 40. Boom length 50 ft. 3" OD .200 wall to .065 wall.	$449.95
DB52	5 ELE. 20 & 2 ELE. 40 INTERLACED BEAM Gain 13 DB—20 5.5 DB 40. Boom length 40 ft. 3" OD .200 wall to .065 wall.	$349.00
DB54	5 ELE. 20 & 4 ELE. 15 INTERLACED BEAM Gain 12 DB—20 10 DB—15. Boom length 40 ft. 3" OD .065 wall.	$229.95
DB43	4 ELE. 20 & 3 ELE. 15 INTERLACED BEAM Gain 10 DB—20 8.5 DB—15. Boom length 30 ft. 3" OD .065 wall.	$179.95
DB32	3 ELE. 20 & 2 ELE. 15 INTERLACED BEAM Gain 8.5 DB—20 6 DB—15. Boom length 20 ft. 3" OD .050 wall.	$109.95
DB76	7 ELE. 15 & 6 ELE. 10 INTERLACED BEAM Gain 14 DB—15 13 DB—10. Boom length 40 ft. 3" OD .065 wall.	$239.95
DB65	6 ELE. 15 & 5 ELE. 10 INTERLACED BEAM Gain 13 DB—15 12 DB—10. Boom length 32 ft. 3" OD .065 wall.	$219.95
DB44	4 ELE. 15 & 3 ELE. 10 INTERLACED BEAM Gain 10 DB—15 8.5 DB—10. Boom length 20 ft. 3" .065 wall.	$109.95

If not available from your dealer write direct to factory for catalog or information and fast service. All prices F.O.B. factory. Wilson beams are available at the following dealers:

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AMRAD ..... OAKLAND, CALIFORNIA
HAM RADIO OUTLET ..... BURLINGAME, CALIFORNIA
HARRISON RADIO ..... LONG ISLAND, NEW YORK

WILSON ELECTRONICS

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PRICES EFFECTIVE MARCH 1, 1972

Surplus [*from page 78*]

ture crystal-controlled transmitter, developed by A.R.C. in the 1950's.

One of the first Command Receivers I worked on was a 1956 model v.h.f. set, the R-13. It had no dial, but I salvaged one from a defunct BC-453 and repainted it with v.h.f. calibrations, and turned out the hybrid set shown in the photo.

The R-113 even spawned an f.m. set, two of which were built by A.R.C. engineer Norman Anderson, with a hand-wound discriminator. I tried that too, but never got the r.f. section to "track" properly in the 88-108 mc band.

By dint of a lot of poking in the right dusty corners, I have collected almost all of the different Command sets, including the rare 13-20 and 20-27 mHz receiver, and the tuneable v.h.f. sets just described. I have Serial 1, Number 1 of several of them. One receiver has still eluded me however. If any sharp-eyed reader discovers a 9-13.5 mHz receiver, or indeed any of the early RAV series, I would be most interested in obtaining it for my collection.

CQ Reviews [*from page 53*]

ditional features of a.m. operation, operation on the 27 MHz Citizen's Band and a means for checking the frequency calibration of the transceiver as read by the counter. Explicit details on how the calibrating setup functions were not available at the time of this writing.

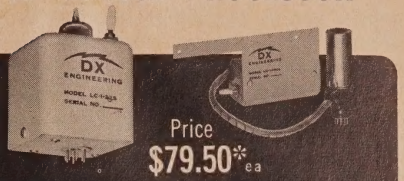
Two of the three spare auxiliary positions, as provided in the Model 500, are now used for the CB range; but they may be changed by the customer for operation in other portions of the 3.5-30 MHz spectrum. It is understood that transmissions can be made on the Citizen's Band, so it should be noted that such operation is illegal in the USA and Canada, because the legal power limit would be exceeded and because the transmitter is not crystal-controlled.

For a.m. operation of the transmitter with this model, a carrier-reinsertion control on the rear apron is switched in.

The size for the Digital 500 series of transceivers is 7" x 13¼" x 12½" (H.W.D.) and the weight is 30 lbs. The power-supply/speaker console measures 7" x 6" x 12½". These units are made in Japan for Robyn International, Inc., 269 Northland Drive, P.O. Box 478, Rockford, Michigan 49341. The selling price for the Model 500 is $895; the Model 500A sells for $995. Both units are supplied complete with the power-supply/speaker console and a new hand-held microphone.

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F.M. [*from page 42*]

printed and in the mail for that month. Please allow 60 to 90 days or more when sending in announcements of meetings. Remember that *CQ* is mailed around the middle of the month preceding the cover month. Also, I have a 60 day deadline to meet to allow time for the editorial staff to get things into proper shape for printing. Then, if your meeting is at the end of the month, another 30 days is lost due to the magazine coming out at the beginning of the months. This is true for all the amateur magazines, not just *CQ*. Please give us enough time to help you out.

Finale

Well, so ends another column. Changes to the repeater directory are already coming in and will begin appearing next month. Other than that, how about some photos of your machine. Best of luck and see you next month.

Welcoming Committee [*from page 34*]

Geraldo CE6EF, Jacob 4X4NY, Hiro JA6-RPE/MM, Andre FR7ZX and many more.

My wife Eva, WA2BAV, and I, are quite active, mostly on the Advanced portion of 15 and 20 s.s.b. and c.w. All those intending to come to N.Y.C. should try to meet us on the band, write us, and upon arrival call us at (212) 639-3195.

We hope to see similar welcoming centers in other cities of the United States and in other countries also, and we can assure all those involved in such activities that they will have a lot of fun. ■

Announcements [*from page 8*]

YL Convention In California

The international organization of women amateurs meets in Long Beach, California, May 26, 27, 28, 1972 at the Edgewater Hyatt House by the Marina. All licensed YL's are invited to join in the biggest Eyelash QSO celebrating the 33rd birthday of YLRL at this Sixth International Convention. The host club of Los Angeles YL's plan a visit to the Queen Mary, harbor tour, special tour for OM's to Swan Electronics in Oceanside, prizes, entertainment, operation of club station W6MWO. Preregistration (before May 15) of $12.50 includes Birthday Luncheon and Luau Banquet; $14.00 after May 15. OM's banquet ticket $6.50. Write Convention Committee, Box 3092, Long Beach, CA 90803, and "Join the YL Crew in '72."

Math's Column [*from page 48*]

used to produce d.c. for various solid state accessories as may be built in the future. In a future column, we will show how to use this winding to produce various regulated and unregulated d.c. voltages.

Suitable silicon diodes are available from many suppliers such as, Solid State Sales, P.O. Box 74A, Somerville, Mass., 02143; Barry Electronics, 512 Broadway, New York City; and Poly Paks, P.O. Box 942E, Lynnfield, Mass. 01940. Diodes are available from 100 peak reverse volts to 1000 peak reverse volts and current ranges of from 1 ampere to 30 amperes. A typical 5U4 replacement consisting of two 800 p.i.v. 1 ampere units should only cost 30¢ for the diodes (15¢ each) and 50¢ for the resistor—quite a bit less than a new 5U4, to say the least. When choosing such diodes, the low cost tempts me to always choose a diode with at least 3 times the peak voltage rating of the circuit it is used in, and consequently have never experienced problems with marginally specified units. Consulting a tube manual or the tables in the back of the *Radio Amateurs Handbook* will also be of great help in determining what diodes to use to replace a particular vacuum tube rectifier.

Irv, WA2NDM

---

225 mHz Converter [*from page 17*]

generator output as the converter becomes tuned, but keeping an eye on the discriminator for zero. Re-trim all capacitors for maximum sensitivity, still avoiding setting the oscillator on edge.

If you have a weak signal known to be on-frequency, you can best zero the receiver discriminator by varying the *receiver*, not the converter, oscillator warping coil or capacitor. Variation of C_5 on the converter will provide a little further warping ability but at the expense of sensitivity or stability. (Stay away from the edge!)

Performance

With a Motorola PA-8633A Sensicon receiver tuned to 52.525 mHz, the 225 mHz receiving capability was in the order of 0.5 to 0.6 microvolts for 20 db quieting. The receiver sensitivity, by the way, was slightly better than 0.5 microvolts at 52.525 mHz. The v.t.v.m. read about 1.0 volts d.c. at the test point *TP* as a measure of maximum injection. The image, at 119.89 mHz for the 224.94 mHz operating frequency, was down 62 db. Nothing was heard from the closest aeronautical channels of 119.85 and/or 119.90 mHz. ■

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This fabulous top-performing monitor radio regularly sells for $119.95. But House of Power has acquired a fine lot of PF-1s, brand new in factory-sealed cartons with full manufacturer's warranty, and we're passing the savings on to our customers.

You save a full $40 by ordering your PF-1, while they last, at just $79.95. Why pay more when the Cobra PF-1 gives you top quality at this incredibly low price? Just look at these features:

Now you can hear about all the exciting events in your town as they happen. Traffic jams, robberies, dangerous criminals at large. Exact details of the latest fire. Hazardous storm warnings . . . before it's too late.

It's amazing! The new Cobra PF-1 monitors government AM and FM VHF channels and lots more. Does it better than any other radio. All at a price you can afford.

Unlike other monitors, you receive all frequencies on both high and low bands as easy as tuning a radio. And in addition to manual tuning, push button crystal control is available at a preselected frequency of your choice on each band — a feature usually offered only in the most expensive radios. Crystals available from all electronics distributors.

So why settle for less? Exclusive noise limiting circuits reduce ignition interference and insure quiet operation. And the ultimate in new solid state circuit design gives you top reach, selectivity and dependability.

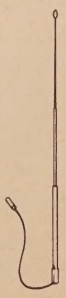
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envelope of the Sun into interplanetary space.

The Charged-Particle Lunar Environment Experiment will study the energy distribution and time variations of proton and electron fluxes in 18 energy intervals over the range of about 50 to 150,000 electron volts.

Lunar Atmosphere Device: Determining the amount, composition, and variation of the lunar atmosphere will greatly contribute to lunar geophysical information. It is possible that this atmosphere is dominated by volcanism or other outgassing processes. The atmospheric measurements by the Lunar Atmosphere Detector shown in fig. 11 are, therefore, directly relevant to a study of the structure of the Moon.

Apollo 11

ALSEP was to have been flown on the Apollo 11 trip to the Moon. But, because of time and distance constraints, astronauts Armstrong and Aldrin were given the Early Apollo Scientific Experiments Package (EASEP). EASEP, deployed 70 feet from the Lunar Module, contained a laser ranging reflector and a passive seismic device mounted on the Central Station and operating on 2276.5 mHz.

On August 25, 1969, during the second lunar day, the seismic package refused ground commands and has remained in a standby status since.

Apollo 12

The Apollo 12 astronauts completed deployment of ALSEP 1 near the Surveyor III landing site at 0921 EST on November 19, 1969. The transmitter was immediately commanded on and within a minute the Manned Space Flight Network station at Carnarvon, Australia reported they were receiving data. The data being received was relayed to the ALSEP System Support Room in the Houston Mission Control Center. In this room the data is completely and continuously monitored and evaluated. Any commands required to adjust the performance or operating mode of the instruments are initiated by the staff in this room.

ALSEP 1 has transmitted data on 2278.5 mHz to Earth continuously since November 19, 1969.

Apollo 13

The much-publicized flight of Apollo 13 was terminated before a landing could be completed and thus the ALSEP experiments for the mission will be made up in part on the following flights.

Apollo 14

On February 4, 1971 Apollo 14's ALSEP went into operation on 2279.5 mHz. Eleven months later it was still in operation having supplied more than 4,500 command transmissions.

Apollo 15

In the summer of 1971 Apollo 15 set down on the moon for the most ambitious lunar undertaking to that date. The ALSEP that was set into operation on that flight has been the busiest—more than 4,900 transmissions were made in its first 150 days of service for an average of about 32 transmissions a day.

Apollo 16/17

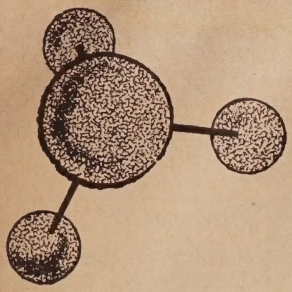
As of press time Apollo 16 will leave for the moon with its ALSEP station on April 16, 1972 and Apollo 17 is tentatively planned for late 1972 or early 1973.

The Builders

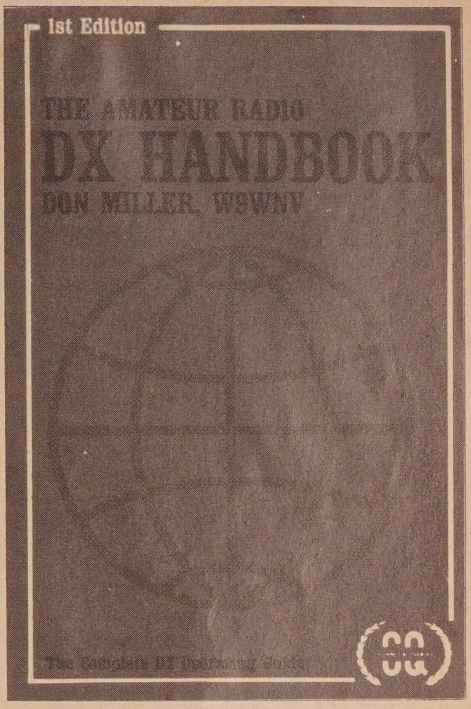
The Bendix Corporation is the prime contractor for the construction and testing of ALSEP. The author offers his gratitude to Bendix and NASA for their cooperation in assembling the information and materials for the publication of this article. ■

DX [*from page 61*]

TR8MR—c/o VE3DCY
TT8AD—Via F2MO
TU4AA—To VE7BWG
TYØABD—c/o VE7BWG
UKØKAA—Via UW3FD
UM8FZ—To WA5EFL
VK9JH—c/o WA6MRG
VKØCC—Via VK2BRK
VP1BH—To VE2AKZ
VP2DAE—c/o K3RLY
VP2SAH—Via WB2AMO
VP2VAM—To VE3GMT
VP8ME—c/o W5FWG
VQ9FW—Via W4NJF
VR1AA—To K3RLY
VR4BS and VR4DI—c/o ZL4NH
VS6BO—Via W2GHK
VS9MB—To G3KDB
VU2AAA—c/o W3FDU



WHAT'S TO KNOW ?



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ZB2A—c/o WA9YNE
ZD3Q—Via OZ3PO
ZF1AA—To K2OLS
ZF1RT—c/o K2FO
ZF1WF and ZF1ZZ—Via K4CDZ, Rt. 2, Box 353, Lewisville, N.C. 27023
ZK1CD—To ZL2FA
ZK2AG—c/o ZL4NH
ZL3PO/C—Via ZL2AFZ
ZS2MI—To ZS6LW
1S1A—c/o K3RLY
3AØGB—Via VE3MR
4YØDI—To UA3OG
4W1AF—c/o DJ9ZB
4X4DK—Via VE3MR
5H3MV—To VE7SE
5R8AB—Colin R. McRae, 9 Portal Close, Barnham, Thetford, England
5X5NA—c/o G3LQP
5Z4LW—Via W8KCJ, 2024 Cumberland Rd., Lansing, MI 48906
6D4J—To XE1J
7Q7AA, 7Q7CY and 7Q7LA—c/o K4CDZ, Rt. 2, Box 353, Lewisville, N.C. 27023
8R1J—Via K2DDK
9H3B—To VE3MR
9J2PM—c/o WA7ICK
9L1RP—Via GW3AX
9L1VW—To W9FIU
9NCTY—c/o W9CTY

73, John, K4IIF

Propagation [*from page 63*]

cross the geomagnetic equator at approximately a right angle. TE openings to South America favor locations in the southern third of the USA, with progressively fewer openings in the central and northern sectors.

Lyrids, a major meteor shower is expected to take place between April 20-23, peaking during the early evening hours, local time, of April 21. During the peak of this shower, an average of 15 good-sized meteors are expected to enter the earth's atmosphere every hour, considerably increasing chances for v.h.f. meteor scatter-type openings.

Some fairly good v.h.f. auroral-type ionospheric openings should also be possible during April, especially during periods when the ionosphere is disturbed for h.f. signals. Check the "Last Minute Forecast" at the beginning of this column for those days that are forecast to be below normal or disturbed during the month. These are the days on which auroral-type v.h.f. openings are most likely to occur.

Sunspot Cycle

The Zurich Solar Observatory reports a monthly mean sunspot number of 90 for December, 1971. This results in a smoothed sunspot number of 64, centered on June, 1971.

A smoothed sunspot number of 47 is forecast for April, 1972, as the present cycle continues to decline at a steady pace.

Contest Calendar [*from page 69*]

Mailing deadline is June 10th to: DARC Contest Committee, D-8950 Kaufbeuren, P.O. Box 262, Germany (West).

N.Y. State QSO Party

Two Periods: GMT

1700 April 29 thru 0500 April 30
1200 April 30 thru 2359 April 30

The same station may be worked on each band and mode, phone and c.w. NY stations may work in-state stations for credits.

Exchange: QSO nr., RS(T) and QTH. County for NY, ARRL sections for others.

Scoring: One point per QSO on 80—10; two points on 160, 6 and 2 meters. Multiplier for NY, ARRL sections (max. 74) and countries. Others, NY counties, (max. 62)

Frequencies: Phone — 3975, 7275, 14285, 21375, 28875. C.W.—1810, 3560, 7060, 14060, 21060, 28060. Novice—3725, 7175, 21114. Try even hours for phone; 6 and 2 meters activity encouraged.

Stations logging over 50 contacts are requested to include a check list.

Awards: Certificates to top scorers in each ARRL section, country and NY county. Also Novice and Technician awards.

Mailing deadline June 1st to: LERA ARC, Att: Jeff Rooner, WB2AEQ, 35 Gottlieb Drive, Pearl River, New York 10965. Include a s.a.s.e. for copy of results.

Editor's Note

We hope to have the WW Contest results out a little earlier this year. If we don't run into any unusual problems. The boys are working real hard to accomplish this goal.

73 for now, Frank, W1WY

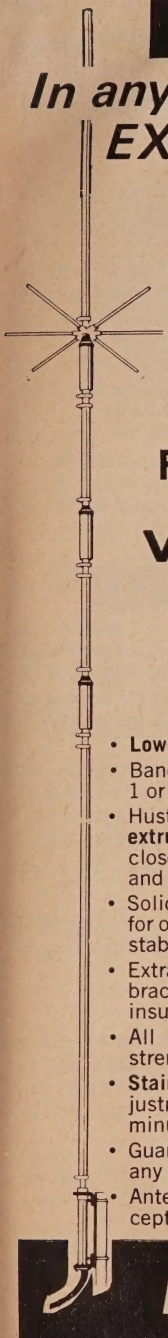
USA-CA [*from page 74*]

SM4CMG, Box 1258, S-71041 Fellingsbro, Sweden. The Countries/Prefixes used for this Award are: LA; JW; JX; OH; OHØ; OX; OY; OZ; SK/SL/SM; and TF. Although all of these prefixes are geographically not in Scandinavia, they are considered so, for this award.

Italian Prefixes Certificate: Correction to award rules as listed on page 77 of February *CQ*. European stations need 10 prefixes on at least 3

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- Extra heavy duty aluminum mounting bracket with **low loss—high strength** insulators.
- All sections **1¼" heavy wall,** high strength aluminum. Length 21' 5".
- **Stainless steel clamps** permitting adjustment without damage to the aluminum tubing.
- Guaranteed to be **easiest assembly** of any multi-band vertical.
- Antenna has ⅜"-24 stud at top to accept RM-75 or RM-75S Hustler resonator for **75 meter operation** when desired.
- Top loading on 75 meters for broader bandwidth and **higher radiation efficiency!**
- Feed with **any length** 50 ohm coax.
- Power capability—**full legal limit** on SSB and CW.

MODEL 4-BTV Wgt. 15 lbs.

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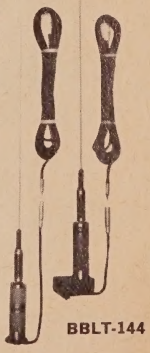
MOBILE 2 Meter ANTENNAS 143-149 MHz

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Get extended range and full quieting with the Hustler BBL models. The optimized power gain performance with lowest SWR, typically 1.1:1 at resonance, plus the superior mechanical construction will give you a totally new dimension in two meter operation. Only Hustler two-meter gain antennas are supplied completely operational, ready for installation and use.

Model BBL-144: Mounts on any flat surface in ¾" hole—easy installation on roof, (without pulling car's header), deck or fender—complete with adjustable, taper ground stainless steel radiator, stainless steel spring. Overall height approximately 47", 17' RG-58-U coax with PL-259 connector.

Model BBLT-144: Same as BBL-144 with Hustler trunk lip mount for no holes to drill installation on side or rear of trunk lip. Heavy duty mount assures "stay-put" operation, positive RF ground for lowest SWR and completely hidden cable.



BBLT-144

BBL-144

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NANUET, N.Y. 10954 195 West Route 59, Half Mile East of Thruway Exit 14
FARMINGDALE, L.I., N.Y. 11735 900 Route 110, One Mile South of Republic Aviation
MINEOLA, N.Y. 11501 525 Jericho Turnpike, One Half Block East of Herricks Road
TOTOWA, N.J. 07511 225 Route 46, 201-256-8555
NORWALK, CONN. 06850 18 Isaac Street, Shopping Pl., 203-838-4877

bands (10 QSOs—*not* 30). Others need 10 prefixes on at least 2 bands (10 QSOs)—*not* 20).

Notes

A note from the Radio Society of Great Britain to bring attention to an error on page 55 of the *DX Awards Log* which says to apply to RHGB although RSGB is correctly mentioned twice before on the same page—some are sending checks/money orders for RHGB—it is RSGB (Radio Society Great Britain) and their new address is: 35 Doughty St., London WC1N 2AE, England. Also take note of the date limitations on QSLs/QSOs of former Commonwealth countries.

A nice letter from Bertha, WA4BMC regarding mobiles on the Independent County Hunters Net. It is obvious that only a certain number of QSOs per day can be made, so when a mobile has worked those he can reasonably hear, let another mobile run. Don't waste time trying to hear the impossible ones. Each county will remain active for years, and if you don't make it today, perhaps conditions will be better tomorrow or next week. With the bands being so jammed these days, we are getting the general ham fraternity angry by moving mobiles off frequency. (*Are we taking more than our share of the bands? Ed.*)

A question has been asked of late, can a station who has already worked All Counties start all over by working different stations and work up to another Award, seals and eventually another plaque? Although we do *not* want any of the County Hunters to lose interest, and the All County winners are in demand for QSOs for other awards, I am sorry to say that I can *not* see how I could say yes, sorry.

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

Q & A [*from page 12*]

pot between phono sockets AA and AC on the rear apron. Dress the wiring harness down against the chassis and install the pot with a suitable knob on the outside.

2—Install the one-lug insulated standoff using the bottom bolt on the phono socket AB.

3—Connect a bare wire from the bottom of the pot (that is, the ground end) to lug 2 on phono socket AB. Solder each end.

4—Connect the .001 capacitor from the arm of the pot to the standoff previously installed in step 2. Solder the capacitor lead at the pot, only, at this time.

Refer to the audio circuit board for the following steps (See page 189 of THE MANUAL).

5—Locate the 1 meg resistor, R_{326}, and unsolder the right-hand lead only, as shown in the manual.

6—Directly above the foil where the 1 meg resistor was originally installed, is an unused two-hole foil. Solder this resistor back in place using the right-hand hole.

7—Using the unused hole where the relocated resistor R_{326}, is installed, connect a wire from that hole to the standoff installed in step 2. Solder each end.

8—Connect a wire from where R_{326} was originally installed to the unused lug on the pot (the hot end). Solder each end.

This completes the modification. It will be noted that the volume can be completely off and the sidetone used on your keyer instead if so desired. The revised circuitry is shown at fig. 1.

(Ed. Note—The sidetone gain control is installed "backwards" from the usual method. This is necessary to avoid interference with the normal a.f. characteristics during receive. Also, the control cannot be installed at the input to the sidetone amplifier, as this might result in too low a level from the amplifier for proper keying of the v.o.x.)

Contact-Current Requirements with Antenna Relay

Question: I plan on putting a d.p.d.t. relay in the middle of an antenna to shift a phasing network from 20 meters to 15 meters. The relay will be connected at a high-current point for 20 meters and at a low-current point for 15 meters. What amperage relay should be used?

Answer: The relay-current requirements for the contacts depend on the power and impedance at the point of installation. With 1000 watts the r.f. current at 50-ohms impedance (resistive) would be 4.45 a. ($I = \sqrt{\frac{P}{R}}$), at 10 ohms 10 a., at 100 ohms 3.14 a. etc. When used at a low-current (high-voltage) point, the relay should have good r.f. insulation between the contacts.

More on Equipment Feet

In a recent Q & A Column mention was made of neat equipment feet available from the Heath Company. Remsen T. Schenck of Bangor, Pa. has found another source for the same type of feet. His letter reads as follows:

"Those resilient mounting feet you mentioned back in the October 1971 *CQ* are available (at least here in the East) a lot quicker and more conveniently than by mail from Heath. They are a regular 3M product which is packaged for the retail consumer by several of the 'Five-and-Dime' stores, such as Grant and Woolworth. They come in white, tan and brown, and in 1/2" and 3/4" squares, eight or twelve to the package, at 29¢ to 59¢, depending on the size and the store. Look for them at the household-supplies counter, mixed in with picture hangers, furniture glides and such."

Many thanks OM. No doubt many of our readers will welcome this information.

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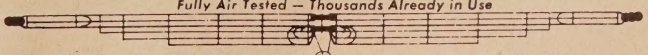
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21st Annual Dayton Hamvention will be held on April 22, 1972 at Wamplers Dayton Hara Arena. Technical sessions, Exhibits, Hidden transmitter hunt, flea market and Special program for the XYL. For information write Dayton Hamvention, Dept. C, Box 44, Dayton, Ohio 45401.

HEATH HW-18 160M crystal-controlled SSB transceiver for sale - $75. W2AEF, CQ Magazine, 14 Vanderventer Av., Port Washington, NY 11050.

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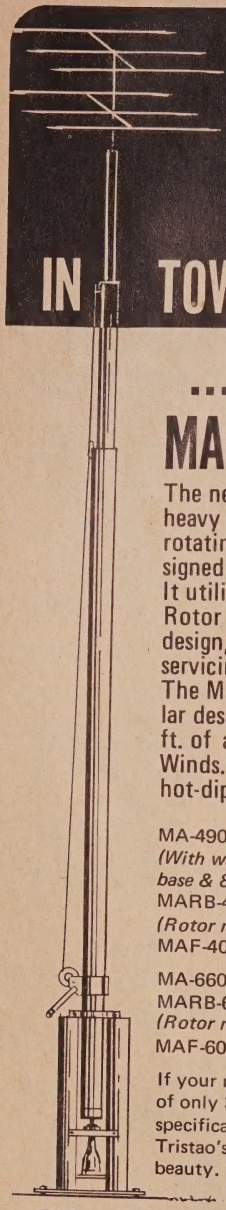
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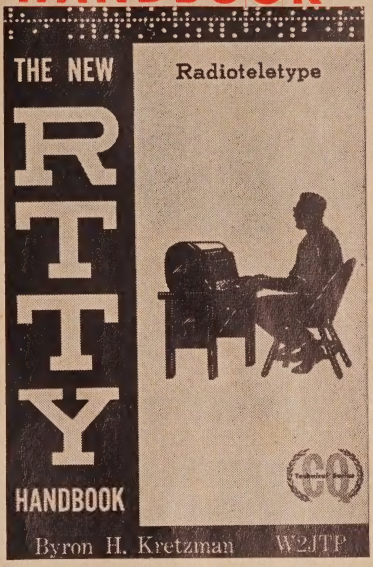
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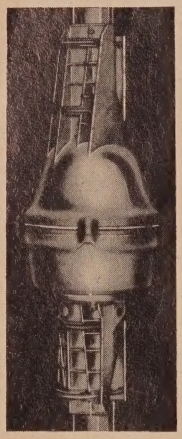
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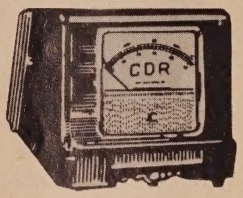


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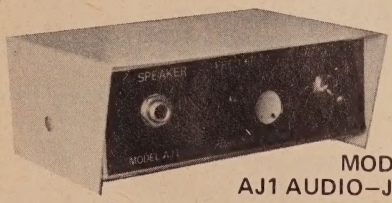




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SELL: Eico GDO 710 - $25. 200' RG8/U stored indoors - $5. FOB Wm. Sakal, 62 Bacon Hill Rd., Pleasantville, NY 10570.

SELL: Link 1907 FM 152 mhz base station, 60w output - $75. Want: Dumont 5814 transc schematic J. Wasiewicz, 229 Sarles Ln., Pleasantville, NY

FOR SALE: Plans and specs for 45' crank-up tower, self-support, easy to build. Send $2 to D&D, 1007 Janlee, Burkburnett, TX 76354.

CANADIANS: Wanted Heath Warrior or Chippewa linear amp. Arch Bursey, Middle Arm, Green Bay, Newfoundland, Canada.

FREQUENCY Allocations - 50 cents. Latest list cover 20 khz to 90 ghz. J. Romain, WB9HWS, 408-51 st St., Western Springs, IL 60558.

HEATH TWOER, scope, VTVM, etc. Davco DR-30. Sase. Jurow, Box 183, Olympia Fields, IL 60461.

NEED schematic for Harvey-Wells bandmaster model TBS-50D xmtr & Hammar. BC-779A rcv. WN5DXK, 800 Ann Arbor, Lt 2, Okla. City, OK 73127.

SWAN 500 & AC PS - $350. No trades. R. Vaceluke 17 W. 540 Hillcrest, Wood Dale, IL 60191.

CANADIANS: Equip repair & align. Fully lic'd tech kits wired, serv'd. Bob Fransen, VE6TW, 227 Cottonwood, Sherwood Pk., Alberta, Canada.

HEATH HW-16 CW transceiver - $80. Heath HG-10B VFO - $30. Both for $100. W2AEF, CQ Magazine, 14 Vanderventer Ave., Port Washington, NY 11050

EICO 760 CB base unit, Eico 730 modulator, driver unit and clegg 99er w/4 xtals to trade. Want Senior voltohmist & stable VFO for 2 & 6 mtrs. WA5YJM, 422 Cottonwood NW, Ardmore, OK 73401.

WANT: 1962 ARRL Hdbk, must be clean & in good condx. L. Mueller, 12700 Elliott Av., Sp287, El Monte, CA 91732. 213/442-0015.

Heath SB-401 - $350. Doug Renwick, 2420 Eastview, Saskatoon, Sask., Canada.

75A4 & 75A4 - $325 ea. HT37 like new - $100. Johnson matchbox 250-23 - $40. Heath ant bridge - $12. All mint w/manuals. WA6XTR, Box 241, Calimesa, CA 92399.

Swap for 2m-AM transceiver TX62,621 VFO, Trio 60. Ameco converters 6-2 w/separate PS. 14if mc, feeding into homebrew. NYC area for pickup - preferred. WA2DWZ.

Complete station 10-160 mtrs. PMR-7 rcvr, AF67 xmtr, M1070 (AC-DC) supply, all cables plus TR relay - $150. K8SJU, 916 Columbia Dr., Amherst, OH 44001.

FOR SALE: QST 59, 65 & 66. CQ 57, 58, 59 & 60. 10 cents each. Sase for others. W2DEW, 70 Basswood Tr., Wayne, NJ 07470.

WANTED: Heath SB640, Twoer, SB-610, Drake R-4B, give price & condition. B. Fournier, WA4UTP/1 Box 339, Winter Harbor, ME 04693.

Factory wired Central Elec. 20A and VFO - $85. Fac wired Viking II & VFO - $65. HRO-50 & 4 coils $90. Stamp for list. Shank, 21 Terrace Ln., Elizabethtown, PA 17022.

SELL: Drake 2NT transmitter, excellent. Heath VF1 VFO, fair. 20 novice crystals - $120 package or separate. WB4VKW, Box 668, Moulton, AL 35650

WANTED: Swan 175 transceiver. Knight VFO-V 107 for 2 and 6 meters. WA0KHN, Box K, Grand Lake, CO 80447.

FOR SALE: P&H 6m xmitting conv Mod 6-150 - $130. Jones micro match & ind - $20. Want 3-el Telrex 15m beam. Judd Bodycote, 2214 59th St., Sarasota, FL 33580.

WILL BUY transceivers, unusual equip, even if defective. State condx, etc. E. Erickson, 13 Robert Cir., South Amboy, NJ 08879.

FOR SALE: Drake DC-3 PS - $70. Superex Model AP-S headset - $15. Both mint w/orig boxes. L. Poulson, Granda, MN 56039.

Swan 500 & 117XC, new finals. Satisfaction guar. $300. Marty, WB6NWW, 5349 Abbeyfield St., Long Bch., CA 90815. 213/597-2631.

SWAP Drake 2C recv for SP401. SALE: Collins novice adapter. WANT: Used linear for Galaxy. Call 412/775-6509.

SSTV'ers - 50 crt yokes - $15, 70 yokes - $10. Focus coils - $8. Magnetic focus coils - $10. R. L. Guard 750 Lily Flagg Rd., Huntsville, AL 35802.

SELL: 2KW Millen transmatch - $85. Galaxy 2000 Power - $150. Ralph Metheny, 232 E. Poplar St., Sidney, OH 45365.

35ASR Flour Console cabinet, sell or trade for 35 printer or tape equip. D.C. Harrington, 1620 Gardena Av., Fridley, MN 55432.

SALE: Hy-Gain DB-24 beam, 3 el, 20m/2 el 40 m w/ferrite balun feed - $110. Deliver w/in 100 mile. W.T. Free, 1394 Letchworth Rd., Camp Hill, PA

Summer 70 USA Callbook, used little - $4 plus postage. W2JBL, 123 Davis Ave., Hackensack, NJ 07601.

WANTED: heavy duty rotator, collins wattmtr. Sell Heath metal locator. M. Ludkiewicz, 143 Richmond Rd., Ludlow, MA 01056.

FOR SALE: HB linear, 4-811A GG, built-in PS - $75. Sixer and 12v PS - $25. DX60A and HB 10-VFO - $67. RCA Radiola recv, best offer. J. Elmore RFD 1, Central City, IA 52214.

COLLINS 75S-1 receiver, mint - $250. Trade considered. Want: 30L-1, SB200, 312B-4. Abbott, Bx 2775, Harrisburg, PA 17105.

VIKING Valiant, 300w, mint condition - $125. D. Renwick, 2420 Eastview, Saskatoon, Sask., Canada

WANTED: Donations of back issues of Radio mags for Club library. Postage refunded. W4DQD, Box 2067, Statesboro, GA 30458.

FOR SALE: old tubes including some '46s. New, not used. Write Kennedy, W0ZJF, Falls City, NB 68355.

FOR SALE: Laf HA-600, gen coverage recr - $45. Heath HD-10 keyer - $25. WB4FJO, 1045 Wateree St., Kingsport, TN 37660.

SELL: New dual section Johnson air var. cap. 216 pf/sec - $12. Heath HD-10 needs transistor - $30. D. Hoffman, Rt. 1, Mt. Horeb, WI 53572.

WANTED: Grid dipper. Swap BC-453 Q-five for it. W6NVA, 15426 Patronella Ave., Gardena, CA 90249.

MUST SELL 500 old radio tubes. List for sase. James Fred, Cutler, IN 46920.

WANTED: Manual or schematic for BC-1060-A oscilloscope. Les Hamilton, K6JVE/3, 9019 St. Andrews, College Pk., MD 20740.

FOR SALE: Cush-craft mobile ant AM-26, complete w/mast. Never used, w/manual. $15. Fox, 318 Montcastle, Greensboro, NC 27406.

12VDC Auto radio, transistor, needs work - $7.50 2 new KJ bibles - $10 ea. WB4OJJ, 1644 Reece Rd. Salem, VA 24153.

WANT: 5 or 6 ft. rack cabinet for 19" panels. K8-NGV, 26496 W. Six Mile, Detroit, MI 48240.

FOR SALE: National NCX200 & NCX-A w/manual $295. Perfect cond., orig cartons. K1MWF, L. Burns RFD, Plainville, CT 06062.

SELL: Laf HA410, 10 mtr AM xcvr, New - $80 fob. Peter Feely, 15 Locust Hill Av., Yonkers, NY 10701.

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FOR SALE: Complete Collins S-line: 75S-3B, 32S-1, 516F-2, 312B-4, 500 Hz filter - $1200. Very clean. More. D. Kay, K4HTY, 106 Highland, Washington, NC 27889.

1-177B Mutual conductance tube tester, MX-949 alu adapter. Updating articles, needs fuse - $35 you ship. Robert Clark, 1644 Reece Rd., Salem, VA 24153.

SELL: Ameco extra class code course. Perfect. Helped me to the Extra Class. $6 pp. WA4KCN, 4921 Edenshire Ave., Memphis, TN 38117.

Bay Area Hams: Goodies going for song. Junk, cheap, some free. W6PYR, Ralph, 4028 China Ct., Hayware, CA 94542. 538-3302.

WANTED: 500 omh mobile mikes. Head band only. W3MSN, 5108 Boulder Dr., Oxon Hill, MD 20021.

DX STATIONS: Let W2KF be your QSL mgr. Cards can be provided at no monetary cost. Write W2KF, 309 Cherry Hill Blvd., Cherry Hill, NJ 08034.

51J4 3 filters, cabinet, speaker - $499.95. Realistic astronaut - $75. Wanted: Melehan valiant auto key. W6RQZ, 1330 Curtis St., Berkeley, CA 94702.

MOBILERS: Hy-Gain 80 mtr Ham Cat ant, brand new, only $7.50. WA3LRJ, 1160 King George Ct., Pittsburgh, PA 15237.

HEATH HW22-A w/mobile PS HP13-A, mint - $140 MN-4 Drake matching network - $80. Wolfe, 311 Academy Ave., Reisterstown, MD 21136.

FOR SALE: KWM-1, 516F-1, 516E-1, 351D-1 - $325. Tempo-1, AC-1, VF-1 - $350. And more. J.W. Craig W1FBG, 29 Sherburne Av., Portsmouth, NH 03801

75A4, SN3244, 3.1 & 2.1 filters & vernier - $400 75A2 good - $150. Want mobile HF R16. Huffman, WA3JRY, 145 Price St., Kingston, PA 18704.

SELL: Pr RCA CW-5B, 960 mc, cc receivers, rack mounting, tech man. P.L. Lemon, 3154 Stony Pt. Rd., Santa Rosa, CA 95401. 707-542-1488.

MECHANICAL FILTERS: new 455 kc for ss. Instrections. $13 or $25 for 2. E. Jeltrup, Box 361 Mamaroneck, NY 10543.

VFO Heath VF-1 - $10. 2-mtr ARC-5 w/modulator $30. WA2PCL, 101-23 Lefferts Blvd., Richmond Hill, NY 11419.

FOR SALE: Hy-Gain DB6&2 mtr beam - $20. Lgr prop pitch rotor, xformer & sylsens - $50. Paul Neveu, W1CKA, 60 Northwestern Dr., Bristol, CT.

FOR SALE: Collins noise blanker 136-B-2, new. Make offer. W7DNQ, 4631 E. 8th St., Tucson, AZ 85711.

BUY or swap for Signal-1, KWM2, Drake, Heath or Yaesu. W0BNF, Box 105, Kearney, NB 68847.

FOR SALE: several low noise (3db) transitor preamps for 1200 to 1300 mc. K6KAQ, 2936 Winlock Rd., Torrance, CA 90505. 213/534-4204.

SELL: Std SR-C826M w/SR-C12/120-1A acps. Like new w/warranty card in orig carton - $345. W2AH, 151 Rock Creek Ln., Scarsdale, NY 10583.

EARN "Worked all Cosmophones" Award. U.S. stations work 3 Cosmophones, DX work 2. Send list and sase to W6BVN, Dave Bell, Box 73, Altadena, CA 91101.

EICO 460 scope, perfect w/manual - $90 pp. Knight KG652 sweep gen, 4 bands, 300 kc - 250 mc w/manual - $30. H. Marhoff, Box 569, Largo, FL 33540.

FOR SALE: NC-300 Cal - $100. Heathkit seneca VHF-1 - $80. Want Drake AC4 PS. K3ECF, J. Emdur Box 1087, Camden, NJ 08101.

FOR SALE: Heath HW-16, extra tubes, xtals. Asking $85. Barry Kutner, WB2LYB, 741 Plain Rd., Westbury, NY 11590. 516/333-4930.

Freq Mtr 20 to 500 mc, TS-323, like new - $75. GE 50w FM unit on 146.94 mc w/control - $50. Davis, K6KZT, 4434 Josie Av., Lakewood, CA 90713.

Loktal tubes for 2-way radio. Most types $1 each. Sase to W4JGO, 643 Diamond Rd., Salem VA24153

Collins 75A-2 recv, Heath HD-11, Heath DX-60 xtr. More. All good to excellent condx $200. DeLorenzo 16 Laurel Dr., Pt. Jefferson, NY 11777. 473-2957.

Laf HA-35A, w/12v power, 6 mtr - $50. EMC 208 tube test - $20. Century 103 crt tstr - $18.50. FOB Wendel, 160-20 Grand Central Pkwy, Jamaica, NY

Halli SX-101 - $100. Heath DX-60B - $65. Time-O-Lite foto timer - $25. WB6CWW, 116 Greenwood, San Rafael, CA 94901.

Want ARRL Handbook 1960 Ed. Must be clean. Will pay $2 includ postage. M. Bae, Box 95, South Branch, NJ 08881.

Linear Builders: 30 amp filament chokes for GG amp. Perfect for pair 4-400s or single 4-1000A, 3-1000Z. New - $5 ea, $9.50 for 2 pp. Murrell, 712C Rich Rd., Newport, TN 37821.

$10 for copy of service manual for Bendix remote unit type MS-271B. I keep or copy it. Bill Terrell, W8NTZ, Rt. 2, Box 380, Hillsboro, OH 45133.

SELL: new 4-1000A - $50, Used - $30. New PL-172 $50 ea. P1-172 socket - $20. Massa-Cohu, 2 chan recording oscillograph. Trammell, 1507 White Oak Ct., Martinsville, VA 24112.

WANTED: 8 or 10 Henry filter choke 2 or 3 amp DC rated. Buy or trade. Wayne W8TGL, RFD 2, Box 305, Fairmont, W.VA.

New Heath SB-303 rcvr, fac alignd $225. Swan SW-240 xcvr w/AC sup $155. 4BTV 40-10 mtr, vertical ant $35. Grahs, 751 Fall St., Eau Claire, WI 54701

Want Maxon PS M1141B, HP-340B or 342A noise figure ntr. Swap VHF/UHF list sase. W4API, Box 4095, Arlington, VA

Mot 80D, 12VDC, cables, head, 2m & 220 articles. FM schematic digest $45. Clark, 1644 Reece Rd., Salem, VA 24153. You ship.

NCX-3 used 25 hrs, NCX-D PS & Heath PS $265 or trade for new 2 mtr HR2A. WB5BLX, 3728 Wilkie Way, Ft. Worth, TX 76133

Drake R-4B mint $300. Yaesu FL2000B new - $200 Johnson Navigator perfect $60. Dow-Key relay $7. Carsner, 1615 E. Del Rio Dr., Tempe, AZ 85282

Trade Veto Tenor Sax for 5 band xcvr & PS. K5YIF Bx 1395, Denver City, TX 79323

Want FTDX 560 or 101. Trade Ricoh SLR,5 lens & prof case, like new, over $700. WN4VMX, Box 7071, Greensboro, NC 27407.

SX100 Mk1A $100. TX-1 $100. Hygain 3 el triband-er $50. Mint, pick up, all $225. Bennett, 1910 Rockingham Dr., Bethlehem, PA 18018

Arizona amateurs: 10/10 members & non-members ck ins - 29 mhz AM & SSB. 7PM mondays, K7VIN

Sell 75S3, 32S3, AC, matchbox. Collins PM2 piggy-back supply, 25khz calibrator for SB100, etc. K1VTM

Sell HR-10B w/acces, GR-64, GD-125. Consider any fair price. WB4SPT, 240 Colony, Jupiter, FL

Mint R4-B $315. TS-175 $30. Wagner 3600-0-3600 at 1 amp w/110-220 $25. Sola 250 w Regulator 110 v $15. W0AIH, 814 4th St. S., Virginia, MN.

Dummy load 50 ohm 1.1-1 swr - 1 kw, assembled-$6.95 pp. 2822 Jefferson Av., Davenport, Ia 52803

Directory of Doctors that are also hams. Send $2 to Dr. W. Fulcher, 105 Freshrun Dr., Hendersonville, TN 37075

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BC-342 xclnt 1.5-18 mhz rcvr w/manual & matching LS-3 spkr, AC power. $95. Silbert, White Sulphur Springs, NY 12787

Wanted: schematic & alignment instructions on RACAL HF Rx No. RA6217A & Panoramic scope RA-6366A. Buy or copy. Blocksome, 1930 Kui Place, Honolulu, HI 96819.

For sale: Heathkit SB-220 linear amp, excel cond $325. Leaman, WA3LWT, 8906 24th Ave., Adelphi MD 20783.

Old books: Best offer. Radio Engineering 1937, Essentials of Electricity 1931, Fundamentals of Vac Tubes 1941. WA5USU, 616 N. 11th St., Carlsbad, NM 88220.

Want a 75A4 recv, need not work. Will buy or trade Have SB300, 400 etc. Also want Collins sideband transmitter. W6LZX, Small, 27828 E 15 St., Hayward, CA 94544.

Want: Info on keying Northern Radio Mod. 115 variable master oscillator. Trotman, Box 140, Denison Univ., Granville, OH 43023.

BC610 PS parts. No shipping. $25 - W4TKD, 4405 Jessup Dr., Raleigh, NC 27603.

IC socket pins. You epoxy into drilled board. Enough for 25. 14-pin IC pkgs $5. Sample 35 cents. Batten, 23947 Colchester, Farmington, MI 48024.

Want: xcvr mobile SBE 34-35, FTDX 101, etc. State price & cond. WB4PTK, Rt 1, Box 244, Troutville, VA 24175.

2m FM Inque IC-20, New, 1 & 10w, ss, 12 chan, w/xtals, w/access $235. Brunkow, 15112 SE 44th Bellevue, WA 98006. 206/747-8421.

Knight scope $35. Knight Cap Cker $10. Variac in cab $45. Ultra sonic burglar alarm, new $75. Kramer, 14 E. Jackson, Chicago, IL 60604.

Sale: CRV-46151 recv 195-9050 kc, 110v converted trade for 6m AM transmitter or transceiver or 40-80 m CW xmtr. Carter, 6675 E 19, Indpls, IN.

Sell Atwater Kent Mod 40 recv. Also, 10 ea UV199 tubes $3 ea. Emerald, 8956 Swallow Av., Fountain Valley, CA 92708.

38' self-support tower, plus AR22 & TH3 tribander type beam. Best offer. Shelar, 5471 Norquest Blvd, Youngstown, OH 44515.

Want to buy or rent: photocopy parts of instruction man of CE-20 SSB exciter and CE-600L amp. W9MKO, 9657 Pacific Av., Franklin Pk., IL 60131.

Sell: 10 m quad ant, new $18. Local deal pref. Feely 15 Locust Hill, Yonkers, NY 10701. YO8-1785.

SB-102/CW filter/Collins 516F-2 all mint $489. Fob Dallas. W5RKT, 901A spring Valley Plaza, Richardson, TX 75080.

Radio Shack Pro-%B hi-lo police xcver, plus SX-71 either $60 or trade for FM. Ivers (607) 539-7612.

Eico 720 xmtr $40. HQ110 rcvr $90. TR switch $4 Realistic TRC25A cb walkie-talkie $12. WB8IMG, 140 Paw Paw Lake Dr., Chagrin Falls, OH 44022

Wanted: Collins gear for cash. State cond & lowest price prepaid to my QTH. WA7PPN, 13615 N. 17th Drive, Phoenix, AZ 85029.

Sell or swap: Elmac AF67 transmitter. W7INR/6, 360 Sharry Lane., Santa Maria, CA 93454.

Wilcox filter, ssb exciter $18. BC342, QSer, 6-9 mc ARC recv & 2 psn rack $57. WB5BLX, 3728 Wilkie Way, Fort Worth, TX 76133.

Sell: Hammerlund 170 chock, match spkr, manual excel cond $160. Heath HD11 Q mult $10. Hygain vertical 14AVQ $25. Lelong, 5408 Simpson Ave., N. Hollywood, CA 91607. 213/766-4010.

Canadians: ARC1 vhf 10 chan, complete w/professionally made 110 ac ps, all in port case, less cooling fan. Lotzer, Box 1441, Langley, BC, Canada.

Want: good FM deviation mtr. State type & price. Smith, W8ESH, Bx 1034, Huntington, WV 25713

Collins 62S1 mint $500. Goodman, W6GQC, 1057 Moana Dr., San Diego, CA 92107.

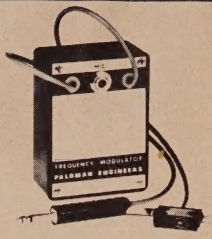
DCU-HP ac4a $5. CE20A $20. RBA or RBB w/ps $35, w/o ps $20. BC610 parts. Want USM32 xfmr. Trammell, 1507 White Oak Ct., Martinsville, VA

New Koss ESp7 electrostatic headphones in orig carton $65. RCA 7" tape recorder w/4 tracks, p.a., auto shut-off $65. WB2MEY, 159 Rochelle, Tonawanda, NY 14150.

Sell-trade: 220 xtals, FT-243, FT-241 holders. Need Simpson 260 or BC-221. Stan W8QKU, 2748 Meade, Detroit, MI 48212;

Wanted: SB610 scope, advise cond & cost. W0FZO, R.W. Pitner, 2931 Pierce St., Sioux City, Iowa 51104.

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Collins 62S1 converter. Hygain 6/2 mtr log periodic ant $500. WB6 KHZ, 213/421-6287

Sell or trade unfinished HB ssb exciter. Contains McCoy fltr, LMO from HW100, many parts. WB2 EHB 212/884-9694

Pick up only. Heath DX-100B xmtr, AM/CW, 160 thru 11 mtrs, 180 wts $45. New 811A tube & socket $5. 3904 San Juan St., Tampa, FL 837-4155

Want info on cheap comput logic circuits w/specs and/or other surpl computer eqpt. Hochman, 577 Grand St., NY, NY 10002.

Mint Galaxy GT500 w/VOX-Cal, AC 400 PS, RF-550. MO $450. Craven, 30 Providence Vill, Winterville, GA 30683.

Sell or trade. 4CX1000, 4X250B, 4X150A, best offer or what have you. W2ASI, 15 Kensington Oval, New Rochelle, NY 10805.

NC300, B&W 5100, both mint & manuals $200. Will deliver to 50 miles. WA2JSF, 101 E. 16th St., NY 10003. 212/982-3134

HT32A, 75A4 w/knob, 2 filters mint $575. SB300 w/mods $175. Lampkin 105B w/book $155. Cert ck FOB Jax W4LCR

Mech filters 455 khz for ss. New w/instructions. $12.95. WA2LNS, Box 361, Mamaroneck, NY

Ameco R5 recv .54 to 54 mhz $40. W3DJD, 205 Elliger Av., Ft. Washington, PA 19034

Join greatest club in the world. For info write: J. Schwartz, K2VGV, 43-34 Union St., Flushing, NY 11355

Davco DR-30, Heath twoer, scope, vtvm, ham scan, keyer. Sase. Jurow, Box 183, Olympia Falls, IL

Swan 500 & 117XC supply. Satisfaction guar $350. Will ship. WB6 NWW. 213/597-2631.

Railfans: swap slides of NW, BTO, PC, EL, B&LE, N&SS for those of your area. Colbert, WA8 MLV, 1008 Englewood Dr., Parma, OH 44134.

Swap Model 28 Simplex teleprinter w/table. What do you have? WN2 CGH, 213-19 St., Brigantine, NJ

Want old radio mags and parts, books, handbooks, etc. E. Rasmussen, 164 Lowell, Redwood City, CA.

Want Collins 75A4 recv and Collins sideband transmitter - any condx. Have 75A-1, SB400, SB300 - sell or trade. W6LZX, 27828 E. 15th St., Hayward CA.

Teletype 32ASR, Tektronix 545/CA HP, VHF, computer, camera, gear. Free list. Perera, 410 Riverside Dr., NYC, NY 10025.

75A3 inclues 2 filters & National calibrator $175. WB2VZM, 2279 E 22, Bklyn, NY 11229. 743-5636.

Valiant 1 - $135. HQ-129X - $95. Heath CT-1 cap checker $12. S. Snyder, 602 East North, Monticello IL 61856.

Ameco 2 & 6 mtr transmitter TX62 w/Ameco VFO 621 - $100. WA9YOH, 1311 W Jeffras, Marion, IN

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Need info Radio Receptor Co. TFG xmtr & RFG recv 142-172 mc fm gear. K7IND, 3820 101st SW, Tacoma, WA 98499.

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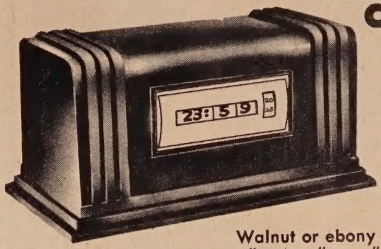
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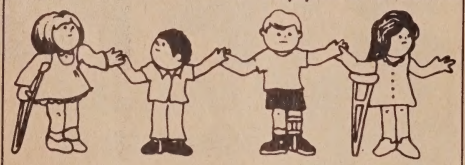
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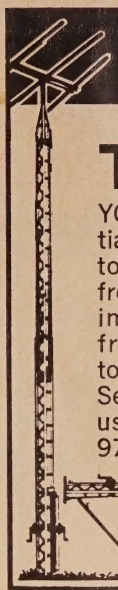
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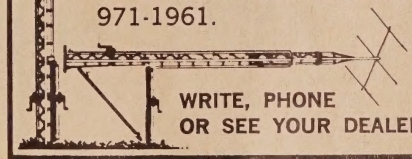
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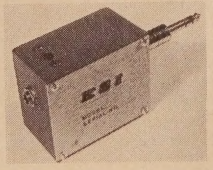
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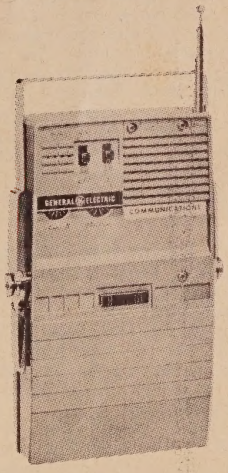
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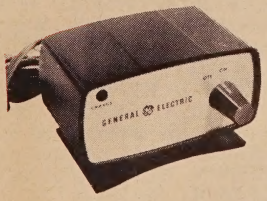
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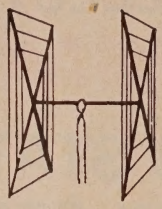
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Power Rating: 5 KW.
Operation Mode: All
SWR: 1.05:1 at resonance
Gain: 8.1 db. over isotropic
F/B Ratio: A minimum of 17 db. F/B
Boom: 10' long x 1¼" O.D.: 18 gauge steel; double plated; gold color
Beam Mount: Square aluminum alloy plate incorporating four steel U-bolt assemblies. Will easily support 100 lbs. Universal polarization.
Radiating Elements: Steel wire, tempered and plated, .064" diameter.
X Frameworks: Each framework consists of two 12' sections of 1" OD aluminum 'hi-strength' (Revere) tubing, with telescoping ⅞" tubing and short section of dowel. Plated hose clamps tighten down on telescoping sections.
Radiator Terminals: Cinch-Jones two-terminal fittings
Feedline (not furnished); 52 ohm coaxial cable

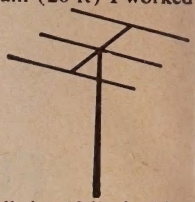
Now check these startling prices—note that they are *much lower* than even the bamboo-type:

10-15-20 CUBICAL QUAD	$37.00
10-15 CUBICAL QUAD	32.00
15-20 CUBICAL QUAD	34.00
TWENTY METER CUBICAL QUAD	27.00
FIFTEEN METER CUBICAL QUAD	26.00
TEN METER CUBICAL QUAD	25.00

(all use single coax feedline)

BEAMS

The first morning I put up my 3 element Gotham beam (20 ft) I worked YO4CT, ON5LW, SP9-ADQ, and 4U1ITU THAT ANTENNA WORKS! WN4DYN Compare the performance, value, and price of the following beams and you will see that this offer is unprecedented in radio history!



Each beam is brand new; full size (36' of tubing for *each* 20 meter element, for instance); absolutely complete including a boom and all hardware; uses a single 52 or 72 ohm coaxial feedline; the SWR is 1:1; easily handles 5 KW; ⅞" and 1" alumnium alloy tubing is employed for maximum strength and low wind loading; all beams are adjustable to any frequency in the band.

2 EL 20	$21	4 EL 10	20
3 EL 20	27	7 EL 10	34*
4 EL 20	34*	4 EL 6	20
2 EL 15	17	8 EL 6	30*
3 EL 15	21	12 EL 2	27*
4 EL 15	27*	***20' Boom**	
5 EL 15	30*		

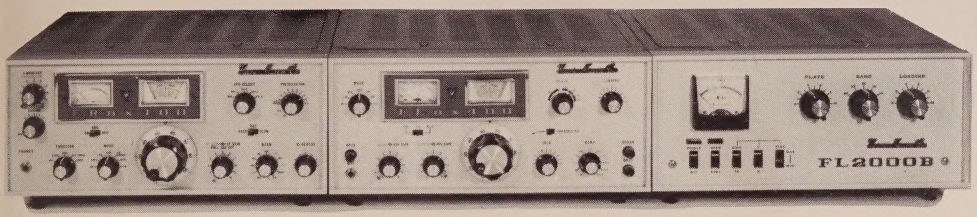
ALL-BAND VERTICALS

"All band vertical!" asked one skeptic. "Twenty meters is murder these days. Let's see you make a contact on twenty meter phone with low power!" So K4KXR switched to twenty, using a V80 antenna and 35 watts AM. Here is a small portion of the stations he worked: VE3FAZ, T12FGS, W5KYJ, W1WOZ, W2ODH, WA3DJT, WB2FCB, W2YHH, VE3FOB, WA8CZE, K1SYB, K2RDJ, K1MVV, K8HGY, K3UTL, W8QJC, WA2LVE, YS1MAM, WA8ATS, K2PGS, W2QJP, W4JWJ, K2PSK, WA8CGA, WB2KWY, W2IWJ, VE3KT. Moral: It's the antenna that counts! *FLASH!* Switched to 15 c.w. and worked KZ5IKN, KZ5OWN, HC1LC, PY5ASN, FG7XT, XE2I, KP4AQL, SM5BGK, G2AOB, YV5CLK. OZ4H. and over a thousand other stations!

V40 vertical for 40, 20, 15, 10, 6 meters	$14.95
V80 vertical for 80, 75, 40, 20, 15, 10, 6 meters	$16.95
V160 vertical for 160, 80, 75, 40, 20, 15, 10, 6 meters	$18.95

"HOW TO ORDER: Send money order (bank, store, or United States) in full. We ship immediately by best way, charges collect. DEALERS WRITE."

GOTHAM
1805 Purdy, Dept. CQ, Miami Beach, Fla. 33139



FLdx 400: $339.95 FRdx 400: $399.95 FL-2000B: $329.95

Triple threat

We don't have to threaten our competition. They're well aware that we offer more value per dollar than anyone else in the amateur radio field.

But what about your competition? If you're not getting through to those distant CQ's, you need the triple threat — the Yaesu FTdx 400 series.

The FLdx transmitter gives you frequency spotting, VOX, break-in CW, SSB, AM, even an FSK circuit. Plus a built-in power supply, metered ALC, IC and PO, and an FET VFO. The rig is conservatively rated at 240 W PEP SSB input, 120 W CW, and 75 W AM, 80 through 10 meters.

The FRdx receiver covers 160 through 2 meters, including WWV. Four mechanical filters provide CW, SSB, AM and FM selectivity. Plus separate AM-SSB-FM detectors, squelch and transmit monitor controls, a noise limiter, AGC, a notch filter, WWV-verified calibration markers, an FET VFO, and a direct-reading 1 KHz dial for readouts to less than 200 Hz.

Now comes the big bopper — the FL2000 linear amplifier. 1500 W PEP SSB input. 1000 W CW. With superbly regulated filtering. And dual fans to help the 572B tubes keep their cool.

You can buy the units separately, of course. But, oh, what a beautiful trio they make! For $1069.85 you can own the triple threat. The rig that keeps all the promises we've made.

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2500 kW output

Now—only two tubes are required in the power amplifier stage of a 2500 kW, 100% modulated long, medium or shortwave broadcast transmitter

Shown below are two EIMAC X-2159 developmental tetrodes, the most powerful tubes in the world. A single X-2159 has an anode dissipation of 1250 kW. Two tubes provide a carrier power of 2500 kW, 100% amplitude modulated.

Here is a technological breakthrough permitting a very high power broadcast transmitter to be built, having a single output stage. Now, for the first time, 5 megawatts output, or greater, is practical. Substantially less capital investment is required; driver stages, power supplies, control circuits, cabinets, and floor space may be substantially reduced when these high gain tetrode tubes are employed.

For full specifications on the new EIMAC X-2159 contact any of the more than 30 Varian/EIMAC Electron Tube and Device Group sales offices throughout the world.
Or the EIMAC Division of Varian
301 Industrial Way, San Carlos, California 94070.

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